



2019

# ENVIRONMENTAL RESOURCE INVENTORY

BERNARDSVILLE BOROUGH  
SOMERSET COUNTY  
NEW JERSEY



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## PREPARED FOR

BERNARDSVILLE BOROUGH  
ENVIRONMENTAL COMMISSION  
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## ACKNOWLEDGEMENTS

Many thanks are due to the 2018 Bernardsville Borough's government officials, professionals, organizations, residents and volunteers who have worked in cooperation to produce this Environmental Resource Inventory in 2018. This project was also supported by the Mayor and Council, Planning Board, and Environmental Commission.

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### DISCLAIMER:

*The 2019 Bernardsville Borough Environmental Resource Inventory is intended to provide an update to sections of the 2010 Environmental Resource Inventory that was prepared by Amy S. Greene Environmental Consultants, Inc. for Bernardsville Borough. Therefore, several sections of the 2010 report that have remained unchanged will be included in this document unamended. It should be noted that credit for these sections is attributed to Amy S. Greene Environmental Consultants, Inc.*



# EXECUTIVE SUMMARY

The Borough of Bernardsville's 2010 Environmental Resource Inventory (ERI) was updated to reflect the current environmental resources and conditions within the community. The goals of the 2019 ERI reflect those set forth in the 2010 ERI and build further on the baseline that the previous ERI outlined. The 2019 ERI identifies and characterizes wetlands, streams, aquifers, floodplains, soils, forests, open space, and habitat. Additionally, the updated ERI can serve as both a tool for planning for future conservation activities, including planning for climate change impacts and resilience, and public education about the natural resources in Bernardsville. This document can serve as a guide to the municipality on where more research is needed to supplement existing data and studies.

The 2019 ERI seeks to objectively identify and describe the natural resources, cultural conditions, environmental features, and concerns within the municipality. Through GIS data, maps were generated that depict the current natural resources. As in prior ERI versions, the data within this report is based on the most up to date information on natural resources from State and Local sources (see references throughout). Eight indicators (Population, Population Density, Forest, Urban Land, Agricultural Land, Barren Land, Wetlands, Open Water) were evaluated to understand changes and rates of change in land use and land cover in the Borough over time.

From 2002 to 2012, the total acres of forested land have decreased by 40 acres and agricultural land has decreased by almost 16 acres. In the 2010 ERI, forest cover and agricultural land acreage were declining, and since then, the total acreage continues to decrease, indicating a continual downward trend. Total acreage of land covered by water, wetlands, and barren land has minimally increased or decreased (one acre or less difference), indicating a stable trend. The 2010 ERI reported the wetlands were decreasing, water was increasing, and barren land was increasing, however, given that these changes are equal to or less than one acre, the rate of change has slowed down over the 10-year period from 2002-2012.

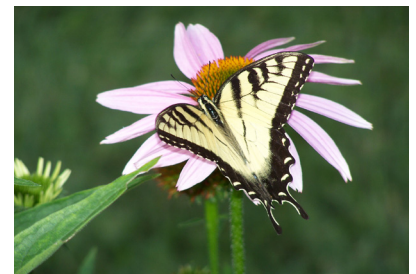
It is important to note that within the same time period, urban land has increased by 55 acres. Since wetlands, water, and barren land have shown minimal shifts, the decrease in forest cover and agricultural land (~56 acres combined) is likely due to a shift to develop more urban landscapes. Additionally, the population has increased in Bernardsville from 2000 to 2016 by 5.87% according to U.S. Census Bureau data. In addition to the land cover data, SSURGO soils data shows that 96.8% of Bernardsville's soil is not hydric, and a majority (52%) of Bernardsville's surface area is classified as "Prime Farmland," "Farmland of Statewide Importance," or "Farmland of Local Importance." Over 53% of the land in the borough has a steep slope in excess of 10%, which increases the potential for erosion, stormwater runoff, and flooding.

Since 2010, three new state-endangered species (Bald Eagle, Indiana Bat, and Bobcat) and one federally-listed threatened species of bat (Northern Myotis) have been identified in Bernardsville. The Cooper's Hawk has shifted from state-threatened to species of special concern, and two threatened species (Grasshopper Sparrow and Northern Goshawk) are no longer present in Bernardsville.

As of 2018, there are 294 known contaminated sites in Bernardsville, of which, seven were identified as "active," seven as "pending," 238 as "closed," and 40 as "no status listed." Since 2010, 13 known contaminated sites have shifted from "active" to "closed."

Overall, the trends and resources identified in this report can serve as a reference point for Bernardsville Borough on future land use and related planning activities. It is intended this 2019 ERI be adopted into the Bernardsville Borough Comprehensive Master Plan as it reflects the data and priorities to guide the purpose of the Master Plan as stated:

- To preserve the residential and open character of the community; and
- To protect Bernardsville residents and their property from negative environmental, financial, and other impacts of development; and
- To promote the conservation of natural systems, environmental resources, rural appearance, and the natural amenities that characterize Bernardsville.



# ERI REPORT CARD

TRENDS OVER TIME

EIGHT INDICATORS WERE EVALUATED TO UNDERSTAND CHANGES AND RATES OF CHANGE IN LAND USE AND LAND COVER IN BERNARDSVILLE BOROUGH OVER TIME.



**AGRICULTURE**



**BARREN LAND**



**FOREST**



**URBAN**



**WATER**



**WETLANDS**



**POPULATION**



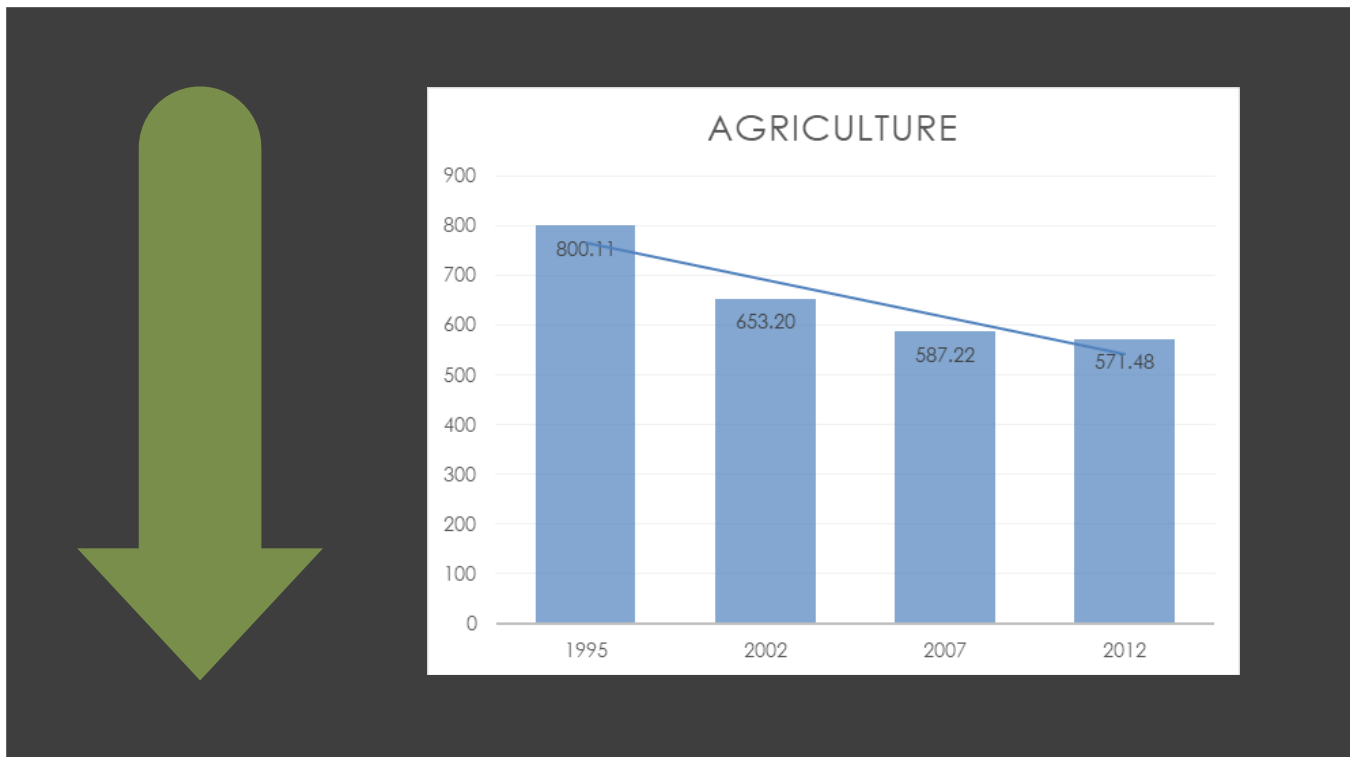
**POPULATION  
DENSITY**



# AGRICULTURE

## DESCRIPTION

This category includes all lands used primarily for the production of food and fiber, and some of the structures associated with production. This includes Cropland and Pastureland; Orchards; Vineyards; Nurseries and Horticultural Areas; Confined Feeding Operations; and Other Agriculture.



## OVERALL TREND: DECLINING

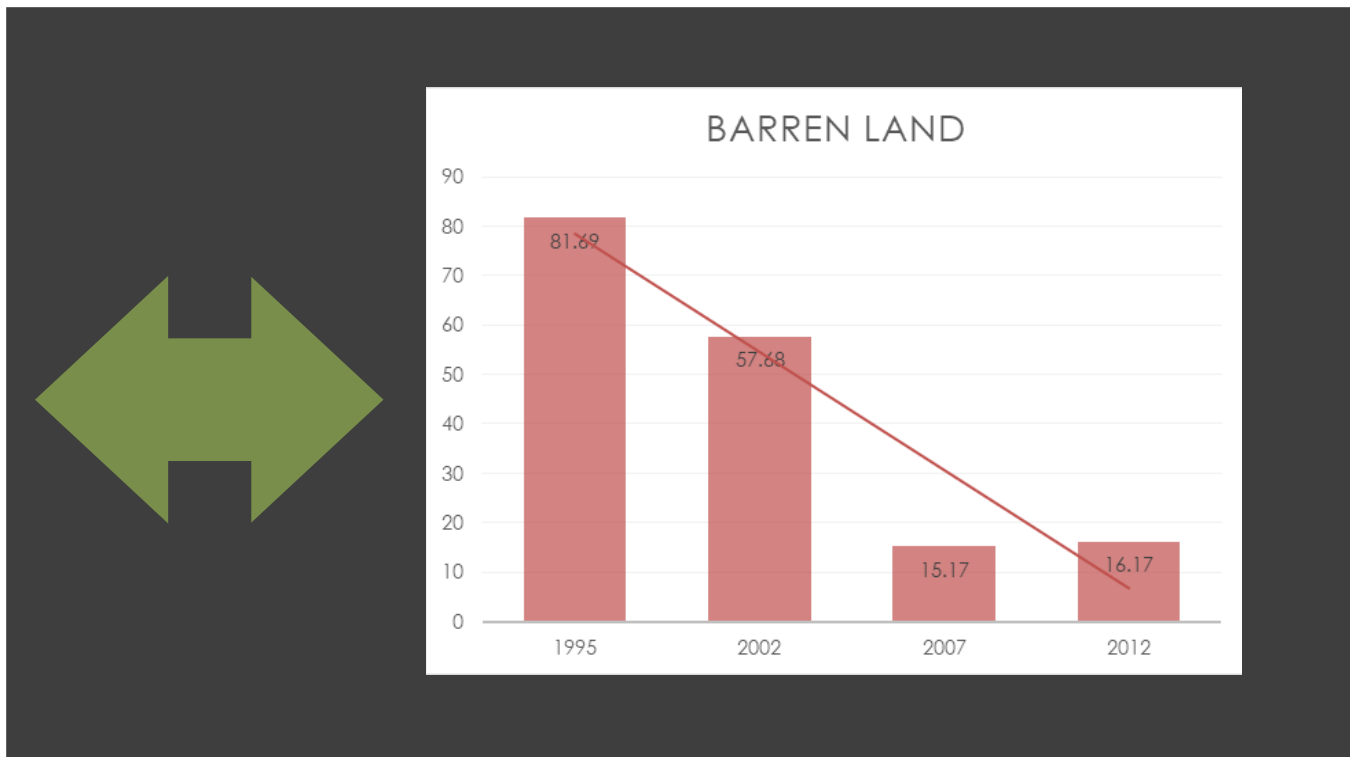
Agricultural land comprises approximately 6.9% of Bernardsville's land cover under the 2012 NJDEP Land Use/Land Cover data. Since 2007, there has been a decrease of 16 acres of agricultural land. Agricultural land is found scattered throughout northern and western Bernardsville. The largest concentrations are identified along the central portion of Mine Brook and along the northwestern boundary of the community near Little Brook and the North Branch Raritan River. The vast majority of this land is listed as cropland or pastureland. Other minor agricultural uses, such as vineyards, have been identified by Land Use/ Land Cover in the past in Bernardsville.



# BARREN LAND

## DESCRIPTION

Barren lands are characterized by thin soil, sand or rocks and a lack of vegetative cover in a non-urban setting. Vegetation, if present, is widely spaced. Barren land such as beaches and rock faces are found in nature but also result as a product of human activities. Extraction mining operations, landfills, and other disposal sites compose the majority of human-altered barren lands.



## OVERALL TREND: STABLE

From 2007 to 2012, the total barren land increased by one acre, according to NJDEP 2012 Land Use/Land Cover Data. In Bernardsville, the largest barren land area is the Bernardsville Quarry in the southernmost portion of the Borough. Other barren land areas in the Bernardsville 2012 coverage appear to be primarily “transitional areas.” This refers to lands in which site preparation for development has begun. It may be for commercial, residential or industrial areas under construction.





# FOREST

## DESCRIPTION

This category contains any lands covered by woody vegetation other than wetlands. These areas are capable of producing timber and other wood products, and of supporting many kinds of outdoor recreation. Types of forestland include Deciduous, Coniferous, Mixed Deciduous-Coniferous, and Brushland.



## OVERALL TREND: DECLINING

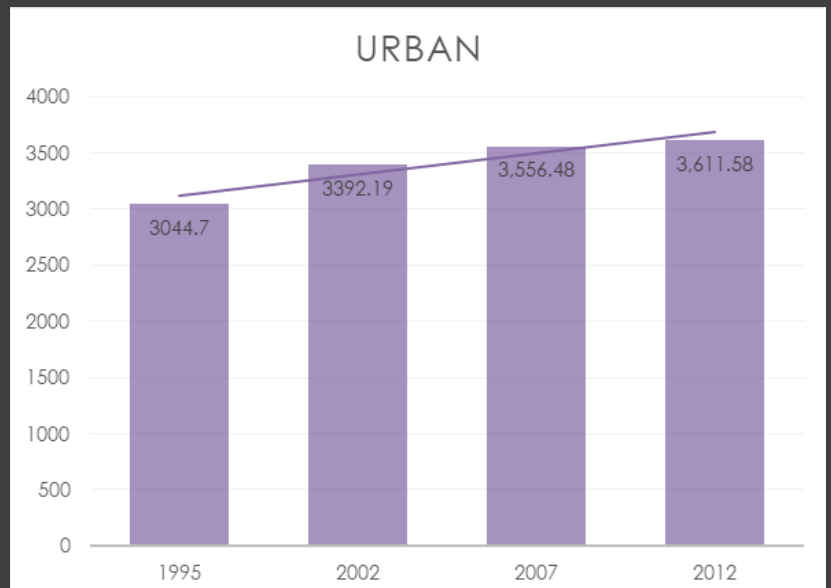
According to NJDEP 2012 Land Use/Land Cover Data, forest coverage in Bernardsville is approximately 3,833 acres and has decreased by 40 acres since 2007. Looking back even further, forest cover has decreased by 302 acres since 1995, a significant steady decline over time. According to NJDEP, forestland is an important category environmentally, because it affects air quality, water quality, wildlife habitat, climate, and many other aspects of the ecology of an area.



# URBAN LAND

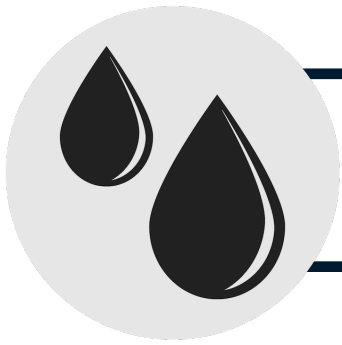
## DESCRIPTION

Urban (or Built-up) Land is characterized by intensive land use where the landscape has been altered by human activities. Although structures are usually present, this category is not restricted to traditional urban areas. Types of urban land include Residential; Commercial and Service; Industrial; Transportation, Communication and Utilities; Industrial and Commercial Complexes; Mixed Urban or Built-up; Other Urban or Built-up and Recreational.



## OVERALL TREND: INCREASING

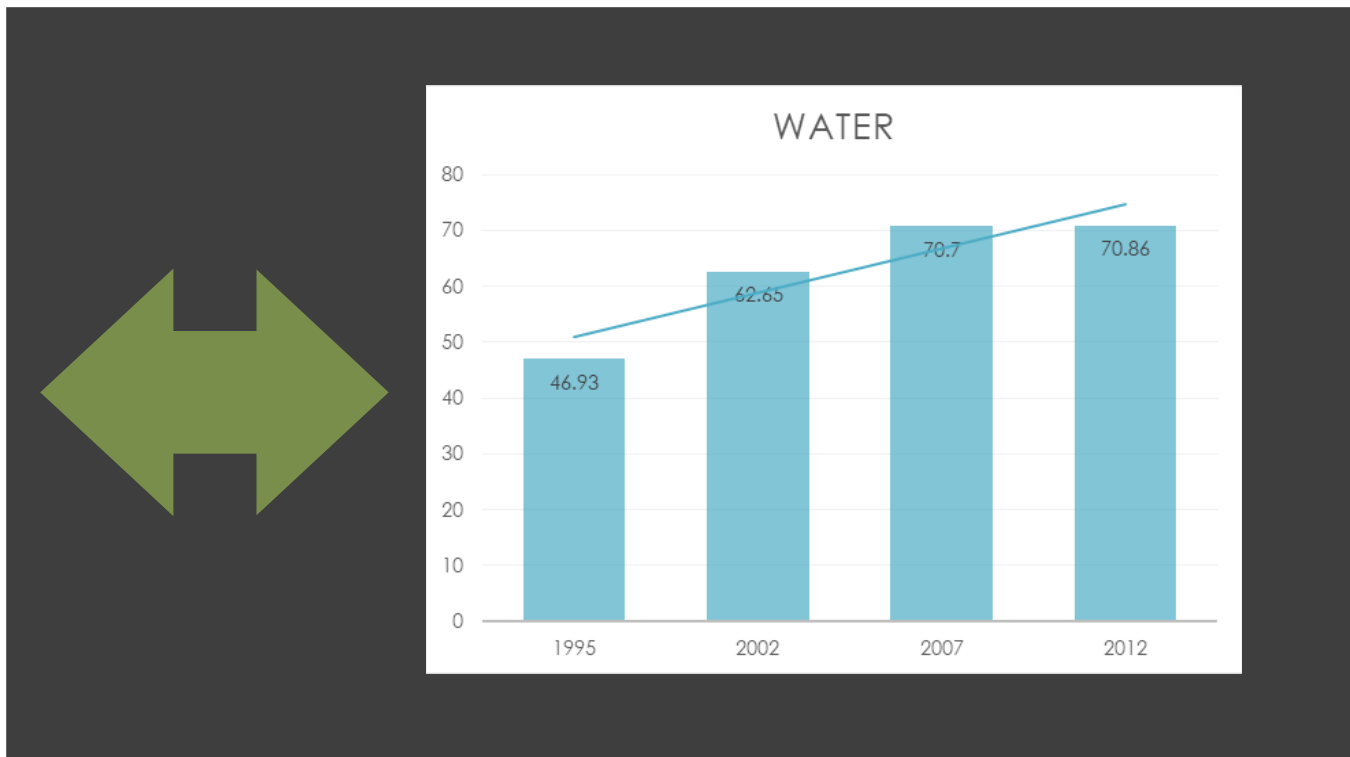
NJDEP 2012 Land Use/Land Cover mapping identifies approximately 3,612 acres or 43.7% of Bernardsville Borough as urban. Since 2007, the urban land cover has increased 55 acres, which equates to a 0.67% increase of overall land cover that is urban. The most concentrated areas of urban land are concentrated around southeastern Bernardsville and are a combination of primarily medium or low density housing and some commercial/service uses.



# OPEN WATER

## DESCRIPTION

All areas within the landmass of New Jersey that are periodically water covered are included in this category. Types of water bodies include Streams and Canals; Natural Lakes; Artificial Lakes; and Bays and Estuaries. Not included in this category are water treatment and sewage treatment facilities.



## OVERALL TREND: STABLE

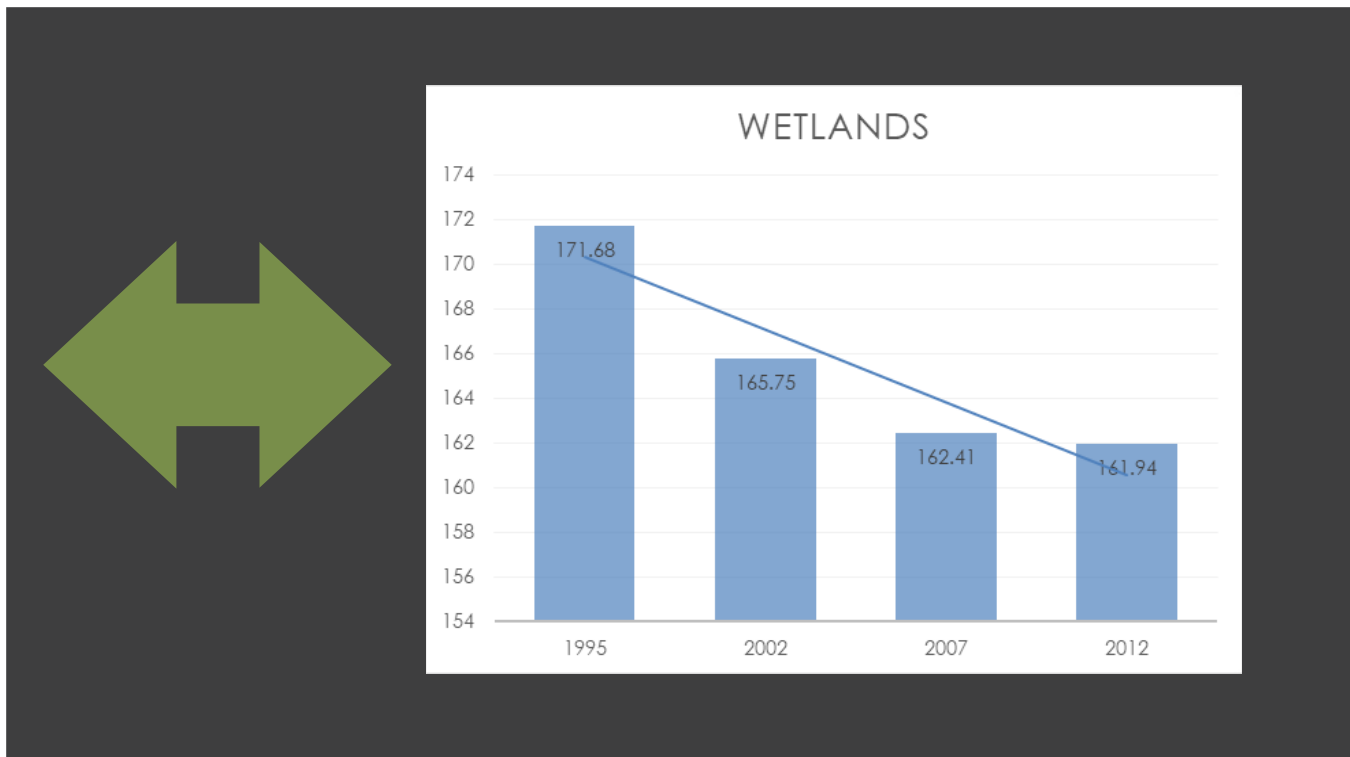
Between 2007 and 2012, the New Jersey Land Use/Land Cover data was updated, and as part of this effort, many additional water features previously unmapped were captured during this 2012 update. However, from 2007 to 2012, the open water land cover area did not change significantly in Bernardsville. The 2012 data shows total acreage at 70.86 acres, covering 0.86% of the total acreage in Bernardsville.



# WETLANDS

## DESCRIPTION

Wetlands are those areas that are inundated or saturated by surface or groundwaters at a frequency and duration sufficient to support vegetation adapted for life in saturated soil conditions. Included in this category are naturally vegetated swamps, marshes, bogs, and savannas, which are normally associated with topographically low elevations but may be located at any elevation where water perches over an aquiclude.



## OVERALL TREND: STABLE

According to New Jersey Land Use/Land Cover data, Bernardsville's wetlands include a total of approximately 162 acres; representing approximately 2% of the Borough's total land. Of the total wetland acres, 26.0% is Agricultural Wetland, 0.4% is Herbaceous Wetland, 3.3% is Urban Wetlands and 70.3% is Wooded Wetland. There has been no significant change in total wetlands acreage since the 2010 ERI report. Note: NJDEP wetland mapping does not substitute for a true delineation. Therefore, it is possible that additional wetlands exist within Bernardsville and onsite evaluation of areas mapped under other land uses may, on occasion, reveal the presence of freshwater wetlands.





# POPULATION

## DESCRIPTION

The U.S. Census Bureau 2000 Survey counted people at their “usual residence,” a principle followed in each census since 1790. Usual residence has been defined as the place where the person lives and sleeps most of the time. This place is not necessarily the same as the person’s voting residence or legal residence. Noncitizens who are living in the U.S. are included, regardless of their immigration status. The 2016 data is an estimate from the U.S. Census American Community Survey.



**7,345** Total People in 2000

**7,776** Total People in 2016

**+5.87%** Percent Change

## OVERALL TREND: INCREASING

From 2000 to 2016, the population in the Borough of Bernardsville has grown by 5.87%. And, the New Jersey Department of Labor estimates that populations will continue to grow across the region (NJDOL, 2016). By 2034, the population in the Upper Raritan Region is expected to grow by 7.4% to just under a quarter of a million people. As population increases, it can increase the stress on the watershed including an increase the potential for contaminated runoff into streams that degrades water quality. Increasing population trends can have a negative impact on watershed health.



# POPULATION DENSITY

## DESCRIPTION

Population density is computed by dividing the total population within a geographic entity by the land area of that entity measured in square miles. Density is expressed as “population per square mile.” Area is calculated from the specific boundary recorded for each entity in the Census Bureau’s geographic database.



**569** Total People/Sq Mi in 2000

**602** Total People/Sq Mi in 2016

**+5.80%** Percent Change

## OVERALL TREND: INCREASING

As the population density increases, the associated urban land uses such as housing, transportation, and commercial uses are expected to increase which in turn puts additional stress on the natural systems. According to the 2016 State of the Raritan Report, increases in population density compound the effects of population and can have a significant impact on watershed health.

The tables below summarize the eight indicators assessed for the Borough of Bernardsville. Each indicator is described in more detail in the subsequent sections.

Land Use Indicator	2007		2012		2017-2012
	Acres	%	Acres	%	Change (Acres)
AGRICULTURE	587.22	7.11%	571.48	6.91%	- 15.74
BARREN LAND	15.17	0.18%	16.17	0.20%	+ 1.00
FOREST	3,872.69	46.86%	3,832.64	46.37%	- 40.05
URBAN	3,556.48	43.03%	3,611.58	43.70%	+ 55.10
WATER	70.70	0.86%	70.86	0.86%	+ 0.16
WETLANDS	162.41	1.97%	161.94	1.96%	- 0.48

Source: 2007 and 2012 Land Use/Land Cover obtained from NJDEP GIS website: [www.state.nj.us/dep/gis/](http://www.state.nj.us/dep/gis/)

Land Use Indicator	2000*	2010*	2016**	% Change
POPULATION	7,345	7,707	7,776	+ 5.87%
POPULATION DENSITY (people per square mile)	569	597	602	+ 5.80%

Source: U.S. Census Bureau

\*2000 & 2010 data from U.S. Census Population Data

\*\*2016 data from U.S. Census American Community Survey (Estimate)

# 1. INTRODUCTION



## MINE BROOK

BY KRISTI MACDONALD

### **An Environmental Resource Inventory (ERI), or Natural Resource Inventory (NRI), identifies and characterizes the environmental resources within a community.**

An ERI can include the location, character, and quality of resources such as wetlands, streams, aquifers, floodplains, soils, forests, open space, and habitat. In addition, ERIs may also detail information on the built environment, such as landmarks and cultural resources. Collectively, these resources establish the foundation for the health and welfare of the environment, the community, and the economy. Through documentation and dissemination, an ERI can inform planning and policy decisions that encourage and allow for the protection, conservation, and restoration of these fundamental resources. This ERI includes an overview of relevant current policy and legal frameworks that protect and impact natural resources in Bernardsville, New Jersey.

The Borough of Bernardsville is a 13-square mile suburban community located in the northeast corner of Somerset County, New Jersey. It is surrounded by Far Hills Township, Peapack-Gladstone, Harding Township, Mendham Borough, and Mendham Township. Populated with over 7,000 residents, it hosts a diverse array of housing types and land uses, ranging from multi-family homes, compact residential neighborhoods, and a busy downtown center surrounded by larger estates nestled into the steeply forested hillsides of the Mine Brook Valley (Open Space, 2016).

As described in the Bernardsville Borough 2016 Open Space Plan, the municipality is rich in local, statewide, and national historical significance, beginning with General George Washington's headquarters in nearby Morristown during the American Revolution, and continuing as a host for numerous prominent businessmen and their families through the mid-19th and early 20th centuries; many of whose estates can still be found today. Traditionally, people came to Bernardsville due to the rail line's easy access to and from New York City.

Gracing the entry to the Borough are the rolling hills and fields of Meadowbrook Farm along Mine Brook Road (Route 202). Framing this are the slopes of the private homes and forested landscapes rising from the valley to the characteristic hills of Bernardsville. These agrarian lands and the estates which reside there are a picture of how the community developed and thrives today. As part of the town's cultural heritage, they are also some of its most environmentally sensitive lands, and surround the North Branch of the Raritan River and the headwaters of the Raritan River, and parts of the municipality are also within the headwaters of the Passaic River (Bernardsville Master Plan).



## 1.1 GOALS

THE GOALS OF THE 2018 ENVIRONMENTAL RESOURCE INVENTORY FOR BERNARDSVILLE BOROUGH WILL REFLECT THOSE SET FORTH IN THE PREVIOUS ENVIRONMENTAL RESOURCE INVENTORY FOR BERNARDSVILLE BOROUGH AND FURTHER BUILD ON THE BASELINE THAT IT OUTLINED. THE GOALS FOR THIS ERI INCLUDE:

- Objectively identify and describe the natural resources, cultural conditions, environmental features, and concerns within the municipality; and
- Serve as both a tool for planning for future conservation activities, including climate change impacts, and for public education so residents can learn more about their community and its environment; and
- Serve as a guide for surveys and other scientific activities for the environmental commission on where more research is needed to supplement existing data and studies; and
- Provide Bernardsville Borough with a reference point for reviewing future land use and related planning activities, including preparation of the land use element of the municipal master plan; and
- Provide visual depictions of natural resources, in the form of mapping information and text that describe these resources, their sensitivities and limitations for development, and suggested measures for protection of sensitive resources.

PHOTO BY ED ENGLISH



## 1.2 ANJEC ERI REQUIREMENTS

Two New Jersey statutes give environmental commissions the authority and responsibility for conducting an ERI. An ERI enables environmental commissions and open space committees to play a significant role in municipal master planning, land use ordinance development, and site plan review. As noted in the ANJEC Resource Paper “The Environmental Resource Inventory: ERI,” this ERI will include a compilation of text, tables, maps, and other visual information about the natural resource characteristics and environmentally significant features of an area. As advised by ANJEC, the following topics will be included in this ERI: municipal profile, climate, geology, geography, topography, soils, hydrology, vegetation, critical areas –slopes, wetlands, floodplains, depth to bedrock, wildlife habitat, existing land use, open space, known contaminated sites, historic areas, and more.



## 1.3 METHODOLOGY

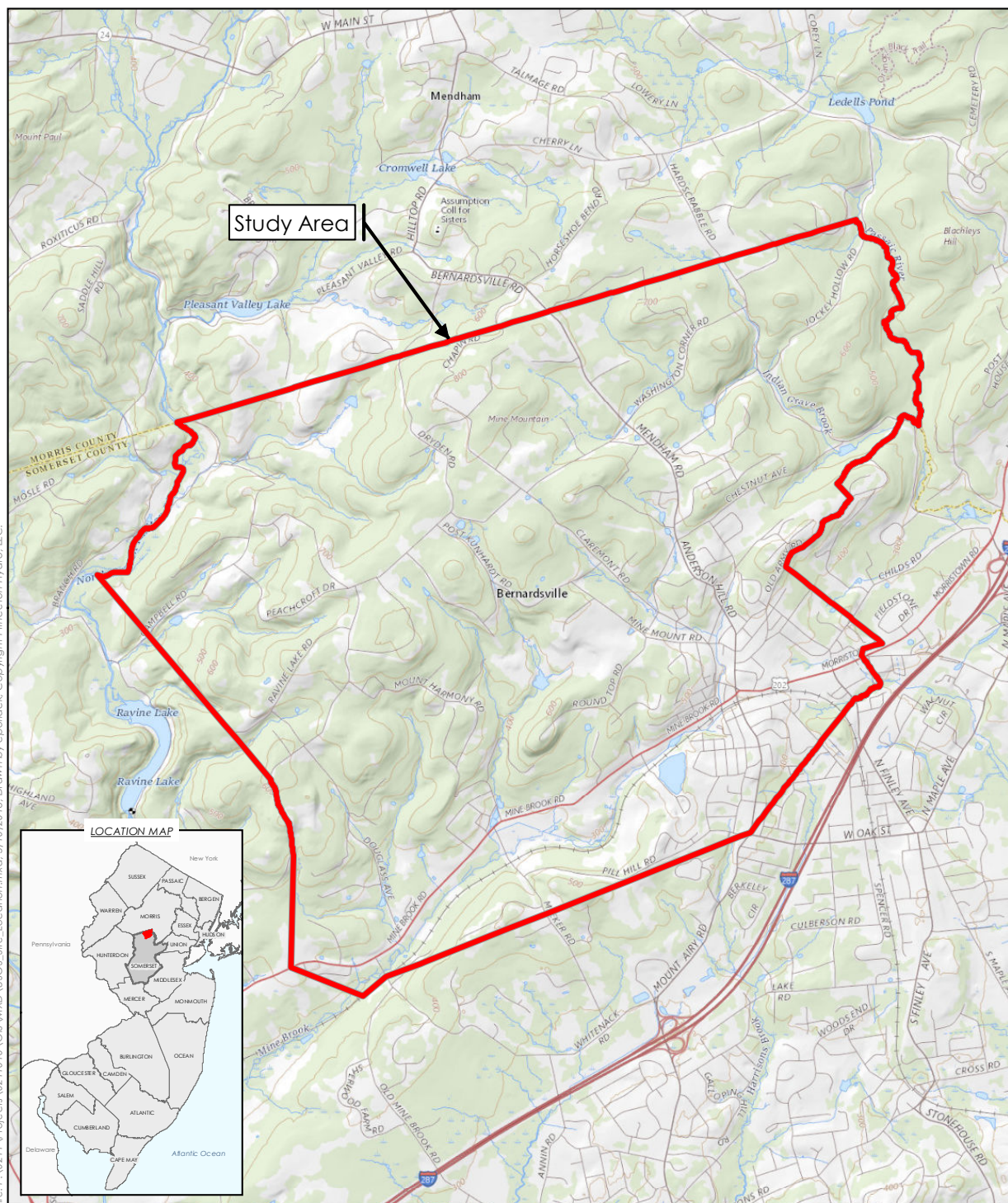
The information provided in the ERI is intended to be adopted into the Bernardsville Borough Comprehensive Master Plan as it reflects the data and priorities to guide the stated purpose of the Master Plan. As in prior ERI versions, the data within this report is based on the most up to date information on natural resources from State and Local sources (See references throughout).

The ERI is designed to serve as a general guideline for determining Bernardsville’s priority resources and their locations within the municipality. No fieldwork, within the Borough or otherwise, was conducted specifically for this report. Although the ERI provides vital guidance to identifying resources through field activities, it is not a substitute for site specific surveys.

Activities such as wetland delineations, wildlife studies, and groundwater testing require *in situ* studies for conclusively determining the presence of various resources, impacts and other detailed site-specific conditions. Once field data are collected and verified, they may be directly incorporated into the ERI in future revisions.



# 1.4 LOCATION MAP



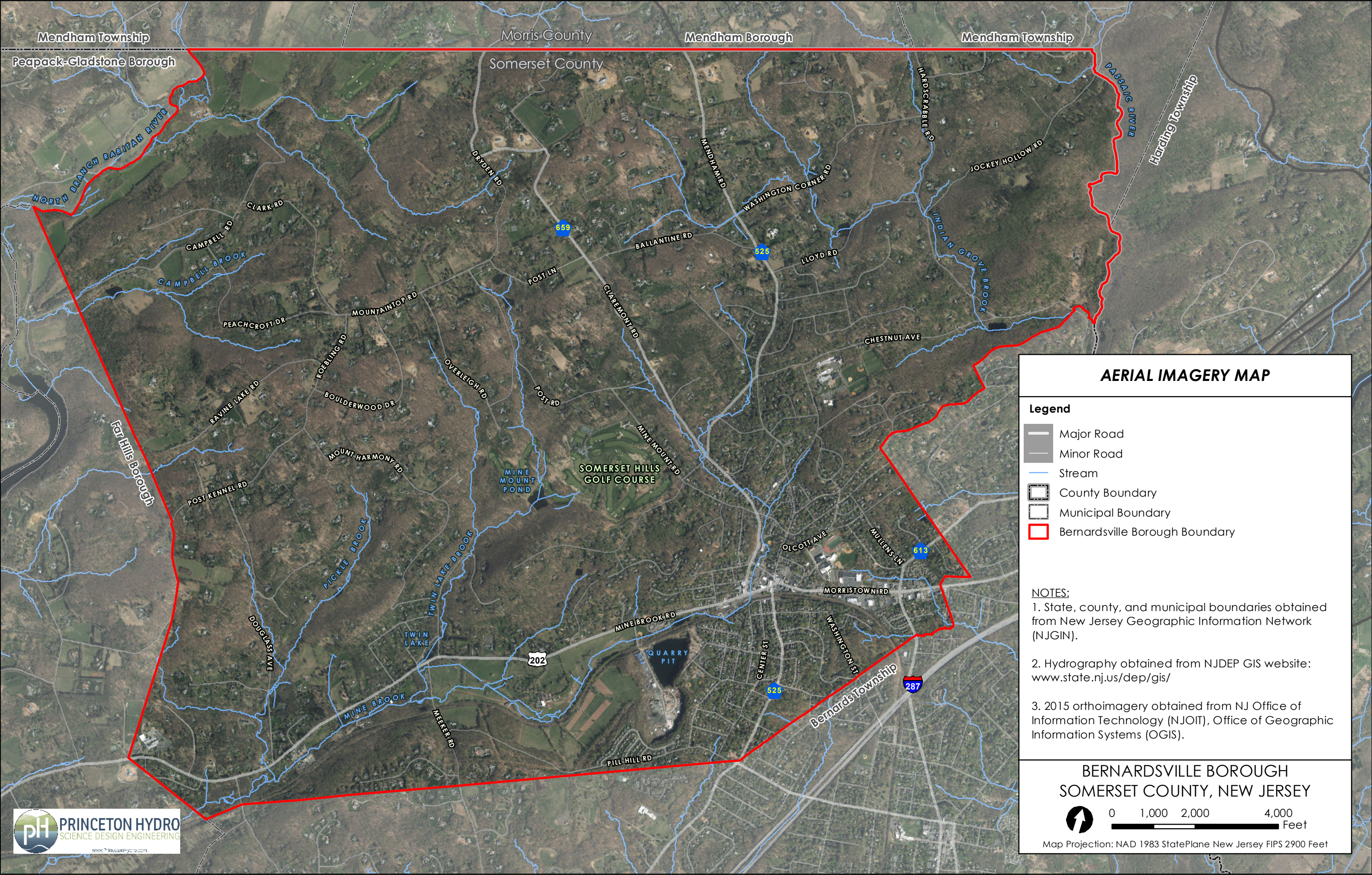
NOTES:  
 1. Study area is the Borough of Bernardsville, Borough boundary obtained from New Jersey Geographic Information Network (NJGIN).  
 2. USGS Topo Base Map obtained from USGS, The National Map Services: <https://viewer.nationalmap.gov/services/>

## USGS SITE LOCATION MAP

ENVIRONMENTAL RESOURCE INVENTORY  
 BOROUGH OF BERNARDSVILLE  
 SOMERSET COUNTY, NEW JERSEY







AERIAL IMAGERY MAP

- Legend**
- Major Road
  - Minor Road
  - Stream
  - County Boundary
  - Municipal Boundary
  - Bernardsville Borough Boundary

**NOTES:**

1. State, county, and municipal boundaries obtained from New Jersey Geographic Information Network (NJGIN).

2. Hydrography obtained from NJDEP GIS website: [www.state.nj.us/dep/gis/](http://www.state.nj.us/dep/gis/)

3. 2015 orthoimagery obtained from NJ Office of Information Technology (NJGIT), Office of Geographic Information Systems (OGIS).

BERNARDSVILLE BOROUGH  
SOMERSET COUNTY, NEW JERSEY

0 1,000 2,000 4,000 Feet

Map Projection: NAD 1983 StatePlane New Jersey FIPS 2900 Feet



## 2. HISTORY



**BERNARDSVILLE LIBRARY IN 1971 (NOW CALLED THE OLD LIBRARY)**

COURTESY OF BERNARDSVILLE PUBLIC LIBRARY LOCAL HISTORY COLLECTION

## 2.1 INDIGENOUS PEOPLES HISTORY

Paleo-Indians settled the Raritan Valley from 12,000 to 10,000 BC after the last glacial retreat (Lennik, 1999). Evidence suggests that these early indigenous peoples were hunter-gatherers that were skillful in pursuing a wide variety of animals ranging from mastodons and mammoths to small mammals. They also supplemented their diets with fish and gathered plants (Cantwell and Wall, 2001). It was believed that these early indigenous peoples generally moved in groups of up to 50 individuals. Evidence of these individuals including what are referred to as “Clovis” type spear points, have been identified along the Raritan River and in other locations within the general vicinity of Bernardsville (Skinner and Schrabisch, 1913).

The Paleo-Indian period was followed by the Archaic period (10,000-2,700 BC) which is marked by post-glacial warming and the increase in nut and seed-bearing trees, as well as small animal and human populations. New technologies including fishing technologies, stone mortars, pestles and better suited axe scraper and spear technologies were developed during this period. Bowls, made of statite or soapstone, also appeared during this period (FRA/NJ Transit, 2008).

The Woodland Period, (2500 BC to 1500 AD) resulted in dramatic changes in the way of life for indigenous people as lifestyles changed from nomadic hunting and gathering to a settled, agricultural way of life and the establishment of villages. Key technological changes are marked by an increase in bone, shell and wood tool making, decorated pottery and the creation of the bow and arrow (FRA/NJ Transit, 2008). Other significant evidence of advanced settlement during this period is the creation of increasingly complex burial sites and the domestication of dogs (FRA/NJ Transit, 2008).

The “Lenape” or Delaware Indians were the indigenous people of the Bernardsville Area when Europeans first settled the region. The Delaware Indians, or Lenape (Woodland) Indians, consisted of three major divisions: the Minsi or Munsee in northern New Jersey, the Unami in Central New Jersey and the Unalatchtigo in southern New Jersey (Hodge, 1906). The Munsee referred to as Min-asin-ink, ‘at the place where stones are gathered together’ (Hewitt from Hodge, 1906) are closely associated with the totem of the wolf (Heye and Pepper, 1916). Munsee peoples would have been the Delaware Indian division, likely found in present day Bernardsville (Native Language of the Americas - NLA, 2009).

The Woodland Period lasted until the Contact Period (1500 to 1700 AD), which was defined by interaction with European settlers. By 1700, indigenous people were forced to compete for resources with growing numbers of Europeans. Hackensack and Tappan tribes had each been forced to retreat to the upper Hackensack and Passaic Rivers (Grumet, 1981). Native people occupied portions of northern New Jersey until the mid-18th century. By the period of the American Revolution, native peoples were continually forced further west (Grumet, 1981).

Indigenous sites of New Jersey are typically found within 300 feet of water and often situated in areas with well-drained soils, level topography, historic trails, and a substantial vantage point. Prehistoric evidence of Lenape campsites would typically include pottery fragments, fireplace stones, and stone chips/unfinished tools or other evidence of tool making (Skinner and Schrabisch, 1913). Encampments

have been identified along both the Raritan and Passaic Rivers and within the Morristown National Historic Site (Nordeen, 2005). Evidence of prehistoric or woodland Indian activity would likely be identified with the vicinity of these rivers. During the early 20th century, Schrabisch identified over 200 sites along the upper Passaic River north of Essex County. Skinner and Schrabisch, in fact reported the presence of 11 indigenous fish weirs along the Passaic River, one of which exists today. The weirs were lines of stones set across the river and designed to funnel fish into a narrow area where they could be netted. In addition to the cultural evidence of indigenous people, the land alteration and burning practices of indigenous people within the region for thousands of years had heavily influenced the structure of local ecosystems (Nordeen, 2005). However, development and major land alteration of the region during the 20th century obscured much of the evidence of the indigenous culture of the region. As early as 1929, Schrabisch noted problems of land alteration and the looting of sites as factors impacting the documentation of the region's indigenous people.

## **2.2 POST-EUROPEAN SETTLEMENT**

Bernardsville was originally part of Bernards Township (formerly Bernardston prior to 1798). The Borough was originally known as Vealtown and received its current name in 1840. Bernards Township and the Borough of Bernardsville are named after Sir Francis Bernard, Colonial Governor of New Jersey from 1758 to 1760 (Bernardsville Municipal Website, 2009).

Bernardsville is closely associated with the American Revolution and several Bernardsville sites are particularly significant in colonial history. Neighboring Morristown served as Washington's headquarters and a winter encampment for the American Continental Army during the winters of 1777 and 1779-80. The Brigade Area (see Section 2.3) in Bernardsville served as part of the Army's encampment. Several additional structures and trails are historically associated with the Continental Army's activities and movement in the area.

Bernardsville had traditionally been a rural community with some additional industries such as mills and iron mines present in the area (Somerville Historical Society). However, Bernardsville experienced post-Civil War development with the creation of a railroad line in 1872. The railroad brought increasing numbers of wealthy summer vacationers to Bernardsville and, as a result, the year-round resident population steadily increased. The increasing popularity of Bernardsville led to the development of what was known as the "Bernardsville Mountain Colony" in the late 19th century. Residents of the "Colony" were wealthy businessmen, bankers, and industrialists who built estates with large elaborate mansions and larger existing homes in the town (such as the Kirkpatrick House/Welwood – 1765-1900 expansion by C. Squibb). Bernardsville became well known for its wealth and the extravagant lifestyle of its residents. Increasing numbers of service people and tradesmen settled the area to serve this community. However, soon after its 1924 secession from Bernards Township, the Great Depression developed and impacted the culture of Bernardsville, as many estates were subdivided and sold off or demolished. In the years that followed, Bernardsville grew and expanded while maintaining much of its quaint cultural atmosphere (Bernardsville Municipal Website, 2009).



## 2.3 HISTORIC RESOURCES

Bernardsville contains a number of significant 18th and 19th century historic resources, including six sites listed on both the New Jersey Historic Preservation Office (NJHPO) and National Historic Registers. These structures are very much connected to the development of the community - as a central location for the Continental Army, and as a destination for the 19th century cultural elite. The state and federally listed historic sites are listed in Table 1 and summarized in this section. The listed structures are discussed in this section with information provided by NJHPO. Included in Table 1 are three structures present within Bernardsville that were given NJHPO consideration. The Bernardsville Municipal Building exists within the historic 1844 building known as the Bunn Cider Mill. The structure also served as a grist mill and a saw mill and operated until 1914. After some years of neglect, the building was renovated for municipal space in 1950. Additionally, the Gill-St. Bernards Lower School, founded in 1900, has been given NJHPO consideration. Since the 2010 ERI report was released, the Gladstone Branch of the Lacakawanna and Western Railroad Historic District, along the New Jersey Transit line has also been given NJHPO consideration.

In 2006 “The St. Bernards Church and Parish House” (ID#4269) was added to the NJDEP-Historic Preservation Office, New Jersey and National Registry of Historic Places. This property is privately owned. In 2018 and 2019 the Parish House was extensively renovated and will become residential condominiums.

Since the 2010 ERI report, two additional places have been added to the NJ and National Registers of Historic Places within Bernardsville: Olcott Avenue Historic District (46 Individual units) and Dunster Squibb House (AKA The Dunster Farmstead, The Orchard).

Additionally, “Pfizer Mansion” was listed in the dataset but it is categorized as an “identified individual property” so it is not officially protected at either the state or federal level, and therefore was not included in the table below. However, it is now considered eligible for listing under the Country Place ERA Resources of Somerset Hills Thematic Nomination Application.



**SCHERMAN POND ACROSS FROM REYNOLDS-SCHERMAN HOUSE, HARDCRABBLE RD. 1963**

COURTESY OF BERNARDSVILLE PUBLIC LIBRARY LOCAL HISTORY COLLECTION

**TABLE 1:**  
**LISTED SITES CONSIDERED FOR THE NJ AND NATIONAL REGISTERS OF**  
**HISTORIC PLACES WITHIN BERNARDSVILLE**

Historic Resource	Location	Status	NJHPO Inventory Database ID	State Register Date	NJHPO Opinion Date	National Register Information System ID	National Register Date
Gladstone Branch of the Delaware, Lacakawanna and Western (DL&W) Railroad Historic District	NJ Transit Gladstone Line between Peapack and Gladstone Borough and Summit City	Eligible - Historic District	5030	NA	10/20/2010	NA	NA
Country Place Era Resources of the NJ Somerset Hills	Potentially, all historic estate properties and structures built in the Bernardsville area between 1870 and 1940	Multiple Property Thematic Submission	5240	2/21/2013	NA	NA	NA
Gill-Saint Bernards Lower School	Claremont Road	Eligible - Individual Property	2478	NA	6/11/1993	NA	NA
Bernardsville Municipal Building	Mine Brook Road	Eligible - Individual Property	2901	NA	2/27/1995	NA	NA
Olcott Avenue Historic District (46 Individual units)	Portions of Olcott, Childsworth, & Highview Avenues and Wesley Ave	Listed - Historic District	4896	5/20/2009	NA	09000940	11/20/2009
Morristown National Historical Park (New Jersey Brigade Unit)	Cross Estate	Listed - Historic District	3381	5/27/1971	NA	66000053	10/15/1966
Dunster Squibb House (AKA The Dunster Farmstead, The Orchard)	189 Mine Brook Road	Listed - Individual Property	4997	10/16/2013	NA	NA	NA
John Parker Tavern	2 Morristown Road	Listed - Individual Property	2479	4/15/1978	NA	78001796	12/14/1978
Reynolds-Scherman House	71 Hardscrabble Road	Listed - Individual Property	2480	3/3/1989	NA	89000298	4/29/1989
St. Bernard's Church and Parish House	88 Claremont Road	Listed - Individual Property	4269	6/28/2006	NA	06000870	9/6/2006
Bernardsville Railroad Station	US Route 202, Mine Brook Road	Listed - Individual Property	2477	3/17/1984	9/1/1978	84002786	6/22/1984

## BERNARDSVILLE RAILROAD STATION

The inclusion of this station to the National Register was part of Thematic Nomination of Operating Passenger Railroad Stations in 1978. The railroad station is currently an active NJ Transit Railroad Station of the Gladstone Branch designed by renowned Philadelphia architect Bradford L. Gilbert. And, built in the early 20th century (1901-02), the station is a stone structure built with a slate and copper roof. It is an example of late Victorian or Edwardian period and Richardson-style Romanesque architecture. The railroad in Bernardsville was constructed in 1872 as part of the New Jersey West Line.

The West line dissolved in 1878 and was purchased by the Passaic and Delaware Branch. It was leased in 1882 by the Lackawanna and Western Railroad. The rail line was traditionally known as the "Millionaire's Express" because of the number of wealthy businessman who used the rail line to commute to New York City offices.



**BERNARDSVILLE RAILROAD STATION, EARLY 1900s**  
COURTESY OF BERNARDSVILLE PUBLIC LIBRARY LOCAL HISTORY COLLECTION

## MORRISTOWN NATIONAL HISTORIC PARK



**REPLICA HUTS AT JOCKEY HOLLOW, MORRISTOWN  
NATIONAL HISTORIC PARK**

COURTESY OF BERNARDSVILLE PUBLIC LIBRARY LOCAL HISTORY COLLECTION

The Park is comprised of four major non-contiguous areas. The New Jersey Brigade used what today is known as the New Jersey Brigade Area for their winter camp. The site is located on the Cross Estate on Old Jockey Hollow Road. The estate was purchased by the National Park Service in 1975 and connected the NJ Brigade to the Main Colonial Army encampment in Jockey Hollow. The Cross Estate itself is of the Arts and Crafts design popular in the early 20th century. The site contains a historic garden open to the public and several trails that connect to Scherman-Hoffman, Lewis Morris Park and Jockey Hollow.



## JOHN PARKER TAVERN (FORMER BERNARDSVILLE LIBRARY)

This structure is listed for its military and business significance during the period from 1750 to 1799. Built in 1730, the tavern site was owned by John Parker, a captain in the Somerset Militia and was a popular spot for Continental Army Officers. The site is closely associated with Old Army Road, which extends from the Tavern to Jockey Hollow and was reported to be regularly used by officers moving between the tavern and the town. The Tavern is the former home of the Bernardsville Library and purportedly haunted by the ghost of John Parker's daughter. A marker on the site acknowledges Washington's route to Morristown Following the Battles of Princeton and Trenton in 1777 (Di Ionno, 2000).

## REYNOLDS-SCHERMAN HOUSE

Constructed as a store and storage structure originally around 1770 in the village of Logtown (now part of Bernardsville), the original structure was converted to a residential home in the early 1800's. The stone house is an example of Early Republic or Federal period architecture with later Colonial Revival details. It is believed that the site was originally a commissary for Washington's Colonial Troops during the American Revolution.

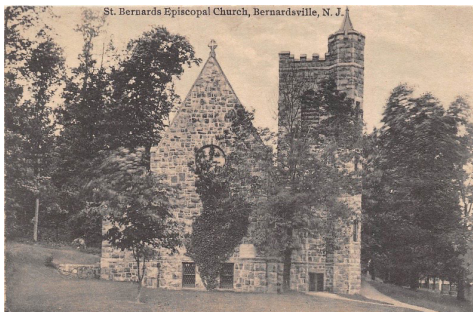
The property was owned in the 20th century by noted businessman and avid reader and birder Harry Scherman, who in 1965 donated 125 acres to the National Audubon Society. In the 1970s, a neighboring land owner, Mr. G. Frederick Hoffman donated land parcels and eventually his entire estate in 1981. These two properties now comprise the Scherman-Hoffman Wildlife Sanctuary. The building was modernized and extensively restored by Ron and Bea Dressen who also listed the building on the Historic Registers in 1989.



**REYNOLDS-SCHERMAN HOUSE, HARDSCRABBLE RD. 1963**

COURTESY OF BERNARDSVILLE PUBLIC LIBRARY LOCAL HISTORY COLLECTION

## ST. BERNARD'S CHURCH



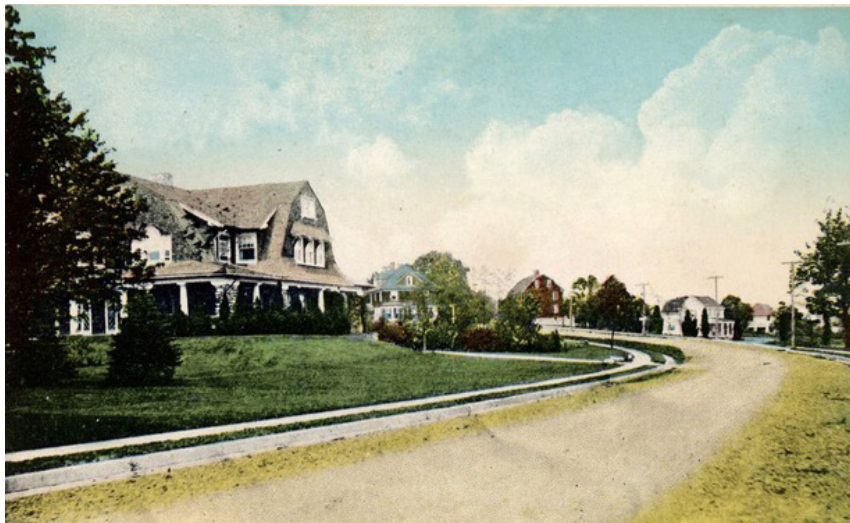
**ST. BERNARD'S CHURCH**  
COURTESY OF BERNARDSVILLE PUBLIC  
LIBRARY LOCAL HISTORY COLLECTION

St. Bernard's is an Episcopal church founded in the 1890s as a place of worship for wealthy families vacationing from New York and larger eastern cities. The church itself was completed in 1898 and is an example of English Gothic Revival Architecture. The church was designed by Napoleon LeBrun and Sons, a well-known New York architectural firm of the time who also designed the Metropolitan Life Insurance Building. The church caught fire in 2004 and sustained considerable damage. Renovation of the structure began in 2006 and was completed in 2008. The church resumed its function as a place for Episcopal worship. It also includes the 1912 Parish Hall designed by Henry Janeway Hardenbergh, a renowned NYC architect.



## OLCOTT AVENUE HISTORIC DISTRICT

Olcott Avenue Historic District was added to the New Jersey Register of Historic Places in 2009, and is Bernardsville's first historic district designation. It includes 46 public and private properties, the Bernardsville United Methodist Church, and the Olcott School Building, which span portions of Olcott, Childsworth, & Highview Avenues and Wesley Ave. The homes in this district are Colonial Revival, Tudor Revival, Eclectic Revival, Craftsman, and Shingle Styles, according to a 2015 Somerset County Cultural & Heritage Commission report.



**OLCOTT AVE, EARLY 1900s**

COURTESY OF BERNARDSVILLE PUBLIC LIBRARY LOCAL HISTORY COLLECTION

presented this to the Bernard's school district and it soon became the first high school in Bernards Township and housed Bernardsville's elementary grades. The entire district, including the Olcott School Building, is representative of the rise of the middle class in Bernardsville and its impact on the entire region. Olcott Avenue was the first street in Bernardsville to specifically appeal to the local rising class of merchants and entrepreneurs. The properties contained deed restrictions regarding lot size, building setbacks, property use and fence limitation that were forerunners of zoning regulations (Somerset County Cultural & Heritage Commission, 2015).

## DUNSTER-SQUIBB HOUSE (AKA THE DUNSTER FARMSTEAD, THE ORCHARD)

According to a 2015 Somerset County Cultural & Heritage Commission report, the Dunster-Squibb House was originally constructed, with Federal-style influences, sometime between 1827 and 1839. The current property contains a late 19th-century barn, late 19th- or early 20th-century caretaker's cottage, a mid-nineteenth century smokehouse structure, and the remainder of a 120-acre farm assembled by Oliver Dunster after he purchased it in 1839. Later the property became part of the large estate established by Charles F. Squibb. Significant renovations in the Colonial Revival/Craftsman style were performed by Squibb circa 1900, turning the house into a guest cottage. The site contains the house, structures



**DUNSTER SQUIBB HOUSE, MINE BROOK RD**

COURTESY OF BERNARDSVILLE PUBLIC LIBRARY LOCAL HISTORY COLLECTION

used above, circa-1900 landscape features, and stone walls. In 2008, the Dunster Squibb House was sold to Bernardsville Borough from descendants of the Squibb family. And in 2017, through efforts by the Friends of Historic Bernardsville Inc., the Dunster Squibb House was awarded \$182,672 from Somerset County's 2017 Historic Preservation Grants for restoration work (Tarrazi, 2017) and then \$41,850 in 2018.

## **COUNTRY PLACE ERA RESOURCES OF THE NJ SOMERSET HILLS**

In 2013, a multiple property Thematic submission designation "Somerset Hills Country Place Era" 1870-1940 was approved by the NJ State Historic Preservation Office. Bernardsville Historic Preservation Advisory Committee has assisted with arranging Borough funding for this area. This designation allows historic estate properties and structures built in the Bernardsville area between 1870 and 1940 to be listed on the NJ Register of Historic Places if desired by the current owners.

In addition to the sites identified on State and Federal lists, the Somerset County Cultural & Heritage Commission has identified numerous dwellings and structures in Bernardsville that are of historical significance. Appendix D of this report identifies over 90 sites of historical significance, most of which are residential houses, many of which are from the late 18th and early to mid-19th centuries. Corresponding Blocks and Lots have been mapped on the Open Space Map on Page 122.



**MEADOWBROOK FARM, MINE BROOK RD EARLY 1900s**  
COURTESY OF BERNARDSVILLE PUBLIC LIBRARY LOCAL HISTORY COLLECTION

## 3. GEOLOGY

Natural forces, including glaciations, erosion, sedimentation, fluvial processes, and freeze/thaw cycles interact with the outcropping geology and drastically influence environmental conditions. Understanding the underlying geology of a site is critical to understanding the nature of ecosystems. Regional hydrology, topography and slope development, development of soils, (Swanson et al. 1988) vegetation and wildlife are all heavily influenced by the underlying geology.

The friability (ability to crack) and permeability of bedrock influence the volume and quality of groundwater recharge and release (USGS, 2005b). Geologic formations provide the parent material for soil development and thus influence the soil's physical and chemical characteristics, such as texture and pH (Swanson et al. 1988). The geological processes that occur including tectonic plate shifts, volcanic eruptions, and weathering rates of bedrock material result in slopes, mountains, valleys, caves, outcrops, and other topographic characteristics. The resultant hydrological, soil, and topographic conditions all influence the nature of the associated vegetation communities (Swanson, et al. 1988).

Geologic information is valuable in municipal and private decision-making processes. For example, a site plan review might use geologic information to assess the design's overall suitability to bedrock conditions, and the feasibility of excavation, rock blasting, anticipated problems of waste rock disposal, septic suitability, foundation adequacy and many other factors.

### 3.1 PHYSIOGRAPHY

Physiography is the relationship between a particular location and its underlying regional geology. New Jersey includes four major physiographic provinces, the Ridge and Valley, Highlands, Piedmont and the Atlantic Coastal Plain. Approximately 80% of Bernardsville Borough is located within New Jersey's Highlands Province. The remaining 20% of Bernardsville is located within the Piedmont Province, also known as the Triassic Lowlands. Within Bernardsville, the Piedmont Province extends in an east-west direction along the southernmost portion of the Borough (generally areas south of Pickle Brook Road to the west, Twin Lakes and Olcott Avenue to the east).

The Highlands Province is an area of approximately 980 square miles within New Jersey. It encompasses western portions of Sussex and Warren Counties, major portions of Hunterdon, Morris and Passaic Counties, and small portions of Bergen and Somerset Counties, including most of Bernardsville Borough. It ranges in thickness from 25 miles across at the New York boundary to 10 miles across at its southern state limit at the Delaware River. The Highlands Province is characterized by rounded ridges of metamorphic rocks divided by narrow linear valleys comprised of erodible limestone formations. These ridges and valleys run in a general northeast/southwest direction. The elongate northeast trending mountains and valleys range from about 1,490 feet at the highest ridge (Wawayanda Mountain) to about 200 feet above sea level near the Delaware River in the southwest portion of the region (NJGS, 2006). Valleys within the region are typically less than 800 feet above sea level.

The Piedmont is a 1,600 square mile area occupying approximately 1/5th of New Jersey. It is situated in northern and central New Jersey between the Highlands and Coastal Plain Provinces. The Piedmont is generally characterized by gently rolling plains of elevations typically between 200 to 400 feet, separated by a series of erodible ridges (NJGS, 2006).

New Jersey portions of the Piedmont incorporate the counties of Essex, Hudson, Union, Hunterdon, and Somerset, most of Bergen, and parts of Mercer, Middlesex, Morris, and Passaic. It is predominantly comprised of mildly folded and faulted sedimentary rocks of Triassic and Jurassic age (240 to 140 million years old), and Jurassic age igneous rocks that comprise ridge areas within the formation.

Varying soil types have developed in the Piedmont as a result of glacial influences occurring at various periods over parts of the province. Vegetation communities within the region are more influenced by the specific hydrological regime than soil variation (Collins and Anderson, 1994).

## **3.2 STRATIGRAPHY & SURFICIAL FORMATIONS**

The underlying bedrock geology of Bernardsville is highly diverse for its size. The Borough contains 20 different outcropping units of granite, basalt, and sedimentary rocks associated with the Highlands and Piedmont Physiographic Provinces. The Piedmont portions of the municipality are a component of a geological formation referred to as the Newark Basin (Olsen 1980). The Basin was created during the breakup of the Pangaea Supercontinent about 250 to 200 Million Years Ago (MYA). Covering about 3,000 square miles and extending for 137 miles through New Jersey, southern New York State and southeastern Pennsylvania, within Bernardsville this formation is represented by a combination of sandstone, siltstone and conglomerate sedimentary rocks separated by the presence of igneous volcanic basalts. Some formations of the Newark Basin, including the Towaco and the Feltville Formations (both within southern Bernardsville) are noted for having plant, vertebrate and invertebrate fossils from a 35-million-year period in the Early Mesozoic Era.

Erosion resistant granites and gneisses form the dominant Highlands bedrock geology within Bernardsville. These metamorphosed rocks date from the Middle Proterozoic age (1.2 billion to 900 million years old). Igneous and metamorphic rocks including granites and gneisses are erosion resistant materials that make up much of the tops of the ridges and valley sides within the Highlands Province. Paleozoic sandstones and quartzites form some of the higher ridges in the province. The erodible



limestone based sedimentary formations associated with the valleys of the Highlands outcrop only in a tiny fraction of the westernmost tip of Bernardsville (Lethsville Formation).

New Jersey Department of Environmental Protection (NJDEP) geologic mapping identifies the following 20 geologic units outcropping in Bernardsville (see URWA Bedrock Geology Map, Page 33). Included below is a general description of the formation and its NJDEP aquifer rank (see Section 3.3). All descriptions of geologic formations are summarized from NJDEP New Jersey Geological Survey geologic mapping unless otherwise identified:

**Boonton Formation Jb** (Lower Jurassic) — The Boonton formation is a 1,600 ft. thick formation found within the municipality. This youngest sedimentary unit contains primarily red, brown, gray fine to coarse clastic. The lowest beds in the formation contain red, gray, brown and black siltstones. Above this layer is a red layer of siltstone and sandstones alternating with thin beds of gray and gray green siltstones. Uppermost beds in this formation contain a variety of fish bearing fossils in siltstone laminate (Olsen, 1980). Reptile footprints and carbonized plant remains exist within the middle and upper parts of the unit. This unit outcrops in a very small portion of southeastern Bernardsville. Its High Capacity Aquifer Rank is C.

**Hook Mountain Basalt Jh** (Lower Jurassic) (Olsen, 1980) — The Hook Mountain Basalt is a 360 ft. thick formation. The unit consists of light to dark greenish gray amygdaloidal basalt (basalt containing vesicles or spaces filled with material). This layer is the uppermost and thinnest volcanic extrusive unit in the Newark Basin. This basalt layer contains three lava flow units (Shilsche). This formation is essentially the basis of the third Watchung Mountain. Its High Capacity Aquifer Rank is D.

**Towaco Formation Jt** (Lower Jurassic) (Olsen, 1980) — The Towaco Formation is a 1,250 ft. thick formation. This formation is comprised of red, gray and black mudstones, and calcareous siltstones and sandstones with some volcanic material. The formation contains diagnostic pollen, fish and dinosaur fossils and takes its name from the Village of Towaco, noted for the occurrence of 195 MYA Theropod (*Anchisauripus* sp.) dinosaur footprints. The formation outcrops around Penn's Brook in southeastern Bernardsville. Its High Capacity Aquifer Rank is C.

**Preakness Basalt Jp** (Lower Jurassic) (Olsen, 1980) — The Preakness Basalt is a 820 to 1,050 ft. thick formation outcropping in a band between Millburn and Fairfield Townships, incorporating western portions of West Orange, Verona and Cedar Grove. The formation consists of primarily dark greenish gray to black very fine grained and dense basalt. This formation creates the second Watchung Mountain. The formation outcrops in a small band around Mt. Airy road in southeastern Bernardsville. Its High Capacity Aquifer Rank is D.

**Feltnville Formation Jf** (Olsen, 1980) — The Feltnville formation is a 510 ft. formation outcropping in an extremely narrow band outcropping through Millburn, West Orange, Verona and Cedar Grove and touching the westernmost end of Maplewood Township. This formation consists of interbedded, brownish to grayish red fine to coarse-grained sandstone and gray and black coarse siltstone. Two 10-ft. thick beds of limestone and siltstones within this formation contain arthropod, fish, reptile and diagnostic plant fossils. This formation outcrops in a narrow band from southernmost Bernardsville and extends in a northeasterly direction for more than one mile. Its High Capacity Aquifer Rank is C.

**Orange Mountain Basalt Jo** (Olsen, 1980) — The Orange Mountain Basalt is a 200m thick formation outcropping in a narrow band. The formation contains primarily dark greenish gray to greenish black basalt. This formation outcrops in a very small band along Mine Brook in southern Bernardsville. Its High Capacity Aquifer Rank is D.

**Passaic Formation Conglomerate and Sandstone Facies JTrpsc** (Olsen, 1980) — This unit of the Passaic formation is a maximum 2,625 ft. thick formation outcropping in a band through the Piedmont region

of western and central Bernardsville. The formation contains brownish red pebble conglomerate with medium to coarse-grained sandstone and siltstone. This formation outcrops in a wedge that extends through southern Bernardsville for approximately 2 miles. Its High Capacity Aquifer Rank is C.

**Passaic Formation JTrp** (Lower Jurassic Upper Triassic) — Some particular outcropping portions of the Passaic Formation are mapped as an entire undivided formation. The undivided formation consists of reddish brown to brownish purple and grayish red siltstone and shale. The whole formation is approximately 11,810 ft. thick. Within Bernardsville, the Passaic Formation JTrp outcrops in a small wedge in the southernmost portion of the Borough. Its High Capacity Aquifer Rank is C.

**The Lethsville Formation Cl.** — The formation is associated with Cambrian era (500 to 590 million-year-old MYA) limestone and ranges up to 1000 feet thick. It is an erodible formation containing dolomite, dolomite sandstone, siltstone and shales. Where present above the wetland and lake levels, sinkholes can be fairly common along some members (Dalton, 1996). Like many limestone formations, its erodibility tends to improve its aquifer potential. This formation outcrops in an extremely small area (< 1 acre) adjacent to the North Branch Raritan River in the westernmost tip of Bernardsville. Its High Capacity Aquifer Rank is C/B.

**Hardyston Quartzite Ch** — This formation is metamorphosed from beach sands of the early Cambrian (roughly 540 Ma) consisting of conglomeratic sandstone, quartzite, and dolomite sandstone. Overlying soil was thin and easily removed to expose a relatively thin (typically 30 to 100 m thick) layer of quartzite. Such quarries would be used as long as needed for a particular phase of construction and then abandoned. Hardyston stones commonly contain small flecks of pyrite (iron sulfide), which releases iron upon weathering to form a yellow to orange coating of iron oxide on the stones. (Lehigh University, 2000). A several acre area of this formation outcrops in westernmost Bernardsville. High Capacity Aquifer Rank C/B.

**Hornblende Granite Ybh** — Hornblende granite is a pinkish-gray light pinkish-gray or pinkish white medium to coarse-grained granite that contains hornblende - a dark colored blend of minerals including aluminum, calcium, magnesium and iron. Hornblende Granite is the most common outcropping formation in Bernardsville and is found throughout the Borough north of Twin Lakes. High Capacity Aquifer Rank D.

**Microperthite Alaskite Yba** — Pink to buff pinkish gray or pinkish white medium to coarse grained granite. Contains microperthite (a microscopic intergrowth of two feldspars) quartz, and oligoclase (whitish crystalline feldspar). This granite outcrops in a small band within central Bernardsville. High Capacity Aquifer Rank D.

**Potassic Feldspar Gneiss Yk** — Light gray to pinkish-buff-weathering, pinkish white to light pinkish-gray fine to medium grained gneiss. Moderately foliated gneiss containing quartz, microcline (a potassium-rich alkali feldspar), microcline microperthite and locally several other minerals in lesser amounts. Yk outcrops in a small area along the northwestern border (North Branch Raritan River) of Bernardsville. High Capacity Aquifer Rank C.

**Biotite-Quartz-feldspar Gneiss Yb** — Gray (weathering, locally rust gray to tan) or greenish-gray fine to medium coarse-grained gneiss containing components similar to Yk (see above) with a greater component of biotite (a phyllosilicate (sheet-forming) dark mineral of the mica group). This formation outcrops in a narrow band extending approximately 1.5 miles in a northeasterly direction from the North Branch Raritan River. Its High Capacity Aquifer Rank is D.

**Hornblende-Quartz-Feldspar-Gneiss Ymh** — Pinkish-gray to buff-weathering white to pale pinkish gray fine to medium grained gneiss. It is moderately layered and foliated gneiss containing microcline, quartz, oligoclase, hornblende and magnetite (a magnetic iron-oxide that crystallizes in a cubic formation). Two

narrow bands of this formation outcrop in a northeast-southwest orientation for approximately one mile near Indian Grove Brook (formerly known as Indian Grave Brook, according to the National Park Service Morristown National Historic Park Management Plan) (northeast) and Pickle Brook (southwest) in Bernardsville. High Capacity Aquifer Rank D.

**Pyroxene Gneiss** — White to tan weathering greenish-gray fine to medium-grained, well layered gneiss containing oligoclase clinopyroxene (silica mineral primarily containing calcium, sodium iron and magnesium) quartz and trace opaque minerals. The gneiss extends in a small 0.75-mile band adjacent to the northern end of the Ymh outcrop in northwestern Bernardsville. High Capacity Aquifer Rank D.

**Quartz-Oligoclase Gneiss** — White-weathering, light greenish-gray, medium to coarse-grained, moderately layered to indistinctly foliated gneiss with lesser amounts of granofels containing quartz, oligoclase, and andesine, and locally biotite, hornblende, and clinopyroxene. This layer contains thin layers of amphibolite. This formation outcrops in two large bands in a northeast-southwest orientation from Hull Road (lower band) and Post Kunhardt Road (upper band) to the eastern border of the Borough (Passaic River). High Capacity Aquifer Rank D.

**Hypersthene-Quartz-Oligoclase-Gneiss** — This formation is a medium grained well layered and foliated gneiss composed of andesine or oligoclase, quartz, clinopyroxene, hornblende, hypersthene, and sparse amounts of biotite. Tan weathering greenish gray to greenish brown. Outcrops in a several-acre area near the Passaic River in eastern Bernardsville. High Capacity Aquifer Rank D.

**Diorite** — Gray to tan weathering greenish gray medium to coarse gray, greasy-lustered massive diorite containing andesine or oligoclase, clinopyroxene hornblende, hypersthene, and traces of biotite or magnetite. Diorite outcrops in a small 0.25-mile band in western Bernardsville just north of Campbell Road. High Capacity Aquifer Rank D.

**Amphibolite** — Gray to grayish black medium -grained amphibolite composed of hornblende and andesine. Amphibolite may contain biotite or clinopyroxene. Amphiboles are dark colored ionosilicate minerals that contain ions of iron and or magnesium in their molecular structures. Amphibolite outcrops in a very narrow (approximately 175 foot) band extending 0.5 mile along the northernmost boundary of Bernardsville. High Capacity Aquifer Rank D.



# Bernardsville Borough

## Environmental Resources Inventory

### Bedrock Geology, Faults, Folds & Glacial Sediments & Aquifer Rank

- Municipal Boundary
  - Parcel Boundaries
  - Rivers & Streams
  - Lakes & Ponds
  - Geologic Folds
  - Geologic Faults
  - Glacial Sediments of the Jerseyan Age
- Bedrock Geology**
- Boonton Formation
  - Hook Mt. Basalt
  - Towaco Formation
  - Preakness Basalt
  - Felville Formation
  - Orange Mountain Basalt
  - Passaic Formation
  - Passaic Formation Conglomerate & Sandstone facies
  - Leithsville Formation
  - Hardyston Quartzite
  - Hornblende Granite
  - Microperthite Alaskite
  - Potassic Feldspar Gneiss
  - Biotite-Quartz-Feldspar Gneiss
  - Hornblende-Quartz-Feldspar Gneiss
  - Pyroxene Gneiss
  - Quartz-Oligoclase Gneiss
  - Hypersthene-Quartz-Oligoclase Gneiss
  - Diorite
  - Amphibolite

Bedrock aquifer rank and range of average yield of high-capacity wells in gallons per minute:

Group C/B (101 to 250 gpm/251 to 500 gpm) - Hardyston Quartzite, Leithsville Formation

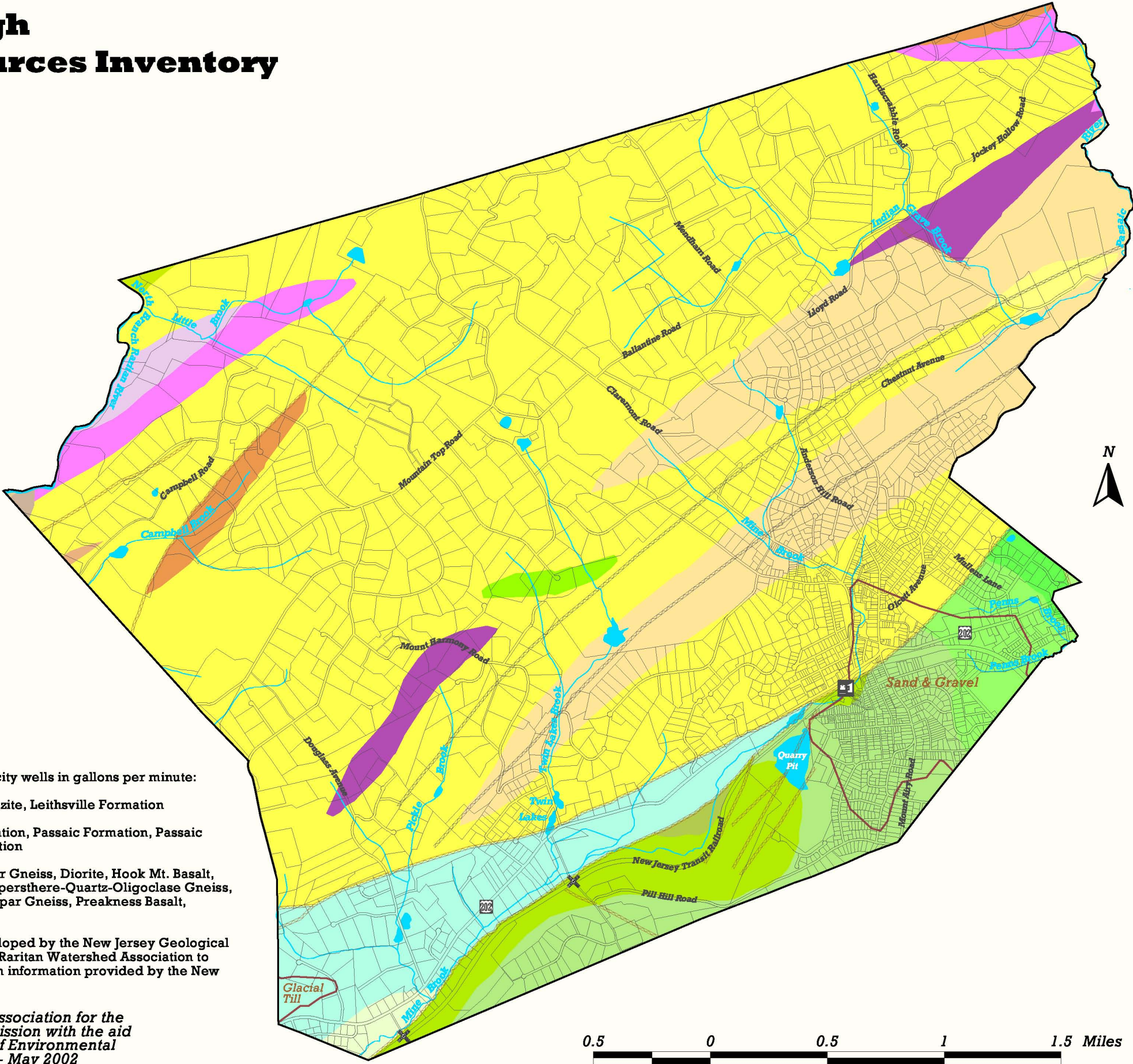
Group C (101 to 250 gpm) - Boonton Formation, Felville Formation, Passaic Formation, Passaic Formation Conglomerate and Sandstone facies, Towaco Formation

Group D (25 to 100 gpm) - Amphibolite, Biotite-Quartz-Feldspar Gneiss, Diorite, Hook Mt. Basalt, Hornblende Granite, Hornblende-Quartz-Feldspar Gneiss, Hypersthene-Quartz-Oligoclase Gneiss, Microperthite Alaskite, Orange Mountain Basalt, Potassic Feldspar Gneiss, Preakness Basalt, Pyroxene Gneiss, Quartz-Oligoclase Gneiss

Bedrock geology, faults, folds and glacial sediments data developed by the New Jersey Geological Survey from 1998 to 2000. Further development by the Upper Raritan Watershed Association to integrate bedrock aquifer rank into the geology database, from information provided by the New Jersey Geological Survey, in May 2002.



Produced by the Upper Raritan Watershed Association for the Bernardsville Borough Environmental Commission with the aid of a grant from the New Jersey Department of Environmental Protection, Office of Environmental Services - May 2002





## 3.3 AQUIFERS AND HYDROGEOLOGY OF RECHARGE AREAS

An aquifer is a saturated permeable geologic unit that can transmit significant quantities of water under ordinary hydraulic gradients. Aquifers are generally equated to the name of the geologic formation in which they exist, but in actuality do not necessarily correspond to the defined boundary of the mapped geologic formation. The most common aquifers are those geologic formations that have relatively high hydraulic conductivity values, such as unconsolidated sands and gravels, permeable sedimentary rocks such as sandstone and limestone, and heavily fractured sedimentary, volcanic and crystalline rocks.

Various aquifers have different well yields (amount of water a well can provide) depending on characteristics of the aquifers and may range from one to 3,000 gallons per minute (GPM) within the state of NJ. The New Jersey Geological Survey (NJGS) has assigned a well yield ranking system for the aquifers of the state based on the findings of high capacity wells. The aquifers are ranked from A to E depending on gallons per minute yield. The ranks are as follows: E, less than 25 gpm; D, 25 to 100 gpm; C, greater than 100 gpm to 250 gpm; B, greater than 250 gpm to 500 gpm; and A, greater than 500 gpm. Each county's yield data were analyzed and ranked based upon this ranking system. The metadata for this ranking system is found at the NJDEP NJGS at [www.state.nj.us/dep/njgs/geodata/dgs07-1/readme.htm](http://www.state.nj.us/dep/njgs/geodata/dgs07-1/readme.htm). It is important to consider that the well yield data collected for this ranking system is from high capacity wells and does not represent all wells located within the aquifer. High capacity wells are often created after thorough hydrologic and geologic investigations and may be installed near surface waters that contribute to well-yields (Mulhall and Demicco, 2004).

The wells of Bernardsville rely on utilizing water retrieved from the fractured formations. Increases in the fracture size are caused by weathering (Mulhall). Weathering increases fracture sizes between rocks and amount of water storage and transmission through these rocks depends on the separation distance between fractures. Fracture separations may range from several inches in some types of rocks to several feet in others (Mulhall and Demicco, 2004). Most weathering of rocks occurs near the surface of bedrock to 75 feet. Although weathering may occur to 500 feet, most fractures providing high yield wells will be encountered at depths of less than 150 feet.

There are two main types of aquifers – confined and unconfined. Confined aquifers are situated such that less permeable formations (called aquitards) are located above and below the aquifer, confining the groundwater in the aquifer. The aquifers nearest the ground surface are generally unconfined aquifers. An actively pumped well in an unconfined aquifer can draw down the surface water table in the vicinity of the well when pumped, affecting nearby surface water bodies (Freeze and Cherry, 1979). Friable (broken) layers closest to the surface of the Brunswick Aquifer are unconfined. The aquifer becomes more confined with depths below 50 feet, however leakage between the large blocky rock confining units may occur in these generally confined aquifer sections.

### **Igneous and Metamorphic Rocks**

NJDEP mapping indicates that the primary bedrock aquifers associated with Bernardsville are Precambrian Igneous and Metamorphic rock aquifers. These aquifers tend to be highly erosion and fracture resistant and therefore are some of the poorest yielding aquifers (Kasabach, 1966). NJDEP gives igneous and Precambrian rock wells a ranking of “D.” Kasabach (1966) identified 203 Hunterdon County Precambrian rock wells with yields ranging from 0 to 66 gpm with a median of 15 gpm.

## **Brunswick Aquifer**

This aquifer derives its name from its association with the Brunswick Formation, currently known as the Passaic Formation (See Section 3.2). Aquifers within the Newark Basin exist within the weathered joint and fracture systems of shales within the upper 200 – 300 ft (USGS, 2005; Barksdale, 1943). The sedimentary formations of Bernardsville associated with this aquifer include Boonton, Towaco, Feltville and the Passaic Formations. Bernardsville's Piedmont formations, including shales, sandstones, siltstones, mudstones, and diabase sills transmit water between fractures from faults, joints or changes in the bedding planes (Mulhall and Demicco, 2004). These sedimentary rocks tend to have higher yields than the basalt and igneous/metamorphic aquifers. Fracture areas are smaller and water availability lessens below 500 feet within these formations. The shale and sandstone portions of the Brunswick Aquifer tend to be the most productive and contain wells known to yield up to 1500 gallons per minute (gpm) (Carswell and Rooney, 1976). Intergranular spaces within the aquifer and coarser grained sandstones also hold water (USGS, 2005). Within Somerset County, the Brunswick Aquifer high capacity well yields range from 20 to 460 gpm with a mean of 188 gpm, giving it a "C" ranking. (Mulhall and Demicco, 2004).

## **Basalt**

Bands of Jurassic basalt forming the Watchung Mountains run in circular bands extending from Somerset northward to Bergen County. Within Bernardsville the Preakness and Hook Mt basalts are located in the southeastern portion of the municipality (see URWA Bedrock Geology Map, Page 33). The basalt tends to be poorly fractured and well yields are generally less than 100 GPM (Gill and Vecchioli, 1965). Well yields from Preakness basalt in the region of Bernardsville indicated yields ranging from 1 to 150 gpm with a median of 12 gpm (Mulhall). Bedrock fractures within the Preakness basalt have very low transmission and are poorly interconnected (Mulhall). Although there are fewer records from this formation, Hook Mountain basalt has been found to also have extremely low yields between 1 and 40 gpm with a median of 15 gpm. As with the igneous and metamorphic rocks, NJDEP gives the Basalt aquifers a ranking of "D."

## **Jacksonburg Limestone, Kittatinny Limestone and Hardyston Quartzite**

The area within Bernardsville underlain by this aquifer is very small (less than 5 acres) and therefore has little impact on the municipality's overall well capacity. Within Bernardsville, this aquifer is associated with the limestone-based Lethsville and the Hardyston Quartzite Formations. The limestones and dolomites of these formations are sometimes referred to as «carbonate rock» and generally can be good sources of well water. These rocks tend to be erodible and ground water flow can be through open conduits in the rock of these aquifers. The NJDEP gives this aquifer a "B/C" rank.

## **Recharge**

The groundwater that comprises an aquifer is derived from that part of precipitation that does not run off the surface of the land to streams or return to the atmosphere through evaporation and transpiration. Factors which determine the amount of water that infiltrates to the groundwater aquifer include the porosity and permeability of the surficial material, the slope of the land, the amount and kind of natural and artificial cover, and the intensity and amount of precipitation. The process of water infiltrating a groundwater aquifer is referred to as "recharge." Within Bernardsville Borough, groundwater recharge generally ranges from 12 to 21 inches per year throughout much of the northern and western portions of the Borough. These areas are interspersed with patches of recharge ranging from 11 to 15 inches per year. Recharge in the residential areas in the southeastern portion of the Borough is also primarily 12-16 inches per year with areas of less than 8 inches of groundwater recharge per year along Morristown and Mine Brook Roads (see Groundwater Recharge Map, Page 37).

## 3.4 POTABLE WATER SUPPLY

Water systems are classified as community or noncommunity systems. Community water systems contain no less than 15 service connections used by year-round residents, or regularly serve at least 25 year-round residents. New Jersey American Water currently holds 1,972 water bills (for zip code 07924)<sup>1</sup>. Examples include municipal systems and mobile home community systems. The NJ American Water Company supplies public community water in Bernardsville Borough under the following two divisions:

**NJ American Water Company - Short Hills Division (ID # 0712001)** consists of 25 wells, 0 wells under the influence of surface water, 4 surface water intake(s), 12 purchased groundwater source(s), and 3 purchased surface water source(s) of drinking water.

**NJ American Water Company NJ (ID # 1803002)** consists of 1 well, 0 wells under the influence of surface water, 0 surface water intake(s), 0 purchased groundwater source(s), and 0 purchased surface water source(s) of drinking water.

No wells are under the direct influence of surface water (GUDI) within these systems.

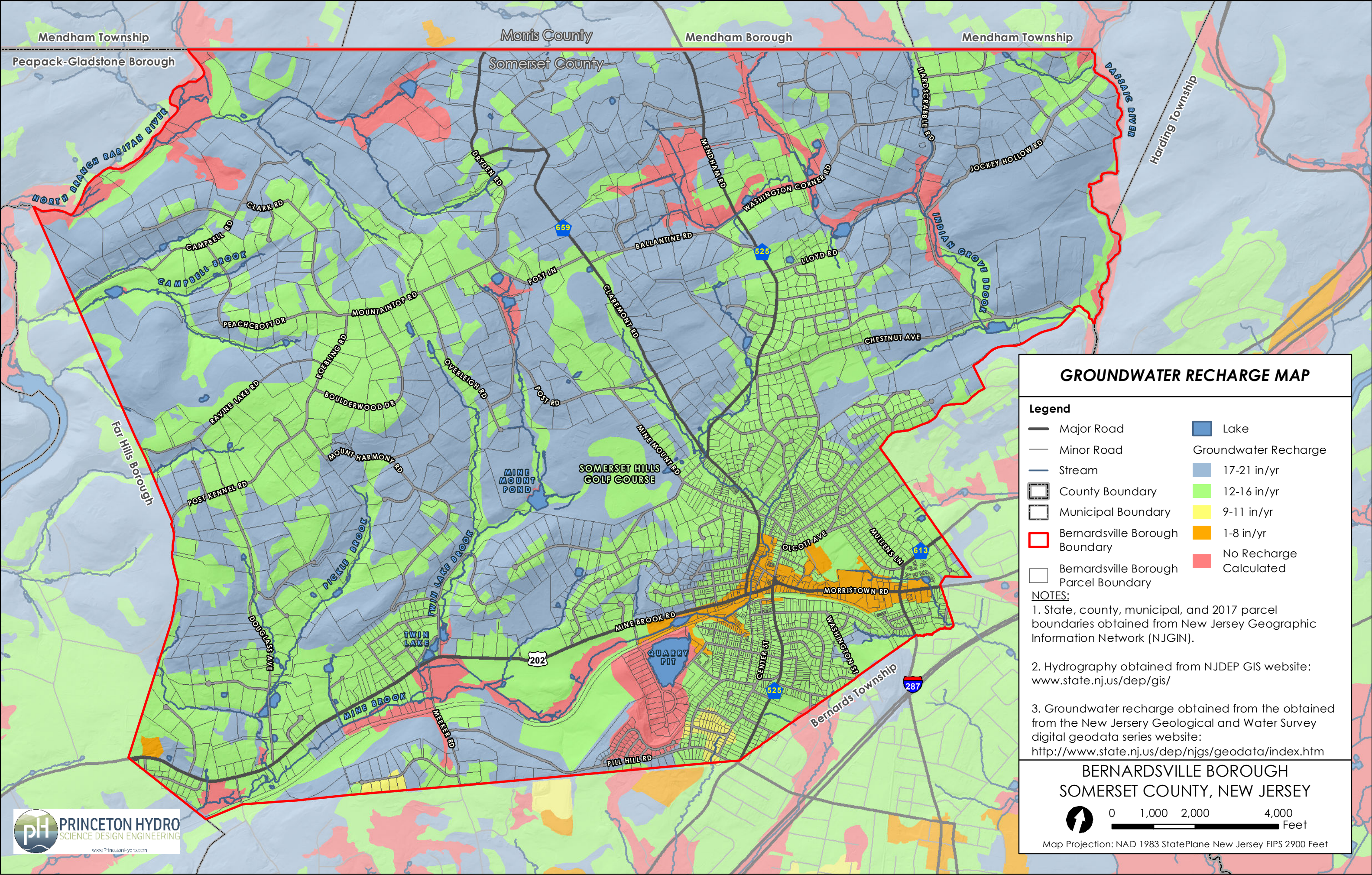
The water system data used for the development of the original drinking water source inventory was compiled in 2014. Full documents may be viewed at <https://www.state.nj.us/dep/watersupply/swap/index.html>.

A noncommunity water system is a public water system used by individuals other than year-round residents for at least sixty days of the year. Noncommunity water systems may serve transient or non-transient populations. If the water system serves the same 25+ people over a six-month period during the year, the system is considered non-transient. Examples include schools, offices and factories. A transient noncommunity water system is a system that is active at least sixty days of the year, but does not serve the same population during that time period. Rest stop areas, restaurants, and motels are examples of transient noncommunity systems. These systems may have their own noncommunity servicing wells. NJDEP well tier data indicates the presence of three noncommunity wells in Bernardsville (see Known Contaminated Sites and Wellhead Protection Areas Map, Page 46). Additionally, the Bernardsville Environmental Commission has identified one additional public community well (see Known Contaminated Sites and Wellhead Protection Areas Map, Page 46).

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1 Correspondence between Paula Stuart (Bernardsville) and Alfredo DaSilva (NJ American Water) on October 29, 2018.





**GROUNDWATER RECHARGE MAP**

**Legend**

- |   |                          |
|---|--------------------------|
| — Major Road                            | ■ Lake                   |
| — Minor Road                            | ■ Groundwater Recharge   |
| — Stream                                | ■ 17-21 in/yr            |
| ▬ County Boundary                       | ■ 12-16 in/yr            |
| ▬ Municipal Boundary                    | ■ 9-11 in/yr             |
| ▬ Bernardsville Borough Boundary        | ■ 1-8 in/yr              |
| ▬ Bernardsville Borough Parcel Boundary | ■ No Recharge Calculated |

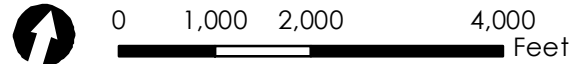
**NOTES:**

1. State, county, municipal, and 2017 parcel boundaries obtained from New Jersey Geographic Information Network (NJGIN).

2. Hydrography obtained from NJDEP GIS website: [www.state.nj.us/dep/gis/](http://www.state.nj.us/dep/gis/)

3. Groundwater recharge obtained from the obtained from the New Jersey Geological and Water Survey digital geodata series website: <http://www.state.nj.us/dep/njgs/geodata/index.htm>

**BERNARDSVILLE BOROUGH  
SOMERSET COUNTY, NEW JERSEY**



Map Projection: NAD 1983 StatePlane New Jersey FIPS 2900 Feet



## 3.5 AQUIFER CONTAMINATION

The chemical quality of groundwater is a primary concern where it is used for public and domestic supply. The chemical properties are determined by the chemical properties of the precipitation; the mineralogy of the substrate through which the water moves; and the length of time the water is in contact with the substrate. The chemical content can be altered by the introduction of contaminants into the environment. Pollutants may enter the environment from point or nonpoint sources. Point sources are usually discrete sources where concentrations may be elevated, such as leaking pipes, underground storage tanks and accidental spills. Nonpoint sources are usually lower concentrations spread out over larger areas, such as fertilizers and pesticides applied in agricultural areas, stormwater runoff from pavement and vehicle emissions that settle on the ground and infiltrate with precipitation.

The 15 basin (Northwest New Jersey) aquifer system, which includes the Raritan River, is considered to be highly vulnerable to contamination by the USEPA (1988). The 15 basin Aquifer is associated with Ridge and Valley, Highlands, and Piedmont Geology. Reasons cited for its vulnerability include thickness of the soils, the shallow depth to groundwater, and the fractured nature of some of the bedrock. Potential sources of contamination cited by the USEPA include transportation routes, septic systems, highway, rural and urban runoff, commercial and industrial facilities, and agricultural practices (USEPA, 1988). The USEPA (1980) identified the Buried Valley Aquifer System (which includes the Passaic Watershed - eastern Bernardsville) as being vulnerable to contamination through its recharge zone. The USEPA identified septic tanks and leaching of discharges to streams and rivers in the recharge and stream flow source zones as potential threats to aquifer quality. This determination aided in both of these aquifer systems' designations as Sole Source Aquifers (see Section 3.7).

Contamination of groundwater may be the result of a surface spill of a liquid, from streams or lakes, or be the result of a buried solid which is dissolved into groundwater as the result of water percolation. Contamination may be less dense than water and float, as in the case of petroleum products, or may sink within the aquifer as many solvents do. Certain chemicals may mix with aquifer water and become solutions such as chlorides. Some chemicals that dissolve into the water may travel distances of thousands of feet from the original source in the form of a "plume." The introduction of certain biodegradable materials into an aquifer may result in changes to the chemical properties of the groundwater. These chemical changes may result in the freeing of previously bound naturally occurring metals into groundwater. The release of metals from chemical changes has been associated with aquifer portions located under landfills (NJDWSC, 2002).

The New Jersey Department of Environmental Protection produces a Source Water Assessment Report under the Source Water Assessment Program (SWAP) for all public water systems within the state. This report determines the susceptibility of a water system to various contaminants and does not reflect actual contaminants being consumed by customers of that water supply system. Under this program the following parameters are considered: Pathogens including bacteria and viruses; nutrients including nitrogen and phosphorus; volatile organic compounds (VOCs) such as solvents, degreasers and gasoline components; pesticides; inorganics including asbestos, arsenic, lead and other metals; radionuclides including uranium and radium; radon; and disinfection byproduct precursors (DBP) that include solutions of organic matter and disinfecting agents such as chlorine.

Each contaminant is given a high (H), medium (M), or low (L) rating depending on the susceptibility of the particular well. Levels of susceptibility are determined by looking at various factors impacting

the wells including the hydrologic conductivity of the soil, percentages of organic matter and clay in the soils, the proximity of agricultural land uses, the proximity and amount of urban landscape or impervious surfaces, and the proximity of streams and wetlands. Susceptibility ratings are listed in Table 2 below for Bernardsville's public community water systems and one noncommunity system (Somerset Hills Country Club). It is important to remember that these ratings reflect a well's potential for contamination, and do not confirm actual contamination. Public water systems are required to monitor for regulated contaminants and must install treatment if any contaminants are detected at frequencies and concentrations above allowable levels (Source Water Assessment Program (SWAP), 2004).

In 2006, the Bernardsville Environmental Commission contracted Connolly Environmental, Inc. to prepare a Water Resources Study for the Borough. The purpose of the report was to assess the carrying capacity of the Borough's resources with respect to supplying potable water. Both groundwater quantity and quality were evaluated. The Study concluded that: (1) the groundwater supply is sufficient and (2) concentration levels of nitrates in groundwater are already elevated.

Additional details and information regarding source water protection data in Bernardsville and throughout New Jersey may be obtained through the NJDEP at <https://www.state.nj.us/dep/watersupply/swap/index.html>.

**TABLE 2:**  
**CONTAMINATION POTENTIAL PUBLIC COMMUNITY AND NONCOMMUNITY**  
**SOURCE WATER FOR THE BOROUGH OF BERNARDSVILLE**

Name and/or ID #	Pathogens			Nutrients			Pesticides			VOCs			Inorganics			Radionuclides			Radon			DPB		
SOURCES	H	M	L	H	M	L	H	M	L	H	M	L	H	M	L	H	M	L	H	M	L	H	M	L
Wells -25 0712001	1	21	3	13	12			6	19	17		8	10	11	4		25		25			3	22	
GUDI- 0																								
Surface water Intakes - 4 0712001	4			2	2			2	2		4		4				4			4	4			
Wells -1 1803002		1		1				1				1			1	1			1				1	
Noncommunity Well-1		1			1			1				1			1			1		1			1	

Source: NJDEP SWAP 2004 Source Water Assessment Reports

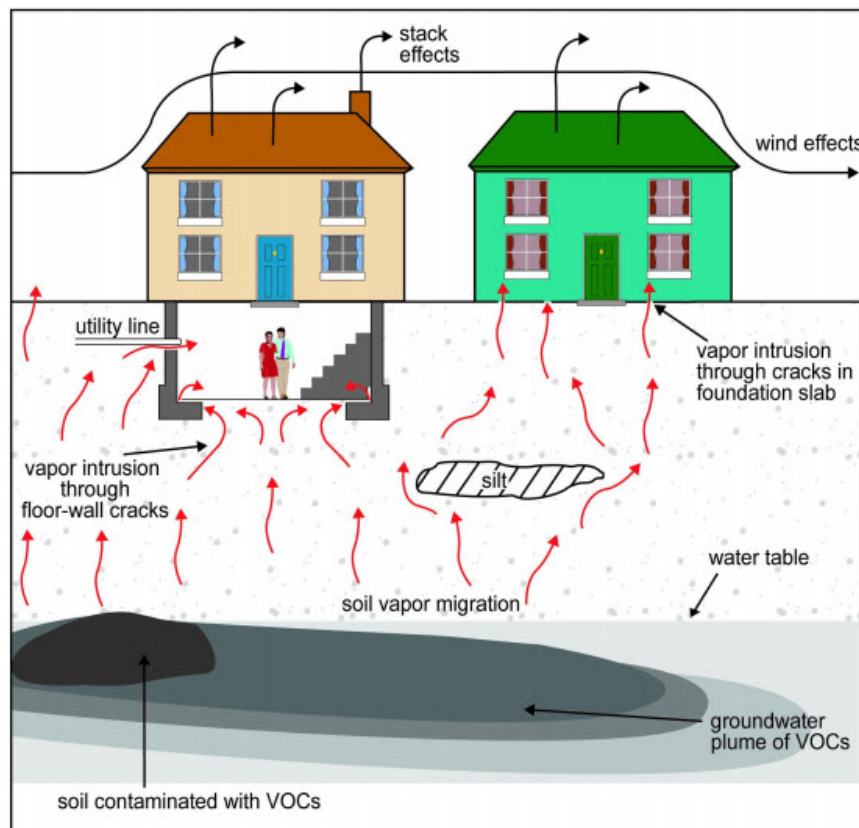
Note: This is the most recent SWAP available as of July 2018.

## CONTAMINANTS

### VOCs

Seventeen wells within Bernardsville's public water systems were determined to have high susceptibility for volatile organic compounds or VOCs (see Table 2). VOCs are the most common organic groundwater contaminants in New Jersey. VOC contaminants may be derived from point or nonpoint in origin and typically include solvents, degreasers, and additives of gasoline including MTBE (methyl tertiary-butyl ether). Gas stations, chemical plants, and other industries are typical sources of VOCs. In addition to being linked to adverse health problems, VOCs contribute to the development of ground level ozone (O<sub>3</sub>). Ozone is a gas that forms when nitrogen oxides and VOCs react in the presence of sunlight and heat. VOC aquifer contamination is common in urban and industrialized areas within the state. MTBE is a common VOC groundwater contaminant used as a fuel additive to increase oxygen content in gasoline. Leaky underground fuel tanks can result in MTBE contamination.

In the last decade, the threat of vapor intrusion from VOC contamination is a growing concern. USEPA defines vapor intrusion as "a migration of vapor-forming chemicals from any subsurface source into an overlying building." Common sources of vapor-forming chemicals include VOCs like Trichloroethylene (TCE) and Tetrachloroethylene (PCE); select semi-volatile organic compounds, such as naphthalene; elemental mercury; select polychlorinated biphenyls; and select pesticides. As vapors off-gas from the source of contamination in soil, groundwater, etc., it rises up or migrates through sewers and drain lines, and begins to build up vapors underneath any structure. Cracks in foundation slabs, utility lines, French drains, etc., provide pathways for the vapors to enter the structures, which can pose threats to indoor air quality and lead to health effects if exposed (See Figure A below). To determine if there is vapor intrusion on known contaminated sites with sources of VOC contamination, subslab and indoor air testing can be conducted.



**Figure A: Vapor Intrusion Pathways**

Source: [USEPA Vapor Intrusion](#)

## Nutrients

A high potential for nutrient contamination was found in two surface water intakes and 14 wells of Bernardsville's Community Water Sources (see Table 2). Nutrient contamination is linked with high levels of nitrogen and phosphorus. High nutrient levels may be connected to fertilizers from agricultural areas or lawns, or may result from sewage treatment effluent, leaky septic systems, livestock or excessive waterfowl (e.g. Canada goose) populations. Nutrients can have environmental and human health impacts by enhancing the growth of harmful pathogens such as E. coli bacteria or creating eutrophic conditions in open waters. NJ American surface water intakes were found to have a high potential for pathogen contamination (see Table 2).

Nutrient overloads and sedimentation, or the occurrence of fine particulate matter in water, may result in eutrophic conditions. Eutrophism is caused by an exponential population increase of photosynthetic organisms including algae, which in turn results in reduced oxygen levels in the water. Ultimately, this may result in inhospitable conditions for many fish and other aquatic wildlife. Residential development, golf courses or other sources of maintained lawn may contribute to excessive nitrogen or phosphorus through application of fertilizers for grass maintenance. Soil erosion from development and increases in impervious surfaces may result in increased sedimentation.

## Radiation

Unstable, radioactive components of certain elements naturally occurring or introduced into the soil are known as radionuclides. Common forms of radionuclides include alpha emitters, proton/proton emitters, radium 226/228 and radon. All of these forms of radiation have been linked to various forms of cancer. Radon is a naturally occurring gas that results from the breakdown of uranium in soil. Although radon is typically associated with and is most dangerous as air contamination, it may also enter water. The single system NJ American source-water well was found to have high susceptibility to radon and radionuclide contamination (see Table 2).

Preliminary water testing for radioactive elements involves measuring gross alpha activity. Alpha radiation is a product of radioactive decay, a process by which elements emit radiation to reach a more stable form. Alpha radiation is measured in units known as picocuries. NJDEP indicates that the geologic formations in NJ typically associated with the highest levels of uranium occur in the Highlands Province of NJ, which includes the northernmost tip of Somerset County (NJDEP, 2004).

Under current U.S. Environmental Protection Agency laws, the lifetime risk associated with consuming water with the maximum allowable contaminant level for gross alpha activity is 1 in 10,000, or one additional fatal cancer for every 10,000 people consuming two liters of water per day for seventy years. Municipal water systems are required to test for and treat water above the maximum contaminant level (MCL). The current MCL for dissolved radium (226 and 228) is 5pCi/L (picocuries per liter) (USEPA, 2002).

Additional information related to radionuclide contamination may be obtained at <http://www.state.nj.us/dep/rpp/radwater.htm>.

## Inorganics

Inorganics include a variety of non-organic substances ranging from asbestos to heavy metals. Heavy metals are those metals ranging from copper (average atomic weight 63.546) and those above it in the periodic table. Industrial waste is a typical source of these metal contaminants. Certain metals including cobalt, manganese, molybdenum, vanadium, strontium, zinc, nickel, copper and iron are utilized by all living organisms in trace amounts. However, mercury (see above), cadmium, chromium, arsenic and lead are metals considered particularly dangerous to humans and wildlife in surface waters (Kennish,



1992). A wide range of health problems have been associated with heavy metals: cadmium disrupts the body's ability to regulate zinc and copper (Kennish, 1992); chromium may cause respiratory and dermatological problems; and arsenic may cause digestive tract and cardiac harm. Arsenic has also been linked to cancer (NJGS, 2007). Ten public community wells and all surface water supply sources for Bernardsville's community water have been determined to have a high susceptibility to inorganics (see Table 2).

### **Disinfection Byproduct Precursors (DBP)**

DBPs are byproducts resulting from the reaction between disinfectants and organic and inorganic compounds in water. Chlorine is the most common disinfectant associated with DBPs. Chlorine is typically used in public water supplies as a means of controlling water-borne pathogens. Common chlorination byproduct chemicals include trihalomethanes (THMs), haloacetic acids, haloacetonitriles and chloral hydrate. Natural organic matter has been determined to be a primary organic component of DBPs (Stevens et al.1976). The USEPA has created some MCL standards for some DBPs.

DBPs may be naturally occurring or the result of septic system effluent coming in contact with surface water bodies or groundwater supplies. Water with higher concentrations of organic compounds is naturally more susceptible to DBP formation. Water quality and water treatment factors that are identified as potentially contributing to the development of certain DBPs (THM) include increased contact time, higher presence of carbon precursors in the water, higher temperature, higher pH, greater presence of free chlorine residuals, and higher concentrations of bromide.

Three wells in the NJ American water systems were found to be highly susceptible to DBP contamination. Surface waters throughout NJ, including the four intakes utilized by the community water systems of Bernardsville Borough, are also highly susceptible to DBP contamination.

### **Pesticides**

Pesticides are a group of chemicals used to kill or control pests. Subcategories of pesticides include herbicides (plants), fungicides (fungi), rodenticides (rodents), algicides (algae), insecticides (insects and other arthropods), nematocides (nematode worms), and bactericides (bacteria and similar pathogens). They are typically distributed from nonpoint sources such as agricultural fields, golf courses, residential lawns, transportation rights-of-way, commercial and industrial sources and atmospheric deposition. A wide range of chemicals are used as pesticides including organochlorine; organophosphorus; carbamate insecticides; chlorophenoxy, acetanilide, and triazine herbicide acids; and some VOC fumigants. Variables that may impact pesticide contamination potential include organic content of soil (wells), surrounding land use, and distance from the water source to agricultural operations and minimum distances to golf courses.

Various pesticides (including organophosphates and N-methyl carbamates) have been linked to nervous system function impacts, and triazines have been linked to developmental reproductive impacts in lab animals and tumor production (chloroacetanilides) (USEPA) Website: [www.epa.gov/pesticides/cumulative/common\\_mech\\_groups.htm#chloro](http://www.epa.gov/pesticides/cumulative/common_mech_groups.htm#chloro). According to the NJDEP SWAP (2004) reports pertaining to Bernardsville, none of the community or noncommunity water sources of Bernardsville were found to have the high potential for pesticide contamination.

Additional information on these and other forms of water contamination may be found at the EPA website [www.epa.gov/ogwdw/hfacts.html](http://www.epa.gov/ogwdw/hfacts.html) and the NJDEP SWAP website at <https://www.state.nj.us/dep/watersupply/swap/index.html> Source Water Assessment Program Plan, November 1999.

## 3.6 WELLHEAD PROTECTION

In order to protect New Jersey groundwater resources, the NJDEP has identified Wellhead Protection Areas (WHPAs) for public community water supply wells (see Known Contaminated Sites and Wellhead Protection Areas Map on Page 46). The WHPA is the area from which a well draws its water within a specified timeframe. Once delineated, the WHPAs are typically considered priority areas to prevent and clean up groundwater contamination.

WHPAs consist of three tiers, each based on the time of travel (TOT) to the well. The outer boundaries of these tiers will have the following times of travel:

Tier 1 = two years (730 days)

Tier 2 = five years (1,826 days)

Tier 3 = twelve years (4,383 days)

The portion of the zone of contribution designated as the WHPA is based upon the TOT of the groundwater to a pumping well. The TOT is particularly significant in that it is related to the amount of time it would take a flowing contaminant to reach the well from a given location. The TOT determination aids in prioritizing sources that pose an imminent threat to a well water source.

There is one community well identified by NJDEP in Bernardsville near Twin Lake, and portions of the 12 and 5 year tiers from a community well in Basking Ridge. There are three noncommunity wells in Bernardsville and portions of the two, five and twelve-year tiers from a noncommunity well in Mendham Borough along the northern boundary of the municipality (see Known Contaminated Sites/ Wellhead Protection Areas Map, Page 46). No known contaminated sites (KCS – see Section 3.8) were identified within the community or noncommunity well tiers within the municipality. However, several KCS sites are close to the community well tiers of Basking Ridge that underlay the more densely populated portions of southeastern Bernardsville.

## 3.7 SOLE-SOURCE AQUIFERS

The Federal Safe Drinking Water Act contains provisions that allow for specific designation of areas that are dependent on groundwater as their sole or principal drinking water source. The technical requirements for designation as a Sole-Source Aquifer are that (1) more than 50% of the drinking water for the aquifer service area is supplied by the aquifer system and (2) that there are no economically feasible alternative drinking water sources (EPA, 2009).

When an area is designated as a Sole-Source Aquifer, the Federal environmental review process will ensure that Federal agencies will not commit funds toward projects which may contaminate these designated groundwater supplies (EPA, 2009). Bernardsville is fully contained within two different Sole-Source Aquifers. The Raritan Watershed Management Area (WMA 8) of western Bernardsville is part of the Northwest New Jersey 15 Basin Sole-Source Aquifer and makes up two-thirds of the Borough. The eastern third of Bernardsville lies within the Upper Passaic Whippany and Rockaway Watershed (WMA 6) and is therefore part of the Buried Valley Sole-Source Aquifer system.

## 3.8 KNOWN CONTAMINATED SITES

Known Contaminated Sites are sites where contamination of soil and/or groundwater is confirmed at levels greater than the applicable cleanup criteria or standard. Remedial activities, which may be as simple as soil removal and replacement, or which are very complex may be underway. A site may be active, or may be pending when the site has not yet been assigned to a specific remediation program, or may be closed with restrictions.

NJDEP's Site Remediation Program currently maintains a list of more than 14,000 New Jersey sites that are confirmed to be contaminated and are undergoing a remedial investigation or a cleanup or are awaiting assignment. In 2009, the New Jersey legislature passed the "Site Remediation Reform Act" (N.J.S.A. 58:10C-1 et seq.), which changed the process for how sites are remediated in New Jersey. SRRA established the affirmative obligation for responsible parties to remediate contaminated sites in a timely manner. In order to achieve this goal, SRRA created a category of remediation professionals known as Licensed Site Remediation professionals (LSRP). LSRPs now serve as the project managers instead of NJDEP, and oversee the remediation of contaminated sites. SRRA requires that the LSRP comply with all remediation statutes and rules and consider NJDEP-developed guidance when making remediation decisions. This process went into effect on May 7, 2012. According to NJDEP, under this new remediation paradigm, with very limited exceptions, the remediating party need not wait for the NJDEP's direction and pre-approvals to commence and continue cleanups. Instead, they must initiate and complete the cleanup under the direction of an LSRP, who has responsibility for oversight of the environmental investigation and remediation. The NJDEP monitors the remediation progress and the actions of LSRPs by requiring the submittal of forms and reports as remediation milestones are reached.

"Active" sites are those sites having one or more active cases or remedial action permits where contamination has been confirmed. These sites may have any number of pending and/or closed cases. "Pending" sites are those sites having one or more pending cases, no active cases, and any number of closed cases. Sites/cases with remedial action permits are not included in this category. "Closed" sites are those sites having only closed cases. Sites in this classification have no active or pending cases. Sites/cases with remedial action permits are not included in this category. "Closed with Conditions" sites are those sites that are closed with institutional controls. "Other" is a category listed in NJDEP Data Miner's Known Contaminated Sites Municipal Report (All Sites) but is not defined by NJDEP on their website, and therefore, the category definition is unknown at this time.

According to NJDEP's Data Miner Municipal Report for Bernardsville, there are 294 identified Known Contaminated Sites in Bernardsville. However, there are only seven (7) sites that are active and seven (7) sites that are pending. Overall, 238 sites have been closed, one (1) site is closed with conditions,



and one (1) site is classified as “other.” 40 sites do not have a status listed, so the current remediation status is unclear. A majority of the mapped active sites are generally clustered in the more densely populated southeastern portion of the Borough along Mine Brook Road and Morristown Road. This finding is consistent with the results in the 2010 ERI Report (See Map Page 46).

The 2010 ERI Report identified 25 Active Known Contaminated Sites in Bernardsville as of 2009, and as of 2018, NJDEP Data Miner data has seven (7) active, (7) pending, and (1) other. If just these are considered, the trend is moving in a positive direction. However, due to the fact that 40 sites are noted as “No Status Available,” it is unclear if they are active and therefore neither a positive nor negative trend can be determined. (Complete list of sites can be found in Appendix C).

Detailed information describing the case history at a site, including active cases, is available through the NJDEP Data Miner's Site Search Report or Active Case Report, by using the Site Remediation Program ([www.nj.gov/dep/srp](http://www.nj.gov/dep/srp)) Interest (PI) Number, which is provided above report. The Data Miner reports will provide the current data available in the database: <https://www13.state.nj.us/DataMiner>. Requests for specific contaminants or additional information may require a formal Open Public Records Act (OPRA) request.

Since 2010, thirteen (13) sites have shifted from “active” to “closed.” They include:

1. 6 Pheasant Hill Drive (PI #172054)
2. 65 Mine Brook Rd (PI# 458024)
3. Bernardsville Sanitary Landfill (PI# G000008852)
4. 26 Crestview Drive (PI# 264281)
5. 15 Sunset Drive (PI# 264959)
6. 189 Mine Brook Road (PI# 279976)
7. 9 Sunset Dr. (PI# 435733)
8. 29 Maple Village Ct. (PI #440030)
9. 591 Mine Brook Rd (PI# 458029)
10. 580 US Highway Rt 202 (PI #461705)
11. 190 Claremont Rd (PI #485091)
12. 59 Page Hill Rd. (PI #493312)
13. 86-4 Douglass Ave (PI #498199)

One (1) site that was listed as “active” in 2010 has shifted to “other:

1. Rite Aid of NJ, Inc. (PI #G000039612)

**TABLE 3:  
STATUS OF KNOWN  
CONTAMINATED SITES IN  
BERNARDSVILLE BOROUGH**

Status of Site	Total Sites
Active	7
Pending	7
Closed with Conditions	1
Closed	238
Other	1
No Status Available	40
<b>TOTAL</b>	<b>294</b>

Source: NJDEP Data Miner, July 2018

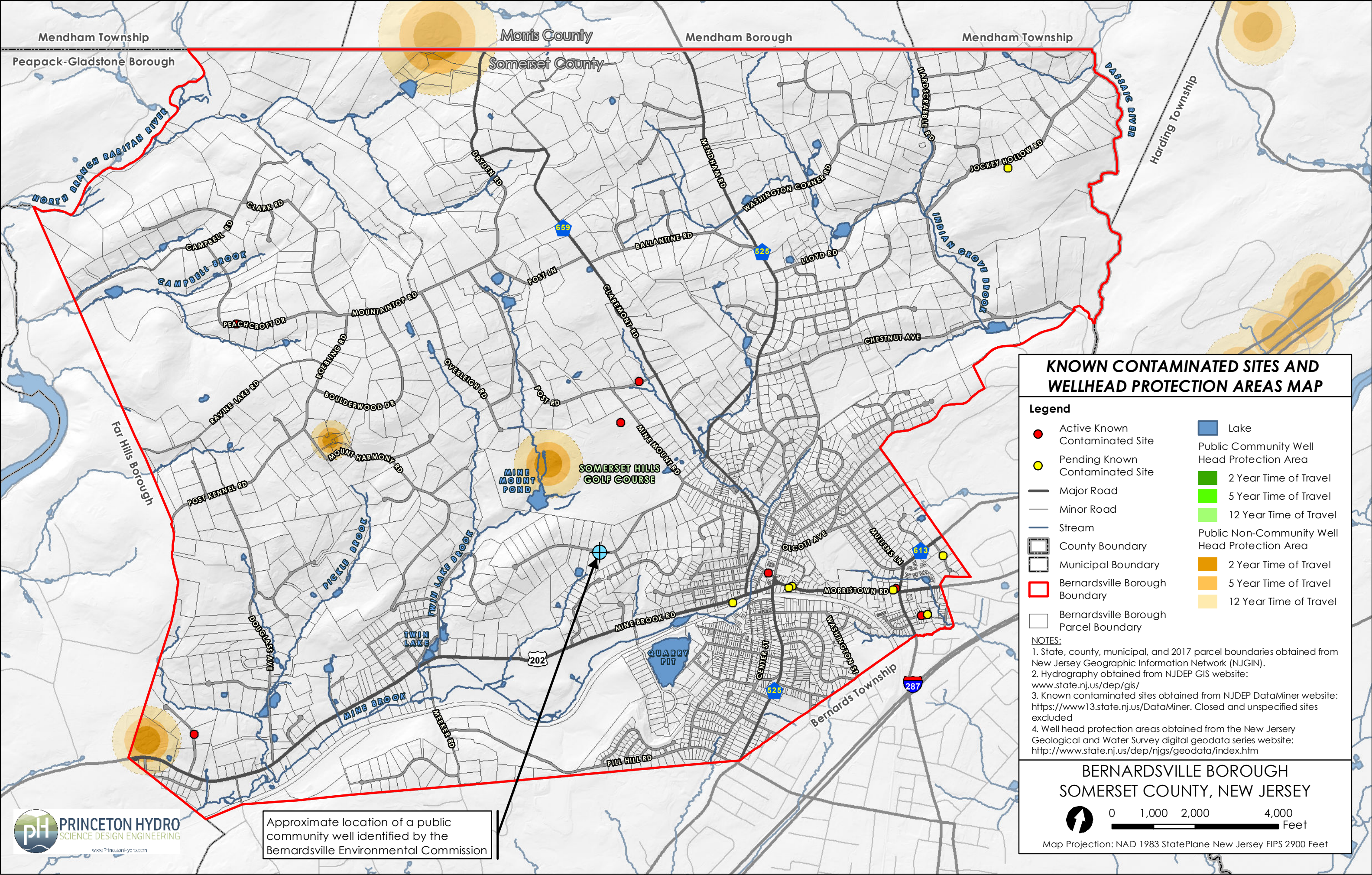
Eight (8) sites have shifted from “active” to “no status available.” They include:

1. Texaco Service Station #100110 (PI #11693)
2. Bernardsville Amoco (PI# 12597)
3. Duffy Transportation (PI# 12053)
4. Novo Motors (PI# G000037487)
5. Love Valero (previously Loves Garage and Gas) (PI# 988)
6. Bernardsville Sewer Plant (PI# 12534)
7. 4 Mine Brook Rd (PI# G000011630)
8. 12 Mine Brook Road (PI# 294286)

The remaining three (3) sites that were listed as “active” in 2010 are still listed as “active” in 2018. They include:

1. Somerset Hills Country Club (PI #20372)
2. 21 Post Kunhardt Road (PI #G000031039)
3. Tysley Road Groundwater Contamination (PI #G000037453)







## 4. SOILS



PHOTO BY ED ENGLISH



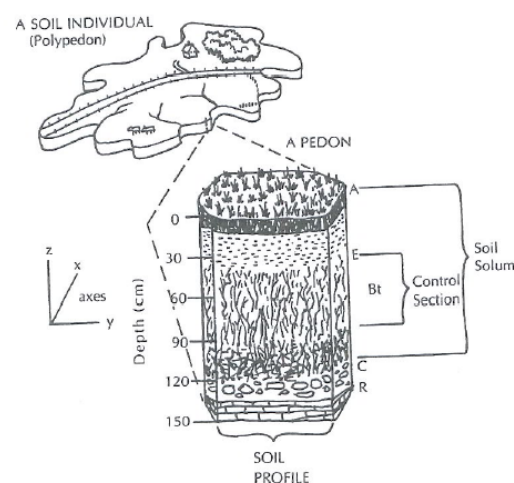
## 4.1 SOIL TYPES

Soils provide the basis for the potential land uses within the community. They determine the types of vegetation or crops that can be grown and influence the development activities and design of structures that can be constructed. Soils represent a non-renewable resource and must be appropriately managed. In addition to the cultural and aesthetic losses typically associated with the loss of farms to residential development, the loss of quality soil typically occurs. Residential and commercial development results in the conversion of soils from their historic agricultural or open space uses into permanent non-use.

Soils are formed by forces of the environment acting on soil material deposited or accumulated by geologic processes. The characteristics of a soil at any given location are determined by the climate in which the soils material has accumulated and has existed since accumulation; the physical and mineralogical composition of the parent material; the relief or slope of the land which influences drainage, moisture content, aeration, susceptibility to erosion, and exposure to the sun and elements; the biological forces (plants and animals) acting upon the soil material; and the length of time the climate and biological forces have had to act on the soil (Ritter, 2006). NJDEP mapping indicates that the parent material of soils in Bernardsville Borough primarily consist of granitic gneisses as well as sedimentary rocks including sandstones, siltstones, and shales (NJGS 2002 – see URWA Bedrock Geology Map, Page 33).

The U.S. Department of Agriculture's (USDA) Natural Resource Conservation Service (NRCS) has prepared soil mapping from the Soil Survey Geographic (SSURGO) database that is available from NJDEP GIS data. SSURGO is mapped throughout the State of New Jersey. Bernardsville Borough contains a relatively diverse range of soil types that include a total of 46 individual units (excluding water, quarry, and Entisols – see below). These soil mapping units are components of 25 soil series (See SSURGO Soils Map - Page 55). Soil series are more generalized soil characterizations. Descriptions of the major soil series within Bernardsville are included in this section. Soil Series totals are included in Table 4. The various units and their amounts within Bernardsville Borough, as mapped by SSURGO, are listed in Table 5.

Soils under the USDA system are arranged in increasingly specific groups based on various definitive characteristics of the soil profile or pedon. The pedon is typically viewed as a cross section of soil showing various layers or horizons (see Figure B). Generalized horizons may include O (organic – dark layer of undecomposed plant residues) A – topsoil that contains organic residues and soil life; E -soil leached of organic and mineral content; B –subsoil that accumulates irons, aluminum, clays and organic compounds; C substratum that contains parent materials; and R which contains weathered bedrock. Subscripts may exist within a horizon and denote additional details such as Ap (A horizon disturbed by plowing) or B2 (slight color or texture changes with horizon depth). The pedon is defined by slope, position, size, profile features, color, chemical, and mineralogical properties, and physical structure (Buol, et al. 1997).



**Figure B: Figure of typical soil profile or pedon showing well-defined horizons from (Buol, et al. 1997). The composition of the profile is utilized in the soil classification system.**

**TABLE 4:**  
**SOIL SERIES OF BERNARDSVILLE BOROUGH**

Series	Total Sum of Acres	% of Total	Depth to Bedrock
Gladstone	2,696.440	32.71%	66+ inches
Parker	1,429.763	17.34%	5 to 10 feet
Califon	1,132.551	13.74%	6 to 20 feet
Meckesville	815.320	9.89%	60+ inches
Udifuvents (not a soil series)	558.033	6.77%	ND
Annandale	364.280	4.42%	5 to 20+ feet
Neshaminy	346.575	4.20%	48+ inches
Hibernia	303.991	3.69%	6+ feet
Water (not a soil series)	136.206	1.65%	NA
Watchung	109.109	1.32%	60+ inches
Fluvaquents (not a soil series)	89.865	1.09%	ND
Berks	54.558	0.66%	20 to 40 inches
Penn	51.836	0.63%	20 to 40 inches
Mount Lucas	41.110	0.50%	48+ inches
Abbottstown	29.107	0.35%	40 to 60 inches
Raritan	26.636	0.32%	5 to 20 feet
Klinesville	18.263	0.22%	10 to 20 inches
Croton	12.486	0.15%	3.5 to 5 feet
Norton	8.533	0.10%	3.5 to 10 feet
Parsippany	5.395	0.07%	6+ feet
Rowland	4.159	0.05%	40+ inches (sand and gravel)
Lansdowne	3.472	0.04%	40+ inches
Bucks	3.357	0.04%	40+ inches
Cokesbury	2.949	0.04%	6 to 10+ feet
Birdsboro	0.597	0.01%	6 to 20 feet

Source: USDA SSURGO Database. Survey Area Version No. 15, Published 10/6/2017

Major Soil Series of Bernardsville Borough (50 + acres) summarized from the USDA NRCS Official Soil Series Descriptions (<https://soilseries.sc.egov.usda.gov/osdname.aspx>):

## GLADSTONE SERIES

**Origin:** The Gladstone Series contains very deep soils formed as residues (residuum) or sediments (colluviums) from granitic gneiss impacted by glacial activity.

**Location:** They are upland soils forming on mountain divides or rolling foothills of Piedmont regions between 400 and 1100 feet AMSL in NJ and PA. They occur on slopes ranging from 0 to 65% gradient, typically 3 to 25%.

**Characteristics:** Gladstone soils are well-drained with moderately high hydraulic conductivity with medium or high runoff. A mesic gravelly loam soil with Ap, BA, Bt1, Bt2, C and R horizons. Gravel content ranges from 5 to 35% in the A and B horizons and 10 to 40 in the C horizon. Color ranges from brown to strong brown in upper horizons to very pale brown in the R horizon. Depth to bedrock is 66+ inches. Gladstone is naturally acidic to very strongly acidic

**Cover and Uses:** Most non-stony soil is utilized for corn, grain, soybean, fruit, hay and pasture production. Some portions of the stony sloping areas are utilized for residential development. Remaining stony areas are wooded. Naturally occurring vegetation includes upland oaks (*Quercus* spp.), hickories (*Carya* spp), white ash (*Fraxinus americana*) and tulip poplar (*Liriodendron tulipifera*).

## PARKER SERIES

**Origin:** The Parker Series contains very deep soils formed as residues from granitic gneiss impacted by glacial activity.

**Location:** They are upland soils forming on gentle hills to very steep slopes of ridges in NJ and VA. They occur on slopes ranging from 3 to 70%, commonly 15%.

**Characteristics:** Parker soils are somewhat excessively drained with moderately rapid permeability and runoff ranges from low to medium. A mesic gravelly loam soil with O and Oe (organic layer) A, Bw1, Bw2, C horizons. Gravel content ranges from 35 to 70% in the A and B horizons and 60 to 90% in the C horizon with cobble and stone fragments occurring. Color ranges from dark brown and brown in upper horizons to yellowish brown and in the C horizon. Depth to bedrock is 5 to 10 feet. Parker is naturally strongly to very strongly acidic.

**Cover and Uses:** Less than 50% has been cleared for crops. Much of the formerly farmed areas are successional dominated by dogwoods (*Cornus* spp.) and Eastern red cedar (*Juniperis virginiana*). Common forest vegetation includes upland oaks (*Quercus* spp.) and hickories (*Carya* spp).

## MECKSVILLE SERIES

**Origin:** The Mecksville Series contains very deep soils formed as sediments, glacial till or congeliturbate (unconsolidated earth disturbed by frost) from red acid sandstone, siltstone or shale.

**Location:** Meckesville soils are formed on concave side slopes of upland ridges on slopes of 0 to 60% mostly found in PA, MD, and WVA.



**Characteristics:** Meckesville soils are well drained with moderately slow permeability and runoff ranges from negligible to very high. A mesic fine-loamy soil with Oi1 and Oi2 (thin organic layer) A, E, Bt1, Bt2, Bt3, Btx1, Btx2, Btx3 and C horizons. Rock fragments range from 5 to 30% in the upper solum (upper A and B horizons), 10 to 50% in the lower solum (lower B horizons), and 15 to 80% in the C horizon. Color ranges from reddish brown, dusky red in the upper solum to weak red in the lower solum and C horizons. Meckesville is naturally extremely to strongly acidic. Depth to bedrock is 60+ inches.

**Cover and Uses:** Approximately 70% of the soil cover is forested, comprised of oaks, maple (*Acer* spp.) and ash species, with the remaining 30% functioning as cropland, pasture or successional land.

## CALIFON SERIES

**Origin:** Califon soils consist of very deep soils formed either in old till or on driftless landscapes in the Piedmont in colluvium from granitic gneiss

**Location:** Califon soils form on upland flats or concave slope positions ranging from 0 to 15 % in north-central NJ and southeastern PA.

**Characteristics:** Moderately well or somewhat poorly drained and contains a moderately low hydrologic conductivity in the fragipan and moderately high conductivity in the substratum. Califon soils are mesic fine-loamy soils with an Ap, Bt, Btx1, Btx2, Btx3, Btx4, and C horizon. Horizons may be brown, strong brown or yellowish brown. Califon is naturally moderately to slightly acidic near the surface and strongly to very strongly acidic in the lower part of the solum and the C horizon.

**Cover and Uses:** A small part of Califon soil is utilized for pasture, hay and woodland. Natural vegetation includes red maple, tulip poplar and pin oak.

## NESHAMINY SERIES

**Origin:** The Neshaminy Series contains deep to very deep soils formed from weathered diabase and similar volcanic rocks.

**Location:** On nearly level to very steep upland slopes ranging from 0 to 70% throughout southeastern PA, MD, DE and NJ.

**Characteristics:** Neshaminy soils are well drained with moderately slow saturated hydro conductivity. Runoff ranges from slow to very rapid. A mesic fine-loamy soil with Oi (thin organic layer) A, E, BE, Bt1, Bt2, Bt3, C, and R horizons. Rock fragments of angular quartzite and rounded diabase from 0 to 40% in the upper solum and 0 to 60% in the lower solum and C horizon. Color ranges from grayish brown and yellowish brown in the upper solum to yellowish red and red in the lower solum and C horizons. Neshaminy is naturally very strongly acidic to moderately acidic. Depth to bedrock is 48+ inches.

**Cover and Uses:** Stony and steep areas are upland oak and hickory forest. Less steep areas may be used for cropland, hay and pastureland. Some portions are utilized for urban and suburban development.

## PENN SERIES

**Origin:** Soils of the Penn Series are moderately deep and derived from weathered Triassic reddish shale, siltstone, and fine-grained sandstone.

**Location:** Penn soils are found on fairly level to steep upland slopes ranging from 0 to 60%. Penn soils are found in southeastern PA, NJ, MD and VA.

**Characteristics:** Penn soils tend to be well drained, runoff is medium to very rapid and permeability is moderate to moderately rapid. Penn soils are mesic, superactive fine-loamy soils with Ap Bt1, Bt2, Bt3, Cr and R horizons. Colors range from dark reddish-brown reddish brown to weak red and dusky red. Rock fragment content ranges from 2 to 50 % in the solum. The C horizon contains 30 to 90% shale and siltstone rock content. Soil ranges from slightly acid to strongly acid. Depth to bedrock is 20 to 40 inches.

**Cover and Uses:** Much of Penn soil is used for rotation cropland. Wooded areas tend to be mixed hardwood dominated by oak.

## ANNANDALE SERIES

**Origin:** The Annandale series consists of very deep, well drained soils that formed in deeply weathered old glacial till (pre-Wisconsin Age) and underlying residuum derived mainly from granitic gneiss.

**Location:** Annandale soils occur on gently sloping to strongly sloping uplands, with slopes ranging from 3 to 25 percent. Annandale soils are located in portions of the Highlands section of the Appalachian Province in New Jersey and possibly eastern Pennsylvania (generally, MLRA 148 - Northern Piedmont) associated with remnants of older (Kansan or Illinoian) glacial periods. Extent is moderate, with about 21,000 acres identified.

**Characteristics:** Thickness of the solum ranges from 40 to 60 inches. Depth of bedrock ranges from 6 to 20 feet or more. Depth to the top of the fragipan ranges from 24 to 36 inches. Depth to a lithologic discontinuity ranges from 2.5 to 6 feet or more. Reaction, unless limed, ranges from moderately and slightly acid in the solum, to very strongly acidic in the C horizon. Rock fragments, some of which are strongly weathered, range from 1 to 20 percent by volume in the textural control section and upper part of the solum, and from 5 to 35 percent in the Btx and C horizons. Stones are few to common throughout the solum. Rock fragments are dominantly granitic gneiss.

**Cover and Uses:** Most of these soils have been cleared of trees and are used for cultivated crops, hay and pasture. Original vegetation was chestnut and oak forest and some white pine and yellow poplar. Abandoned fields have grown up to a wide variety of trees and shrubs, including oaks, ash, hickory, maples, sassafras, black cherry, and dogwood.

## HIBERNIA SERIES

**Origin:** The Hibernia series consists of very deep, somewhat poorly drained soils in low positions on undulating uplands. The soils are shallow or moderately deep to a fragipan. They formed in till and colluvial material.

**Location:** These are the Alden, Netcong, Rockaway, Ridgebury, and Riverhead soils on nearby landscapes. Very poorly drained Alden soils are on lower positions on the landscape. Netcong and Rockaway soils usually occupy higher positions on the landscape. Ridgebury soils usually occupy lower positions on the landscape. Riverhead soils are typically on terraces and outwash plains in major valleys and are in stratified gravelly and sandy deposits.

**Characteristics:** Hibernia soils are somewhat poorly drained. Surface runoff is negligible to high. Permeability is moderate above the fragipan, slow in the fragipan, and moderate to rapid in the substratum. Saturated hydraulic conductivity is moderately low to high above the fragipan, moderately low or moderately high in the fragipan, and moderately low to very high in the substratum. A perched water table is commonly ranging within a foot of the surface in late winter and early spring and following periods of extended rainfall. Lateral seepage to the surface is common, particularly at slope breaks. Thickness of the solum ranges from 24 to 50 inches. Depth to the fragipan ranges from 18 to 36 inches. Depth to bedrock is typically greater than 6 feet. Rock fragments range from 5 to 35 percent throughout the solum, and from 0 to 60 percent in the C horizon. Rock fragments are a mixture of gravel, cobbles, stones, and boulders in varying proportions. The rock fragments are primarily granitic gneiss with smaller amounts of sandstone, quartzite, and shale. Quartz, feldspar, and mica, with smaller amounts of ferromagnesian minerals dominate mineralogy. Reaction ranges from extremely acid through strongly acid in the A and BA horizons, except where limed, and is very strongly acid or strongly acid in the B and C horizons.

**Cover and Uses:** Most areas are wooded or in idle fields. Natural vegetation is largely woodland dominated by oak, ash and birch with some maple and hemlock. In urban areas much of this soil has been drained or overfilled and is used for housing or industrial development.

## WATCHUNG SERIES

**Origin:** The Watchung series consists of very deep, poorly drained soils on upland flats and depressions. Saturated hydraulic conductivity is moderately high in the A and C horizons and moderately low in B horizons. They formed in residuum from basic rocks.

**Location:** Watchung soils are nearly level to gently sloping soils on upland flats and depressions in the northern Piedmont Plateau. Slopes are less than 8 percent. The soils formed in residuum from basic rocks, most commonly gabbro, diabase and diorite. The climate is temperate and humid, with a mean annual temperature of 45 to 55 degrees F., and mean annual precipitation of 40 inches. They are found in New Jersey, Pennsylvania, Delaware, and Maryland. The series is of moderate extent.

**Characteristics:** Solum thickness ranges from 24 to 55 inches and the lower boundary of the argillic horizon is within 40 inches of the surface. Depth to bedrock is more than 60 inches. Rock fragment content ranges from 0 to 15 percent throughout the profile including up to 15 percent of cobbles and stones. Some pedons have up to 40 percent rock fragments.

**Cover and Uses:** Some areas are in corn and pasture. Native vegetation is northern red oak, pin oak, willows, box elder, sedges, ironweed and Joe-pye-weed.

## BERKS

**Origin:** Berks soils are on summits, shoulders, and backslopes of dissected uplands formed in residuum weathered from shale interbedded with fine grained sandstone and siltstone.

**Location:** Kentucky, Maryland, New Jersey, New York, Ohio, Pennsylvania, Virginia, West Virginia, Indiana, and Southern Illinois.

**Characteristics:** The Berks series consists of moderately deep, well drained soils. Berks channery loam, on a south-facing slope of 3 to 8 percent in a cultivated field. (Colors are for moist soil unless otherwise noted.) The potential for surface runoff is negligible to high. Permeability is moderate or moderately



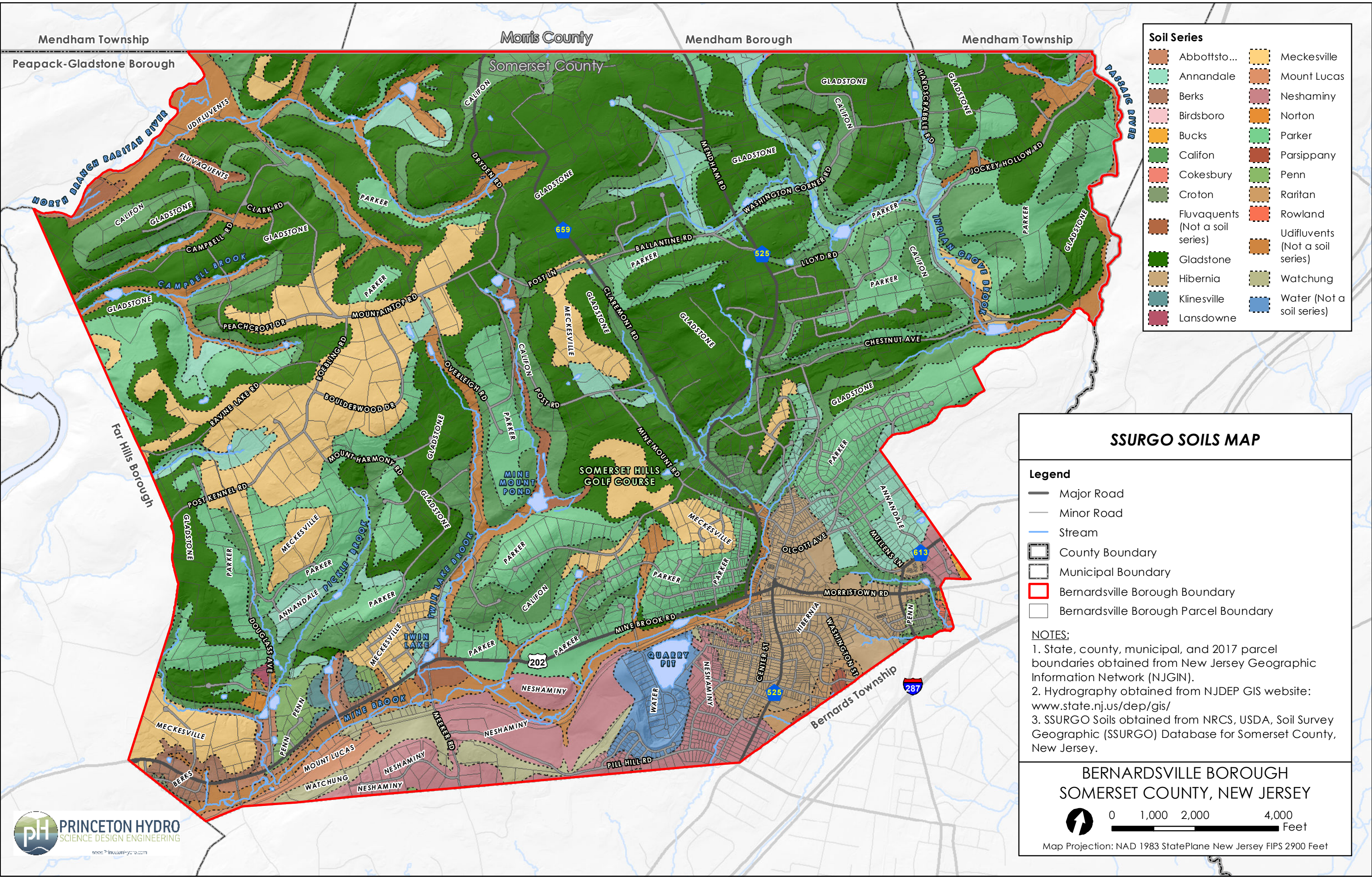
rapid. Depth to a seasonal high-water table is more than 6 feet.

**Cover and Uses:** Approximately 60 percent of Berks soils are in cropland and pasture, the remainder are in woodland or other uses. Principal crops are corn, wheat, oats, barley, Christmas trees and hay. Native vegetation is mixed, deciduous hardwood forest.

## **UDIFLUENTS AND FLUVIQUENTS**

Udifuluents and Fluviquents are among the soils known as Entisols. Entisols show little or no evidence of diagnostic horizons and cannot break down into a specific series or unit due to a lack of distinguishing characteristics. The homogenous appearance of Entisols may result from human induced mixing or other processes such as climate or flooding. The Entisols of Bernardsville are the result of hydrological conditions. Fluvent soils do not develop diagnostic horizons due to sediment deposition from periodic flooding. They are typically found in deltas or river valleys, particularly where there are concentrations of sediment. Fluviquent soils are usually young hydric soils formed on riverbanks in which the hydric nature of the soil prevents the formation of diagnostic characteristics (USDA-NRCS, 2009).







**TABLE 5:**  
**SOIL SURVEY GEOGRAPHIC, SSURGO BERNARDSVILLE BOROUGH.**  
**SOIL MAPPING UNITS AND MAJOR CHARACTERISTICS**

Map Unit Symbol (MUSYM)	Series	Total Sum of Acres	Hydric	Farmland
GkaoC	Gladstone	1,657.476	No	SI
GkaoB	Gladstone	1,038.964	No	P
PauDb	Califon	731.517	No	No
PapC	Parker	697.334	No	No
MenB	Meckesville	557.447	No	P
GkaoD	Parker	524.092	No	No
UCFAT	Udifluvents	467.210	No	No
CanBb	Califon	327.898	No	No
RkrC	Hibernia	303.991	No	SI
NemCb	Neshaminy	269.542	No	No
MenC	Meckesville	257.873	No	SI
CanB	Annandale	221.513	No	P
PapFg	Parker	200.999	No	No
CobBb	Annandale	138.797	No	No
FNAT	Udifluvents	90.823	No	No
FmhAt	Fluvaquents	89.865	No	No
NemDb	Watchung	87.929	Yes	No
QY	Water	86.417	NA	No
PapD	Califon	72.528	No	No
KkoD	Berks	54.558	No	No
WATER	Water	49.789	NA	No
MopCb	Neshaminy	45.276	No	No
AmnrC	Mount Lucas	41.110	No	SI
PeoC	Penn	30.737	No	SI
AbrB	Abbottstown	29.107	No	SI
RarAr	Raritan	26.636	No	P
WasA	Watchung	21.181	Yes	No
NehB	Neshaminy	17.111	No	P
PeoB	Penn	15.324	No	P
NehC	Neshaminy	14.646	No	SI
RehB	Croton	10.729	Yes	SI
PenB	Klinesville	9.683	No	P
KkoC	Klinesville	8.580	No	LI
NotC	Norton	8.533	No	SI
PaoC	Parker	6.004	No	SI



**TABLE 5 (CONTINUED):****SOIL SURVEY GEOGRAPHIC, SSURGO BERNARDSVILLE BOROUGH.  
SOIL MAPPING UNITS AND MAJOR CHARACTERISTICS**

Map Unit Symbol (MUSYM)	Series	Total Sum of Acres	Hydric	Farmland
PenC	Penn	5.775	No	SI
PbpAt	Parsippany	5.395	Yes	No
RorAt	Rowland	4.159	No	LI
CobB	Annandale	3.970	No	No
NotB	Lansdowne	3.471	No	P
BhnB	Bucks	3.357	No	P
CobBc	Cokesbury	2.949	Yes	No
LbtB	Croton	1.757	Yes	SI
PauCc	Parker	1.334	No	No
CakB	Califon	0.608	No	P
BhnC	Birdsboro	0.597	No	SI

**P- Prime Farmland****SI- Soil of Statewide Importance****LI- Soil of Local Importance**

Source: USDA SSURGO Database. Survey Area Version No. 15, Published 10/6/2017

## 4.2 PRIME FARMLAND AND OTHER IMPORTANT SOILS

The NRCS has identified soils based on their agricultural significance, or Land Capability Classification. The best quality soils are termed “Prime Farmlands” which are followed by “Soils of Statewide Importance.” Prime Farmlands include all those soils in Land Capability Class I and selected soils from Land Capability Class II. Prime Farmlands are lands that have the best combination of physical and chemical characteristics for producing food, feed, forage, fiber and oilseed crops and are also available for these uses. It has the soils quality, growing season, and moisture supply needed to economically produce a sustained high yield of crops when treated and managed according to acceptable farming methods. Prime farmlands are not excessively erodible or saturated with water for a long period of time, and they either do not flood frequently 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 Farmlands, but nonetheless support agricultural production, with some limitations. These soils may be suited to certain crops or require special conservation practices to maintain their productivity. Additionally, NRCS identifies “Farmland of Local Importance” and defines land used for the production of food, feed, fiber, forage, and oilseed crops that may not be identified as having national or statewide importance. This farmland is identified by the appropriate local agencies. Farmland of local importance may include tracts of land that have been designated for agriculture by local ordinance.

Significant areas of Prime Farmland, Farmland of Statewide Importance, and Farmland of Local Importance occur in Bernardsville according to SSURGO soils mapping, and collectively occupy approximately 51.85% of Bernardsville’s surface area (See NRCS Farmland Class Map - Page 59). Note: While Meadowbrook Farm is not included on the USDA SSURGO database map layer, it is a locally valued farm that is a prominent, central feature of the town, and is valued for its scenic rolling hills, meadows, and cow pastures.

Within Bernardsville, Prime Farmland soils include certain individual units of the Annandale, Bucks, Calfon, Gladstone, Klinesville, Lansdowne, Meckesville, Neshaminy, Penn, and Raritan Series. Soils of Statewide Importance include individual units of the Abbottstown, Birdsboro, Croton, Gladstone, Hibernia, Meckesville, Mount Lucas, Neshaminy, Norton, Parker, and Penn series. Table 5 identifies the specific units of quality soils. Table 6 below summarizes the total sum of acres and total percent of total Prime Farmland, Farmland of Statewide Importance, Farmland of Local Importance, and Not Prime Farmland in Bernardsville.

**TABLE 6:**  
**SSURGO PRIME FARMLAND AND STATEWIDE IMPORTANCE**  
**SOILS IN BERNARDSVILLE**

Farmlands	Total Sum of Acres	% of Total
Prime Farmland	1,894.12	22.97%
Farmland of Statewide Importance	2,368.33	28.73%
Farmland of Local Importance	12.739	0.15%
Not Prime Farmland	3,969.40	48.15%
Total	8,244.59	100%

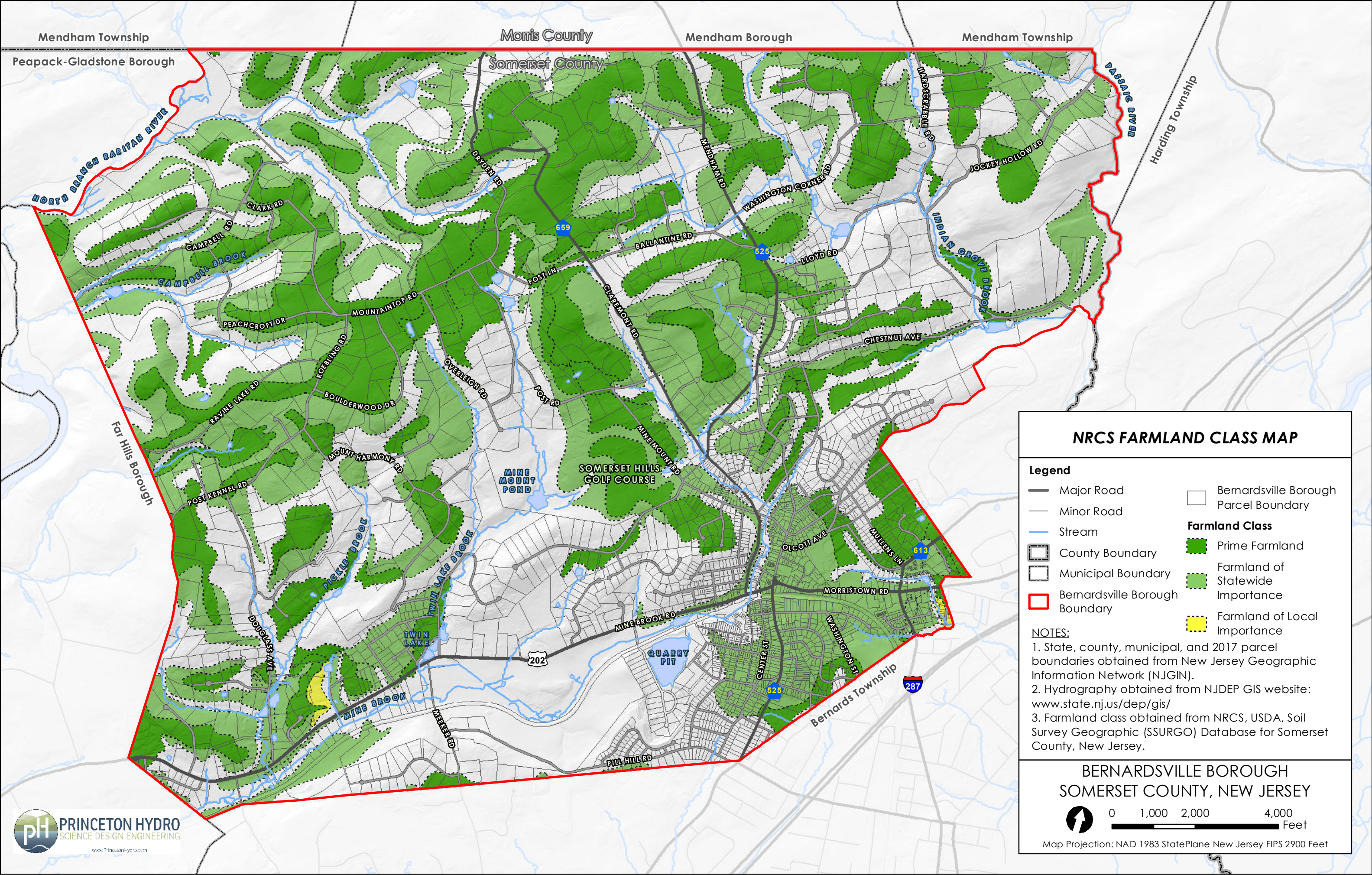
Source: USDA SSURGO Database. Survey Area Version No. 15, Published 10/6/2017

## 4.3 HYDRIC SOILS

Since 2010, the classification for hydric soils has changed from “hydric” and “inclusion” to “yes” and “no,” therefore we are unable to compare the previous data directly. Approximately 130 acres (1.57 % of the land cover) are considered hydric soils in Bernardsville. A large majority, approximately 7,978 acres, were not classified as hydric, comprising of 96.7% of the land cover. And, 136 acres, 1.65% of the land cover was not available for classification.

Hydric soils are the soils that typically characterize the soil substrate found in wetlands. They are soils that have low permeability, are poorly to very poorly drained and have a water table at or near the ground surface during the growing season; or are soils that are frequently ponded or flooded for a long duration or very long duration during the growing season. The major hydric soils in identified by SSURGO include the Cokesbury, Croton, Parsippany, and Watchung Series.





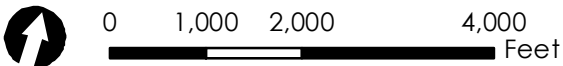
**NRCS FARMLAND CLASS MAP**

**Legend**

- |                                  |   |
|----------------------------------|---|
| — Major Road                     | □ Bernardsville Borough Parcel Boundary |
| — Minor Road                     |   |
| — Stream                         |   |
| ▬ County Boundary                | <b>Farmland Class</b>                   |
| ▬ Municipal Boundary             | ■ Prime Farmland                        |
| ▬ Bernardsville Borough Boundary | ■ Farmland of Statewide Importance      |
|                                  | ■ Farmland of Local Importance          |

**NOTES:**  
1. State, county, municipal, and 2017 parcel boundaries obtained from New Jersey Geographic Information Network (NJGIN).  
2. Hydrography obtained from NJDEP GIS website: [www.state.nj.us/dep/gis/](http://www.state.nj.us/dep/gis/)  
3. Farmland class obtained from NRCS, USDA, Soil Survey Geographic (SSURGO) Database for Somerset County, New Jersey.

**BERNARDSVILLE BOROUGH  
SOMERSET COUNTY, NEW JERSEY**



Map Projection: NAD 1983 StatePlane New Jersey FIPS 2900 Feet



**TABLE 7:**  
**SSURGO SUMMARY OF HYDRIC SOILS IN BERNARDSVILLE**

Hydric	Total Sum of Acres	% of Total
Yes	129.94	1.576%
No	7,978.44	96.772%
NA	136.21	1.652%
Total	8,244.59	100%

Source: USDA SSURGO Database. Survey Area Version No. 15, Published 10/6/2017

## 4.4 STEEP SLOPES

In general, development of steep slopes (in excess of 10%) increases the risk of erosion, stormwater runoff, and flooding potential. The additional runoff results in sedimentation of down slope surface waters, which damages habitat and has the potential to damage property. The sloping land increases the rate of stormwater runoff, which reduces the rate of groundwater infiltration. This is exacerbated when vegetation is unnecessarily stripped from the slope.

Within the borders of Bernardsville Borough, 46.2% of the land is classified as less than 10% slope class, which equates to approximately 3,821 acres of land. Since the 2010 ERI Report, more accurate topographic data has been released. Currently, the slope data (using 2008 LiDAR data provided by the NJ Office of Information Technology, Office of Geographic Information Systems) is 5,733.36 acres. While it appears as if there is a significant difference of over 2,000 acres since 2010, the topographic data has changed, and therefore a direct comparison cannot be made. The total percentage of acres classified within the 15-25% category in the current analysis shows 21.69%. Additionally, the steep slope classes of 25-30% is 372.25 acres, about 4.5% and for greater than 30% is 365.93 acres or 4.43%.

Overall, there are extensive steep slope sections that are greater than 25% in the area south of the North Branch of the Raritan River, along Campbell Brook, Passaic River Little Brook, Twin Lake Brook, Pickle Brook, Chestnut Avenue, Meeker Road south of Mine Brook, and Indian Grove Brook. Additionally, there is an area south and west of the Quarry Pit that is greater than 30%. Many sections surrounding the steepest slopes and scattered elsewhere throughout the Borough contain slopes ranging from 15% to 25%.

It is important to note that Article 12 (Zoning) and Article 14 (Environmental Constraints) of the Bernardsville Borough Municipal Code set disturbance of land limits for new development and residences containing slopes over fifteen (15%) percent. The code sets minimal square footage levels of disturbance per lot based on slope category ranging from 15 to 24.99 (1000), 25 to 29.99 (500) and 30 or greater (250) (Article 14-2.6). Article 14 of the Municipal Code states that approval is required for certain activities such as removal of trees, deposition of fill, construction prep removal of topsoil or other construction activities.

**TABLE 8:**  
**SLOPE AREAS IN BERNARDSVILLE**

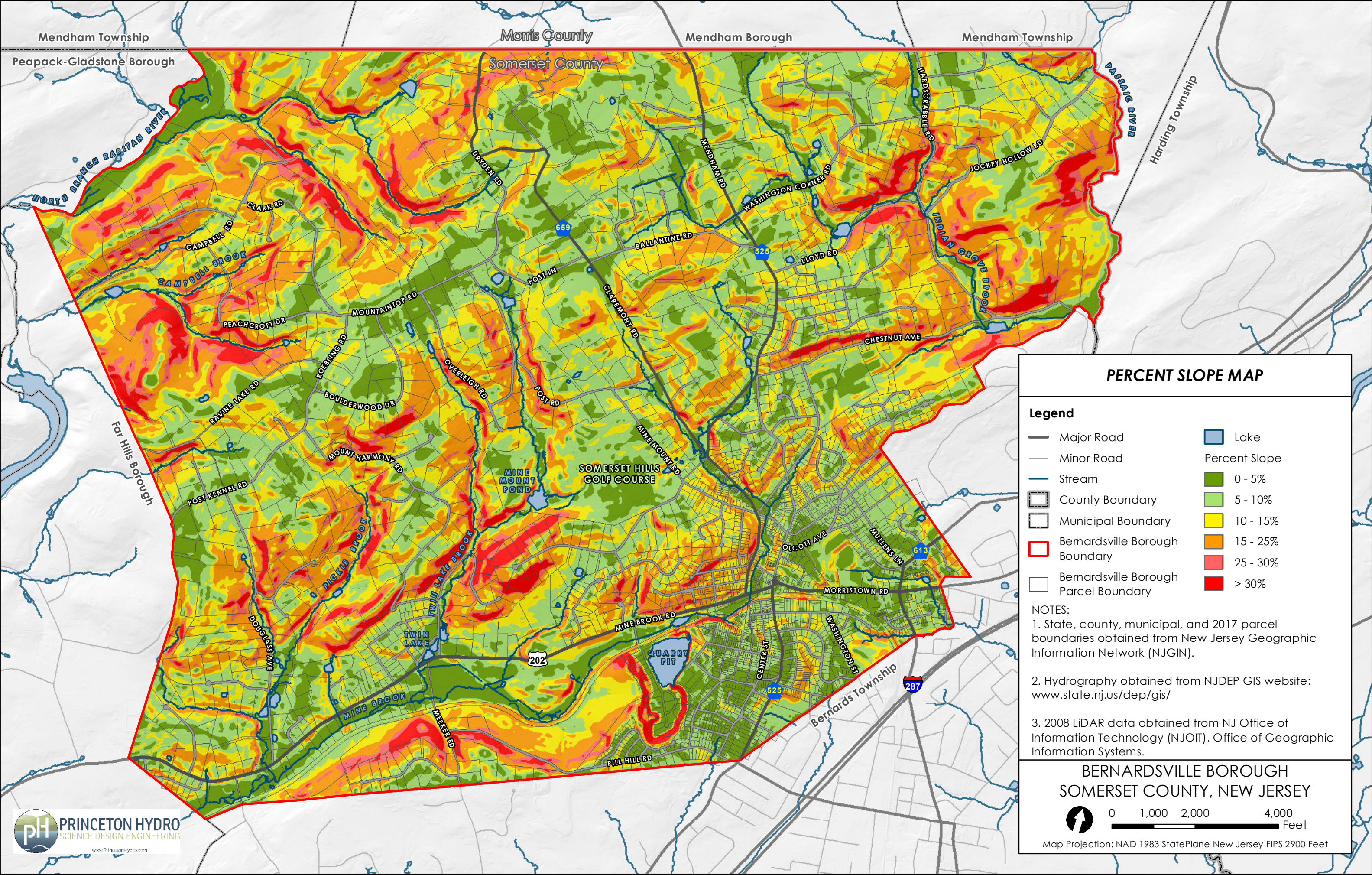
Slope Class	Total Sum of Acres	% of Total
0 - 5%	1,330.35	16.100%
5 - 10%	2,490.99	30.140%
10 - 15%	1,912.02	23.140%
15 - 25%	1,792.87	21.69%
25 - 30%	372.25	4.50%
> 30%	365.93	4.43%
Total	8,264.41	100%

Source: 2008 LiDAR Data, NJ Office of Information Technology, Office of Geographic Information Systems.

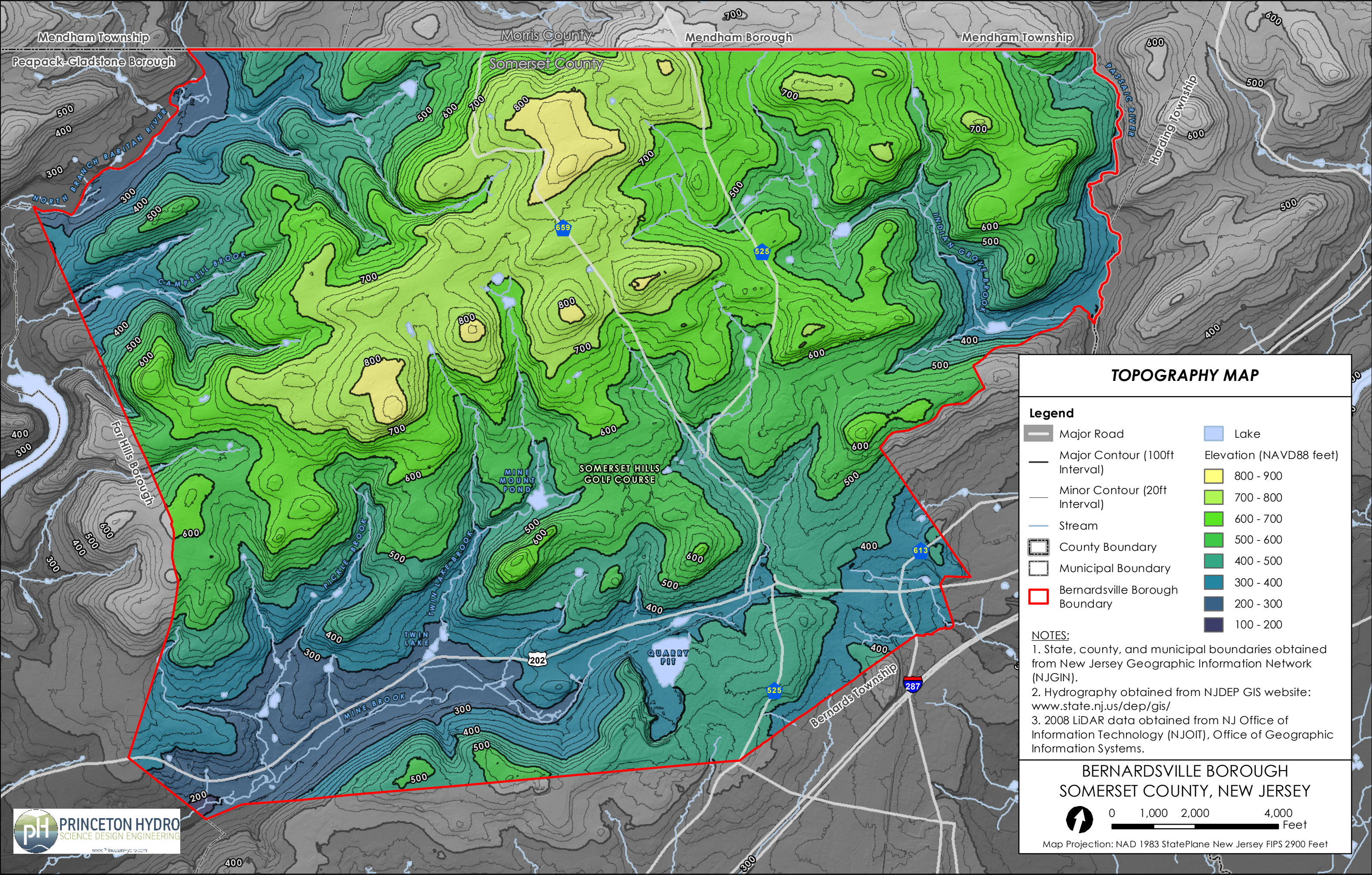
## 4.5 SOIL EROSION AND SEDIMENT CONTROL

The NJDEP Soil Erosion and Sediment Control Act (N.J.S.A. 4-24-39 et seq. and its implementing regulations at N.J.A.C. 2:90 requires that a Soil Erosion and Sediment Control Plan be prepared for any clearing or disturbance of 5000 square feet or more. The plan must be prepared in accordance with the Standards for Soil Erosion and Sediment Control in N.J.A.C 2:90. Soil disturbance of one acre or more during construction also requires a New Jersey Pollutant Discharge Elimination System (NJPDES) permit (NJPDES Rules - N.J.A.C.7:14a) and a Request for Authorization (RFA) from NJDEP's Bureau of Nonpoint Pollution. These documents and information can be obtained through the County's Soil Conservation District (SCD). The SCD monitors compliance with the SESC plan during construction. Information about Soil Erosion and Sediment Control may be obtained from the Somerset County Soil Conservation District at: <https://www.co.somerset.nj.us/government/public-works/soil-conservation>. The Somerset County SCD may be reached at 908-526-2701 or [SoilConsrv@co.somerset.nj.us](mailto:SoilConsrv@co.somerset.nj.us) and is located at 308 Milltown Road, Bridgewater, NJ 08807. Article 9 (Site Plan Review) of the Bernardsville Municipal Code indicates Soil Erosion and Sediment Control Standards for Bernardsville. Additional regulations with regard to soil erosion are identified throughout the Code.









## TOPOGRAPHY MAP

### Legend

	Major Road		Lake
	Major Contour (100ft Interval)	Elevation (NAVD88 feet)	
	Minor Contour (20ft Interval)		800 - 900
	Stream		700 - 800
	County Boundary		600 - 700
	Municipal Boundary		500 - 600
	Bernardsville Borough Boundary		400 - 500
			300 - 400
			200 - 300
			100 - 200

**NOTES:**  
1. State, county, and municipal boundaries obtained from New Jersey Geographic Information Network (NJGIN).  
2. Hydrography obtained from NJDEP GIS website: [www.state.nj.us/dep/gis/](http://www.state.nj.us/dep/gis/)  
3. 2008 LiDAR data obtained from NJ Office of Information Technology (NJGIT), Office of Geographic Information Systems.

BERNARDSVILLE BOROUGH  
SOMERSET COUNTY, NEW JERSEY



0 1,000 2,000 4,000  
Feet

Map Projection: NAD 1983 StatePlane New Jersey FIPS 2900 Feet



## **4.6 ACID PRODUCING SOILS**

NJDEP Division of Land Use (2008a) defines acid producing soils as “Soils that contain geologic deposits of iron sulfide minerals (pyrite or marcasite) which, when exposed to oxygen from the air or from surface waters, oxidize to produce sulfuric acid. Acid producing soils, upon excavation, generally have a pH of 4.0 or lower. After exposure to oxygen, these soils generally have a pH of 3.0 or lower.” The underlying formations in Bernardsville Borough are not associated with acid producing soils.

## **4.7 SOIL CAPABILITIES**

Soils may be evaluated for various uses based on a variety of soil properties. Depending on the specific use, characteristics of the soil that may contribute to a rating include depth to and nature of the bedrock, permeability, slope, gravel content, clay content, saturation, erodibility and frost action.

In the 2010 ERI, several soil ratings maps produced by the Upper Raritan Watershed Association for the Bernardsville Environmental Commission in 2002 were included. These maps evaluate a variety of potential land uses with relevance to soil capability including general Drainage, Septic Absorption, Basements, Paths and Trails, Local Roads and Streets, and Pond Reservoir Areas. Each of these maps lists the severity of the limitation within the municipality and notes the set of characteristics used in the rating evaluation on each map. These maps were prepared from data created by the USDA Natural Resource Conservation Service (1997). It is important to note that these maps are included in this current ERI for reference only. Data layers used in these maps may have been updated since 2010, but was included as part of this 2018 ERI update.



# Bernardsville Borough Environmental Resources Inventory

## Soil Ratings for Drainage

- Municipal Boundary
- Parcel Boundaries
- Rivers & Streams
- Lakes & Ponds
- Soil Ratings for Drainage
- Limitations

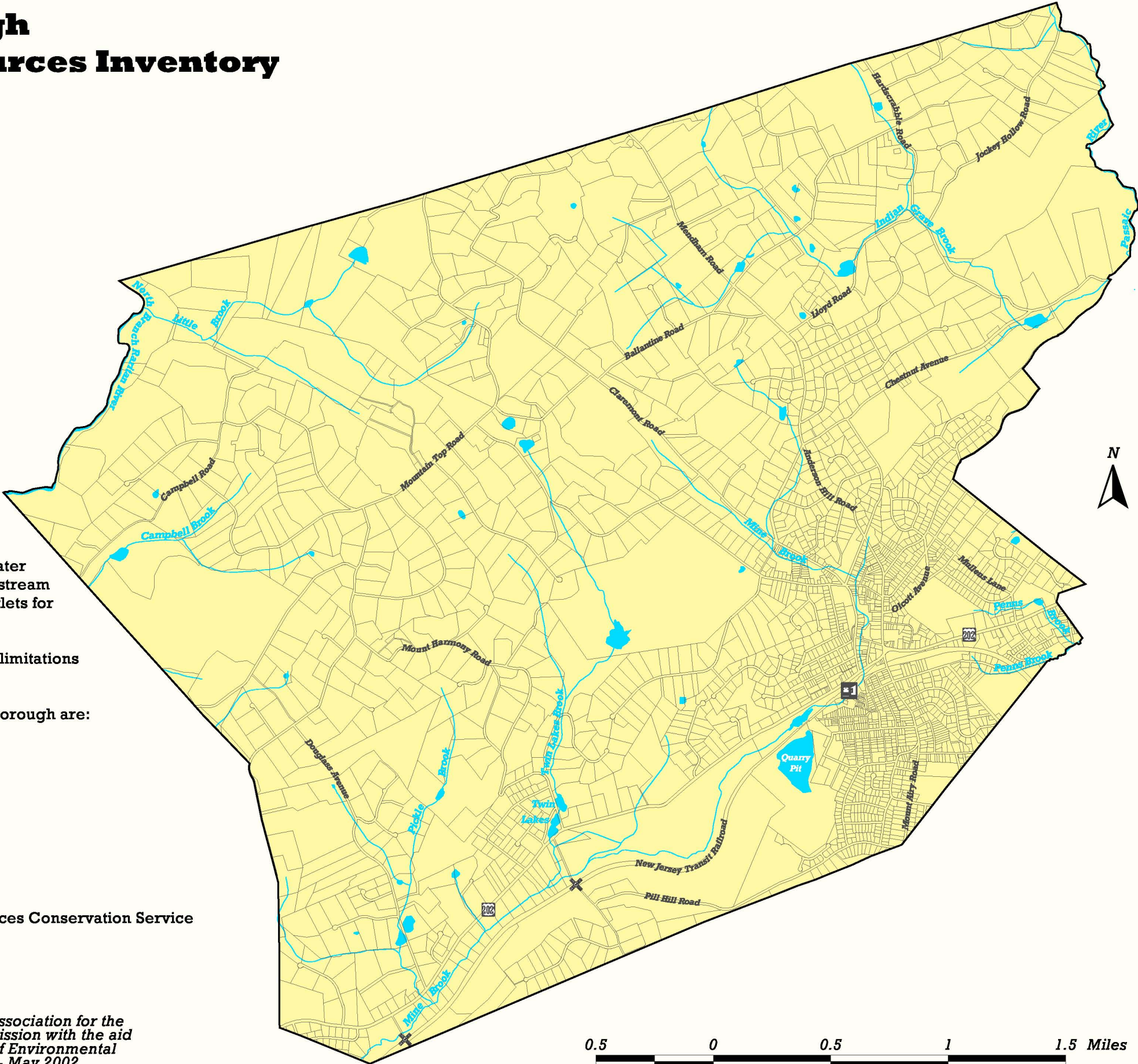
Soil ratings for drainage are affected by such soil properties as permeability, texture and structure; depth to claypan, rock or other layers that influence rate of water movement; depth to seasonally high water table; slope stability in ditchbanks; susceptibility to stream overflow; salinity or alkalinity; and availability of outlets for drainage.

All soils in Bernardsville Borough have one or more limitations for drainage.

Limitations for drainage identified in Bernardsville Borough are:

- \* flooding
- \* frost action
- \* slope
- \* cutbanks cave
- \* depth to water
- \* depth to rock
- \* percs slowly
- \* ponding

Soils data were created by the USDA Natural Resources Conservation Service (formerly Soil Conservation Service) in 1997.





# Bernardsville Borough Environmental Resources Inventory

## Soil Ratings for Septic Tank Absorption Fields

- Municipal Boundary
- Parcel Boundaries
- Rivers & Streams
- Lakes & Ponds
- Soil Ratings for Septic Tank Absorption Fields
  - Moderate Limitation
  - Severe Limitation

Soil ratings for septic tank absorption fields are derived from requirements of the New Jersey Department of Health based on the Realty Improvement and Sewerage Facilities Act, Chapter 199. Soil ratings for septic tank absorption fields are considered applicable for residences on normal lot sizes, but not for public buildings or trailer parks.

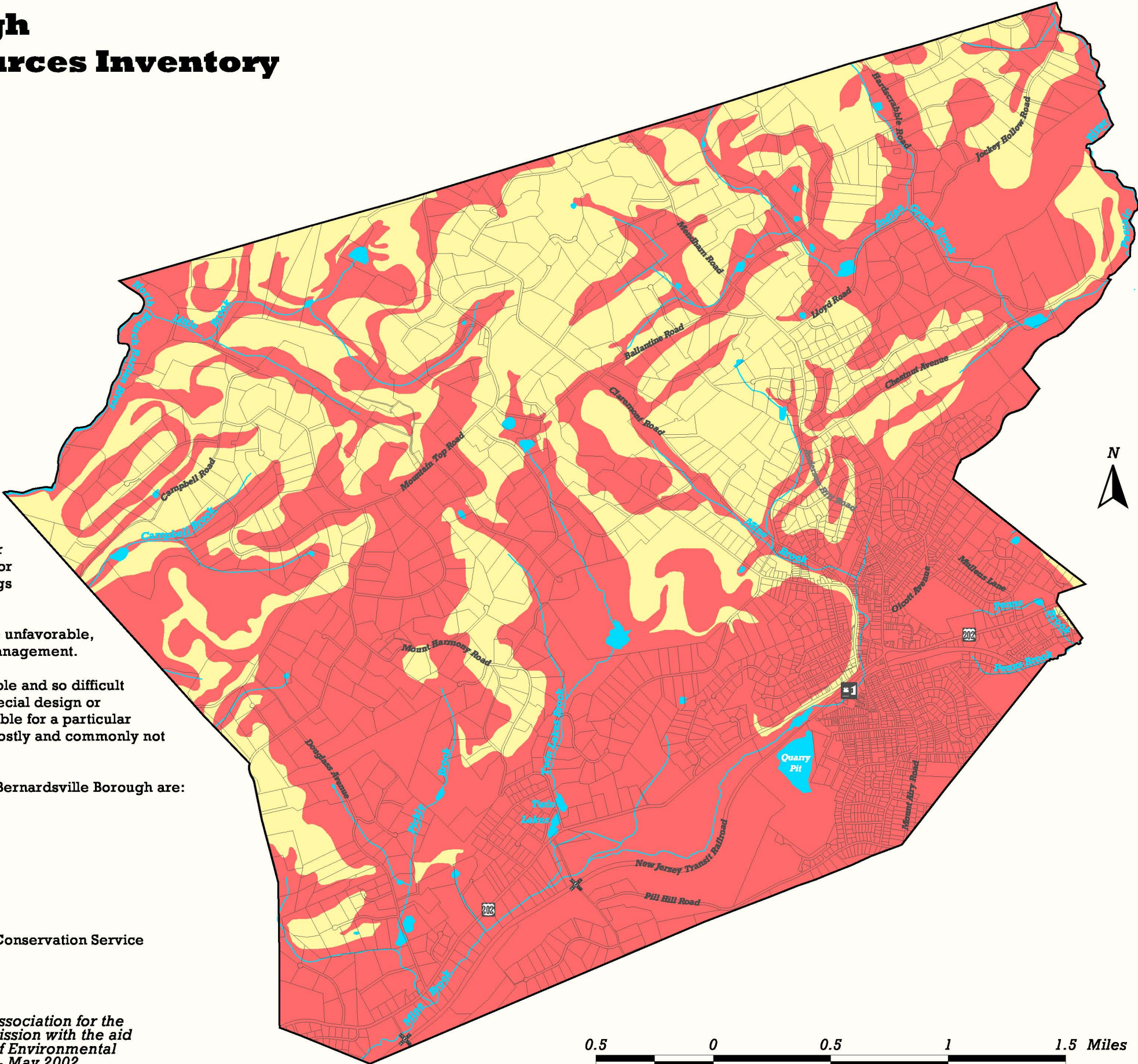
A rating of moderate means that some soil properties are unfavorable, but can be overcome by careful planning, design and management.

A rating of severe means soil properties are so unfavorable and so difficult to correct or overcome as to require soil reclamation, special design or intensive maintenance. Some properties are so unfavorable for a particular use that overcoming the limitations is most difficult and costly and commonly not practical for the rated use.

Limitations for septic tank absorption fields identified in Bernardsville Borough are:

- \* flooding
- \* percs slowly
- \* slope
- \* poor filter
- \* depth to rock
- \* wetness

Soils data were created by the USDA Natural Resources Conservation Service (formerly Soil Conservation Service) in 1997.





# Bernardsville Borough Environmental Resources Inventory

## Soil Ratings for Dwellings with Basements

- Municipal Boundary
- Parcel Boundaries
- Rivers & Streams
- Lakes & Ponds
- Soil Ratings for Dwellings with Basements
  - Slight Limitation
  - Moderate Limitation
  - Severe Limitation

Soil ratings for dwellings with basements are based on the properties of undisturbed soils. These ratings are for dwellings of three stories or less.

A rating of slight means soil properties are generally favorable for the rated use, or in other words, limitations are minor and easily overcome.

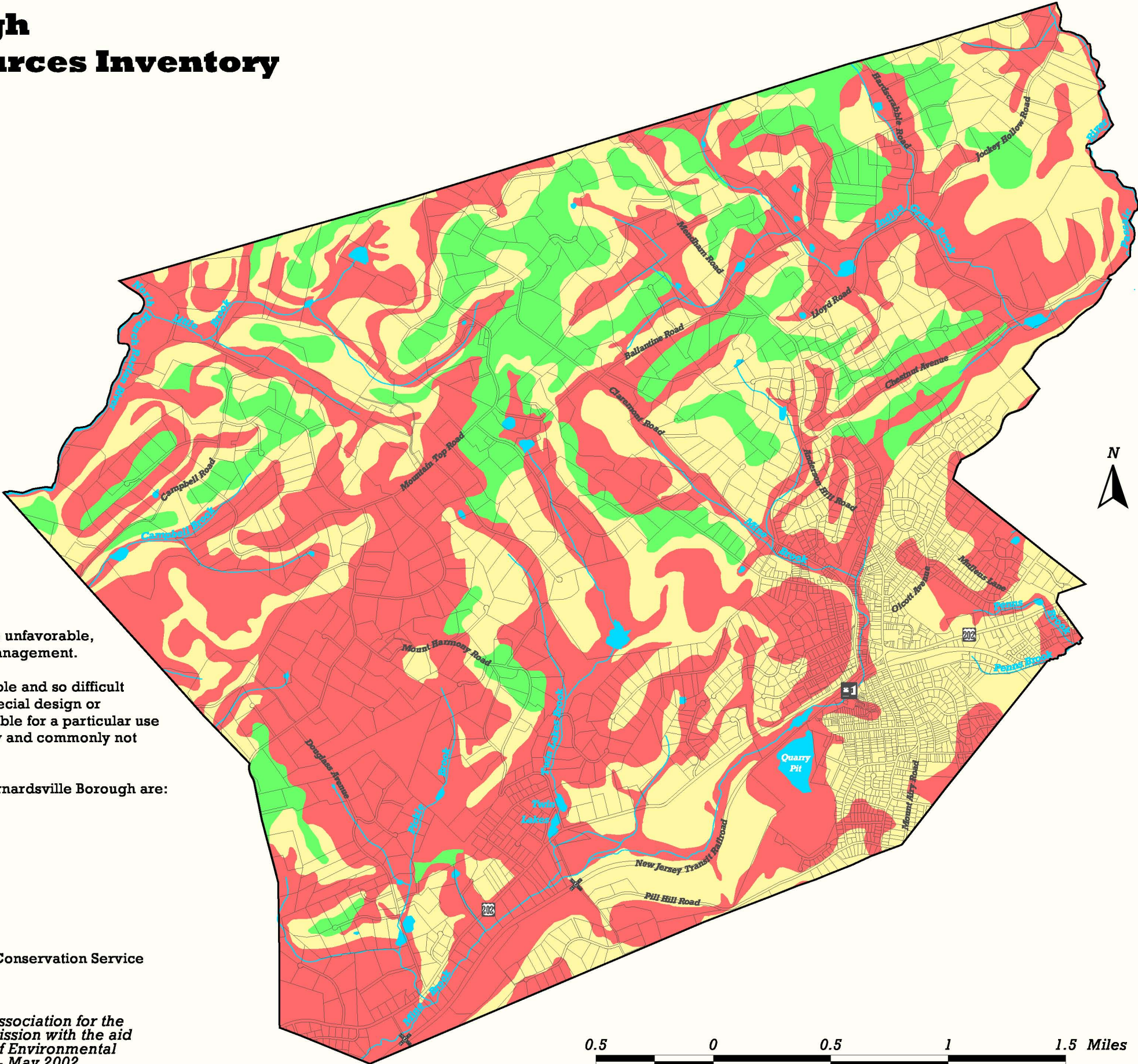
A rating of moderate means that some soil properties are unfavorable, but can be overcome by careful planning, design and management.

A rating of severe means soil properties are so unfavorable and so difficult to correct or overcome as to require soil reclamation, special design or intensive maintenance. Some properties are so unfavorable for a particular use that overcoming the limitations is most difficult and costly and commonly not practical for the rated use.

Limitations for dwellings with basements identified in Bernardsville Borough are:

- \* flooding
- \* shrink-swell
- \* slope
- \* wetness
- \* depth to rock
- \* large stones
- \* ponding

Soils data were created by the USDA Natural Resources Conservation Service (formerly Soil Conservation Service) in 1997.





# Bernardsville Borough Environmental Resources Inventory

## Soil Ratings for Paths & Trails

- Municipal Boundary
- Parcel Boundaries
- Rivers & Streams
- Lakes & Ponds
- Soil Ratings for Paths & Trails
  - Slight Limitation
  - Moderate Limitation
  - Severe Limitation

Soil ratings for paths and trails are based on limitations of soils for local and cross country travel by foot or horseback. Design and layout should require little or no cutting and filling. The best soils are at least moderately well drained, are firm when wet but not dusty when dry, are flooded not more than once during the season of use and have slopes of less than 15 percent. There are few or no rocks or stones on the surface.

A rating of slight means soil properties are generally favorable for the rated use, or in other words, limitations are minor and easily overcome.

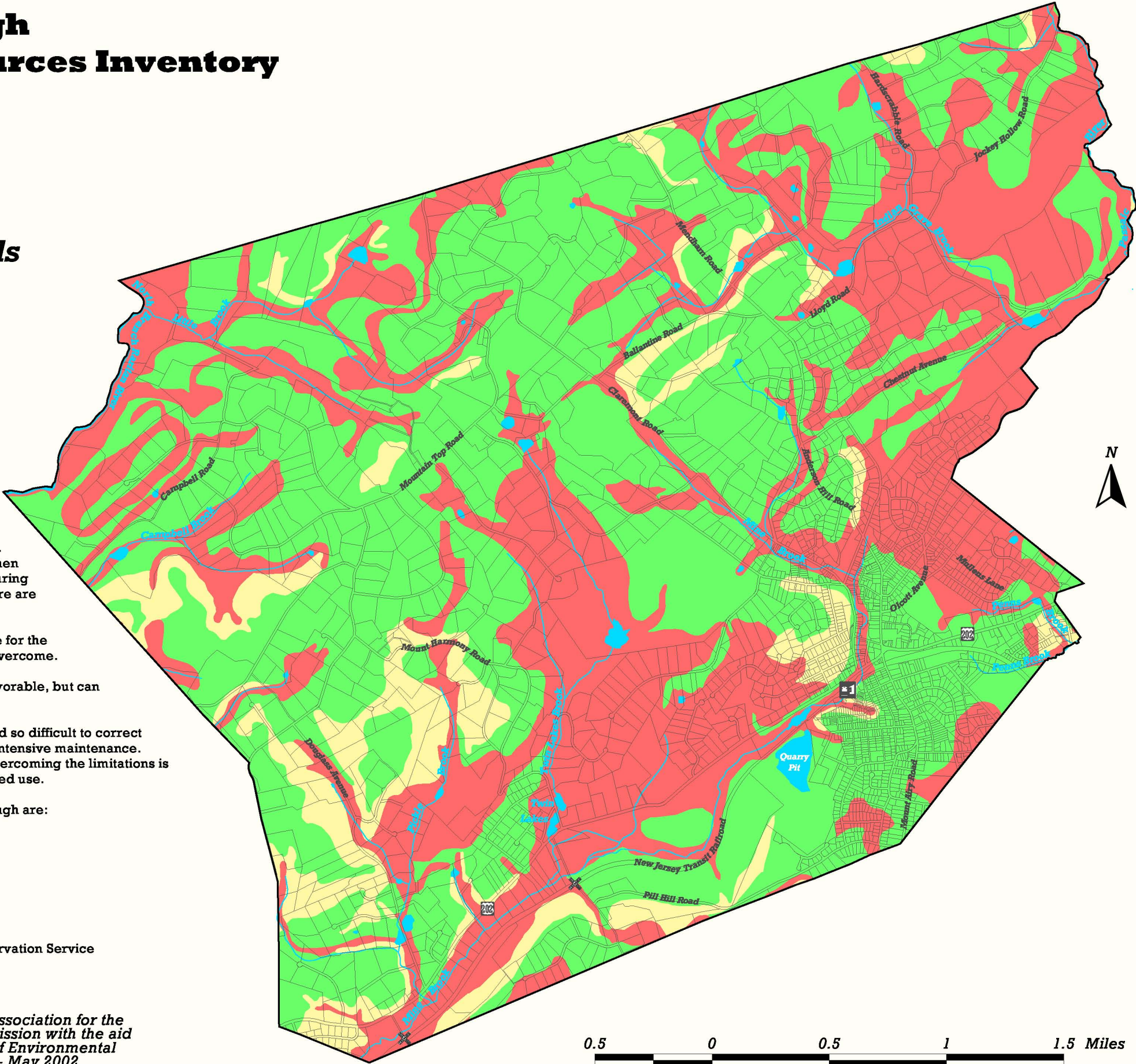
A rating of moderate means that some soil properties are unfavorable, but can be overcome by careful planning, design and management.

A rating of severe means soil properties are so unfavorable and so difficult to correct or overcome as to require soil reclamation, special design or intensive maintenance. Some properties are so unfavorable for a particular use that overcoming the limitations is most difficult and costly and commonly not practical for the rated use.

Limitations for paths and trails identified in Bernardsville Borough are:

- \* erodes easily
- \* large stones
- \* slope
- \* small stones
- \* wetness
- \* ponding

Soils data were created by the USDA Natural Resources Conservation Service (formerly Soil Conservation Service) in 1997.





# Bernardsville Borough Environmental Resources Inventory

## Soil Ratings for Local Roads & Streets

- Municipal Boundary
- Parcel Boundaries
- Rivers & Streams
- Lakes & Ponds
- Soil Ratings for Local Roads & Streets
  - Moderate Limitation
  - Severe Limitation

Soil ratings for local roads and streets are based on the assumption that roads and streets will be paved.

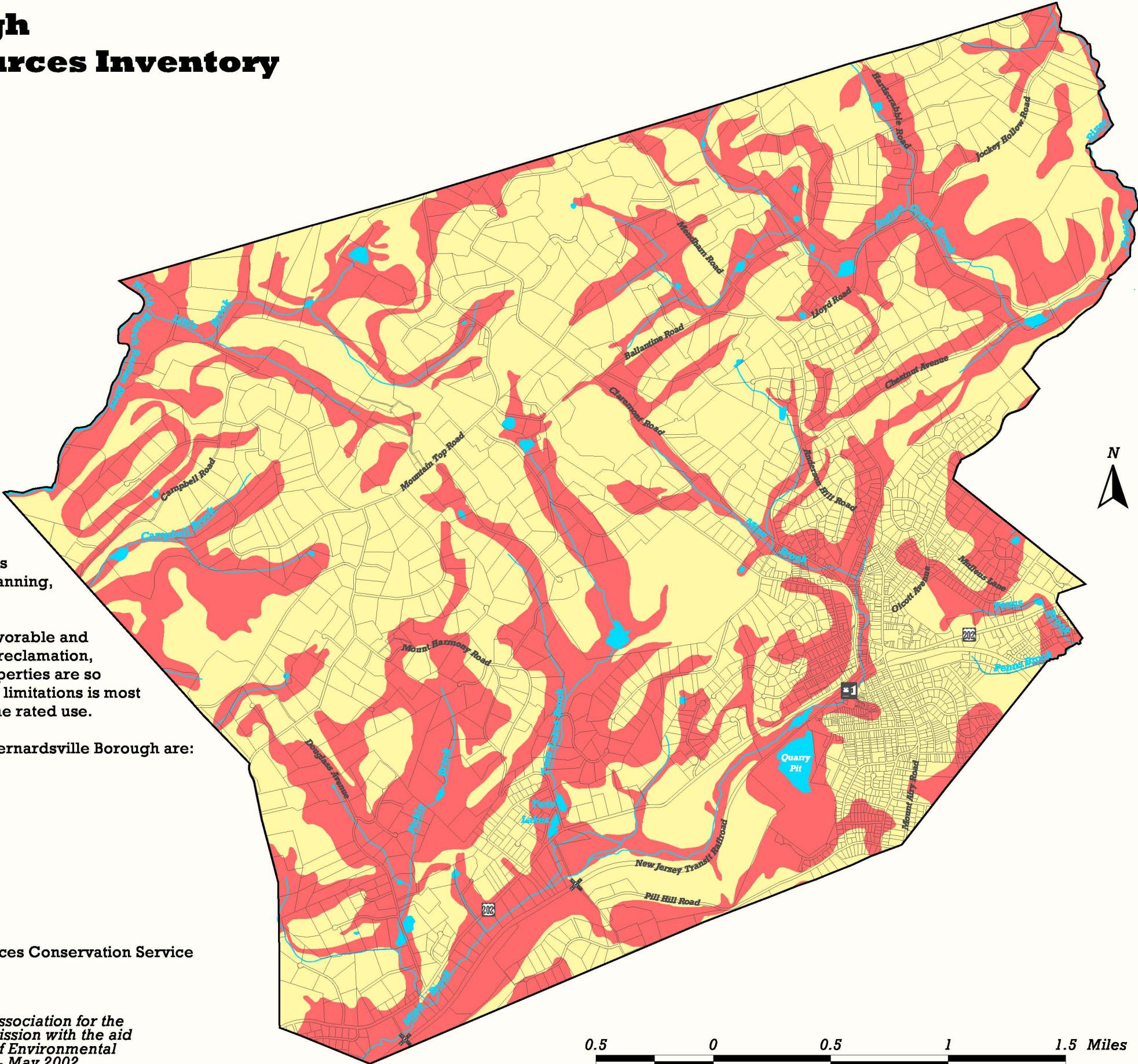
A rating of moderate means that some soil properties are unfavorable, but can be overcome by careful planning, design and management.

A rating of severe means soil properties are so unfavorable and so difficult to correct or overcome as to require soil reclamation, special design or intensive maintenance. Some properties are so unfavorable for a particular use that overcoming the limitations is most difficult and costly and commonly not practical for the rated use.

Limitations for local roads and streets identified in Bernardsville Borough are:

- \* flooding
- \* frost action
- \* low strength
- \* slope
- \* depth to rock
- \* large stones
- \* wetness
- \* ponding

Soils data were created by the USDA Natural Resources Conservation Service (formerly Soil Conservation Service) in 1997.





# Bernardsville Borough Environmental Resources Inventory

## Soil Ratings for Pond Reservoir Areas

- Municipal Boundary
- Parcel Boundaries
- Rivers & Streams
- Lakes & Ponds
- Soil Ratings for Pond Reservoir Areas
  - Moderate Limitation
  - Severe Limitation

Soil ratings for pond reservoir areas are affected by the ability of soils to hold water behind a dam or embankment. Soils suitable for pond reservoir areas have low seepage, which is related to their permeability and the depth to fractured or permeable bedrock or other permeable material.

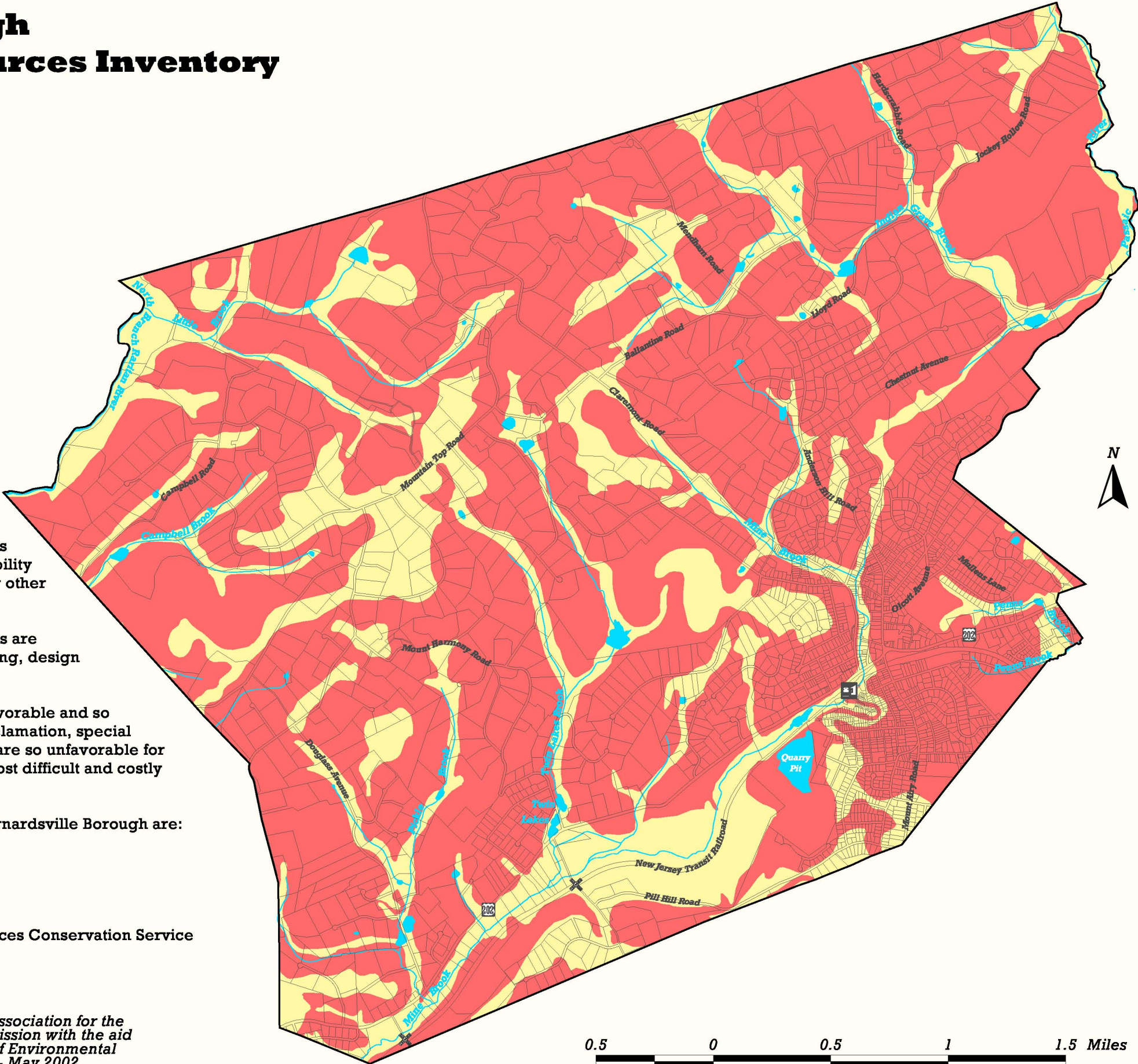
A rating of moderate means that some soil properties are unfavorable, but can be overcome by careful planning, design and management.

A rating of severe means soil properties are so unfavorable and so difficult to correct or overcome as to require soil reclamation, special design or intensive maintenance. Some properties are so unfavorable for a particular use that overcoming the limitations is most difficult and costly and commonly not practical for the rated use.

Limitations for pond reservoir areas identified in Bernardsville Borough are:

- \* seepage
- \* slope
- \* depth to rock

Soils data were created by the USDA Natural Resources Conservation Service (formerly Soil Conservation Service) in 1997.





## 5. WATER RESOURCES



**PLANTING NATIVE AQUATIC PLANTS AT NERVINE POND**

BY KRISTI MACDONALD



## **5.1 WATERSHED MANAGEMENT AREAS, DRAINAGE BASINS, AND MAJOR SURFACE WATER FEATURES**

A watershed is an area of land that drains into a body of water such as a stream, lake, river or bay. This includes surface water features and the surrounding land itself. Topographic features such as hills and slopes define the boundaries of watershed management areas. These watershed management areas are comprised of Drainage Basins; large watersheds that encompass multiple small watersheds. NJDEP manages watersheds by dividing the state into 20 large watershed management areas (WMAs). The Borough of Bernardsville is located within two watershed management areas: WMA 6, Upper Passaic, Whippany and Rockaway primarily in the eastern third of the Borough, and WMA 8, the North and South Branch Raritan River in the western two-thirds of the Borough. The border between the two WMAs is defined by the drainage areas of Mine Brook and additional North Branch Raritan tributaries in the western part of the municipality and the drainage area of Indian Grove Brook and Passaic River tributaries in the eastern part of the municipality.

**WMA 6** The Upper Passaic, Whippany and Rockaway WMA 6 is comprised of areas within Morris, Somerset, Sussex and Essex Counties. This WMA watershed includes the Passaic River basin and the River itself from its headwaters in Morris County, through western Essex County and the associated wetland complexes to its confluence with the Pompton River in Passaic County. WMA 6 is characterized in part by extensive areas of residential development. WMA 6 contains EPA Priority Wetlands.

**WMA 8** North and South Branch Raritan River includes both branches of the Raritan River and their tributaries and incorporates much of Somerset, Hunterdon, and Morris Counties. The North Branch Portion of this WMA incorporates Bernardsville. The North Branch of the Raritan River is 23 miles long and flows from northwestern Morris County through Somerset County to the confluence with the South Branch between the towns of Branchburg and Raritan. Major tributaries include the Peapack Brook, Rockaway Creek and Lamington River and the only major impoundment is Ravine Lake. Land use in the North Branch Raritan River Watershed is primarily rural, woodland and agricultural with scattered areas of commercial and residential but there is intense development along the major road corridors.

Source: NJ Division of Watershed Management: [www.nj.gov/dep/watershedrestoration/info.html](http://www.nj.gov/dep/watershedrestoration/info.html)

### **5.1.1 HUC 11 WATERSHEDS AND HUC 14 SUBWATERSHEDS**

Within each WMA, there are multiple watersheds and subwatersheds. The U.S. Geological Survey has mapped and identified watersheds using a hierarchical numbering system. Each watershed or “hydrologic unit” is identified by a unique hydrologic unit code (HUC) consisting of up to 14 digits, for the smallest mapped (sub) watersheds. There are 150 HUC 11 watersheds in New Jersey ranging in size from 0.1 to 143 square miles, with an average size of 51.9 square miles. (see URWA Water



Resources Map, Page 76). There are 921 HUC 14 subwatersheds in New Jersey, ranging in size from 0.1 to 42 square miles, with an average size of 8.5 square miles.

Bernardsville contains seven HUC 14 subwatersheds within two HUC 11 watersheds (see URWA Water Resources map, Page 76).

**TABLE 9:**  
**BERNARDSVILLE HUC WATERSHEDS, SUBWATERSHEDS AND MAJOR STREAMS**

HUC 11	Watershed	Subwatershed	HUC 14	Streams within Bernardsville	Classification*
02030103010	Upper Passaic River (above Pine Brook br)	Upper Passaic River (above Osborn Mills)	02030103010010	Indian Grove Brook, Passaic River and numerous tributaries	FW2-TP C1 FW2-TP C2
02030103010	Upper Passaic River (above Pine Brook br)	Upper Passaic River (Dead River to Osborn Mills)	02030103010070	Penn's Brook and few tributaries	FW2-NT C2
02030103010	Upper Passaic River (above Pine Brook br)	Harrisons Brook	02030103010090	Harrison's Brook and few tributaries	FW2-NT C2
02030103010	Upper Passaic River (above Pine Brook br)	Dead River (above Harrisons Brook)	02030103010080	None (Dead River and tributaries outside of Bernardsville)	FW2-NT C2
02030105060	North Branch Raritan River (above Lamington)	North Branch Raritan River (Mine Brook to Peapack Brook)	02030105060070	Mine Brook and numerous tributaries	FW2-TP C1
02030105060	North Branch Raritan River (above Lamington)	North Branch Raritan River (inc. McVickers to India Brook)	02030105060040	North Branch and numerous tributaries	FW2-TP C1 FW2-TM C2
02030105060	North Branch Raritan River (above Lamington)	North Branch Raritan River (inc. McVickers to India Brook)	02030105060030	McVicker's Brook tributary headwater	FW2-TM C1

\*See pg. 74 for stream classification definitions.

**TABLE 10:**  
**MAJOR NAMED LAKES IN BERNARDSVILLE BOROUGH**

Lake	Location (Nearest Road)	Associated Stream & Classification*	Acres
Lakeview Pond	Old Quarry	None	18.174
Mine Mount Pond	Roundtop	Mine Trib (C1)	3.966
Spinello Pond	Lloyd	Indian Grove (C1)	2.468
Dreesen Pond	Chestnut	Indian Grove (C1)	2.467
Salovaara Pond	Dryden	NB Raritan Trib (C1)	2.312
Twin Lakes Lower Pond	Eastern	Mine Trib (C1)	1.793
Leone Pond	Campbell	NB Raritan Trib (C1)	1.789
Mill Pond	Rt. 202 and Bernards	Mine Brook (C2)	1.558
Williams Pond	Douglass	Mine Trib (C1 section)	1.519
Rogow Pond	Post	Mine Trib (C1)	1.366
Gwinn Pond	Post	Mine Trib (C1)	1.223
Twin Lakes Upper Pond	Rippling Brook	Mine Trib (C1)	1.098
Kenny Pond	Youngs	Mine Trib (C2)	0.925
Rosenthal Pond	Douglass	Mine Trib (C2)	0.908
Cambria Pond	Washington Corner	Indian Grove (C1)	0.772
Harmony Pond	Charles	Mine Trib (C2)	0.573
Iovion Pond	Campbell	NB Raritan Trib (C1)	0.516

\*See pg. 74 for stream classification definitions.

Bernardsville has over 75 water bodies, most of which are small (under one acre) artificial impoundments along streams. Water bodies classified by NJDEP as natural lakes in Bernardsville are limited to several very small impoundments along tributaries of the NB Raritan River in the northwestern section of the municipality. The named lakes identified by NJDEP in Table 10 are generally over an acre in size and were artificially created.

## 5.2 SURFACE WATER QUALITY CLASSIFICATION

In New Jersey, it is the policy of the State to restore, maintain, and enhance the chemical, physical, and biological integrity of its waters, to protect the public health, to safeguard aquatic biota, protect scenic and ecological values and to enhance the domestic, municipal, recreational, industrial, agricultural and other reasonable uses of the State's waters. Water quality is evaluated with respect to Surface Water Quality Standards (SWQS) and water quality concerns occur when SWQS are not met or are threatened. New Jersey's Surface Water Quality standards (N.J.A.C. 7:9B, et seq.) establish the water quality goals and policies underlying the management of the State's water quality. The highest quality surface waters in NJ are referred to as Outstanding Natural Resource Waters (ONRW). These waters are typically in State or National parks and are not subject to any wastewater discharges or increases in runoff (these waters may be identified as Freshwater 1 (FW1) or Pinelands (PL) waters. Remaining waters are identified as Freshwater 2 (FW2) waters. All of Bernardsville's waters are FW2.

Nearly all of the surface waters located in northern Bernardsville are identified as Freshwater 2, Trout Production (FW2-TP). Trout production indicates that trout (native brook trout, *Salvelinus fontinalis*) may complete their life cycle and reproduce in a natural habitat. One tributary of the Raritan River south of Ravine Lake Road in western Bernardsville is listed as freshwater 2 trout maintenance (FW2-TM) which indicates that water supports trout (typically stocked) throughout the year, but they do not reproduce. Stocked trout may include (brook trout, rainbow trout *Oncorhynchus mykiss*, brown trout *Salmo trutta*, or various hybrids). Waters in southern Bernardsville, including Mine Brook, Pickle Brook, and Harrison's Brook, are listed as FW2-NT. Non-Trout waters are not associated with trout production or trout maintenance and are generally unsuitable for trout because of their physical, chemical, or biological attributes. These waters may be suitable for a wide variety of other fish species. Trout production and trout maintenance waters are subject to special protections including timing restrictions for certain work in or near these waters. Trout production waters are provided a 150 foot protected riparian zone under the NJ Flood Hazard Area Control Act (FHCA) (N.J.A.C. 7:13) (see FHCA Rules in Section 5.5) and wetlands discharging into a trout production water are considered exceptional resource value and subject to a 150-foot transition area (see Section 6, Wetlands).

### CATEGORY 1 AND 2 WATERS

In addition to the standard water quality classifications, waters are also classified as either Category 1 or Category 2 waters. Category 1 waters are those waters designated for additional protection due to their "color, clarity, scenic setting, other aesthetic value, exceptional ecological significance, recreational significance, water supply significance or fisheries resources." All other waters are considered Category



2 (C2) waters. Under the NJ Stormwater Management Rules (N.J.A.C. 7:8), C1 waters are protected from “measurable or calculable changes in water quality and are afforded a designated special waters resource protection area (SWRPA). The SWRPAs are those areas within 300 feet of the top of each bank of C1 waters. In addition, the 300-foot width SWRPA is required adjacent to those waters that drain to C1 waters within the limits of the associated subwatershed (HUC-14) (See URWA Water Resources Map - Page 76). This buffer may be reduced to 150 feet for disturbed areas such as yards, lawns and agricultural areas. The SWRPA is intended as a buffer between development and these special waters in order to further protect water quality. The 300-foot width buffer is based on an NJDEP review of existing scientific literature. Existing development within the SWRPA is not regulated. Consequently, maintenance of existing features, such as tree pruning, cultivation and mowing are also not regulated. However, new construction or expansion of existing facilities that would disturb up to one acre of land or create one-quarter acre of new impervious surfaces is considered major development and would be regulated under the NJDEP Stormwater Management Rules (N.J.A.C. 7:8). Furthermore, all C1 waters and upstream waters within the same HUC 14 are subject to a 300-foot regulated Riparian Zone in which vegetation removal is regulated under the Flood Hazard Area Control Act Rules (N.J.A.C. 7:7-13).

A large portion of the waters within northern Bernardsville are listed as FW2/C1 Trout Production waters. This includes all of Indian Grove Brook and nearly all of the associated tributaries; the North Branch Raritan River and nearly all of its tributaries; Campbell Brook; the Passaic River; and Twin Lake Brook in central Bernardsville. The headwaters of McVicker’s Brook, which touch the border of northern Bernardsville, are listed as FW2/C1 Trout Maintenance. Remaining waters within Bernardsville Borough are listed as FW2 Non-trout, Trout Maintenance, or Trout Production Waters (see Surface Water Quality Standards Map, Page 77).



**NERVINE PARK POND**

BY KRISTI MACDONALD



# Bernardsville Borough Environmental Resources Inventory

## Surface Water, Wetlands, Flood Areas, Subwatersheds & Watershed Management Area Boundaries

- Municipal Boundary
- Parcel Boundaries
- Rivers & Streams
- Lakes & Ponds
- Wetlands
- Flood Hazard Areas
- Flood Prone Areas
- North & South Branch Raritan River WMA
- McVickers Brook Subwatershed
- Mine Brook Subwatershed  
(including Pickel Brook  
and Twin Lakes Brook)
- North Branch Raritan River Subwatershed  
(including Campbell Brook and Little Brook)
- Upper Passaic River WMA
- Dead River Subwatershed
- Harrisons Brook Subwatershed
- Passaic River Subwatershed  
(including Indian Grave Brook)
- Penns Brook Subwatershed

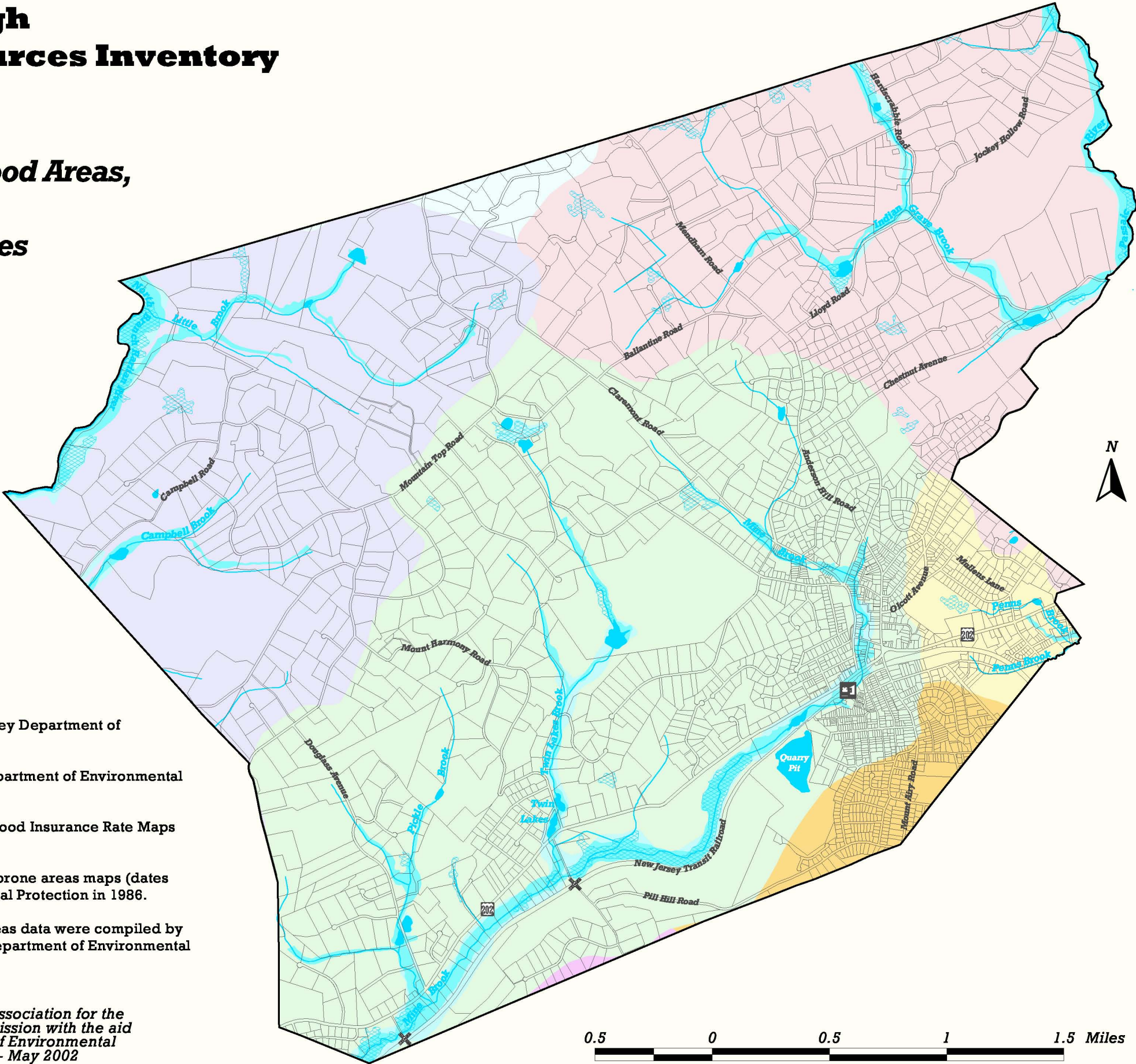
Rivers and streams data were generated by the New Jersey Department of Environmental Protection from USGS files in 1998.

Lakes and ponds data were derived from New Jersey Department of Environmental Protection land use/landcover data from 1995/97.

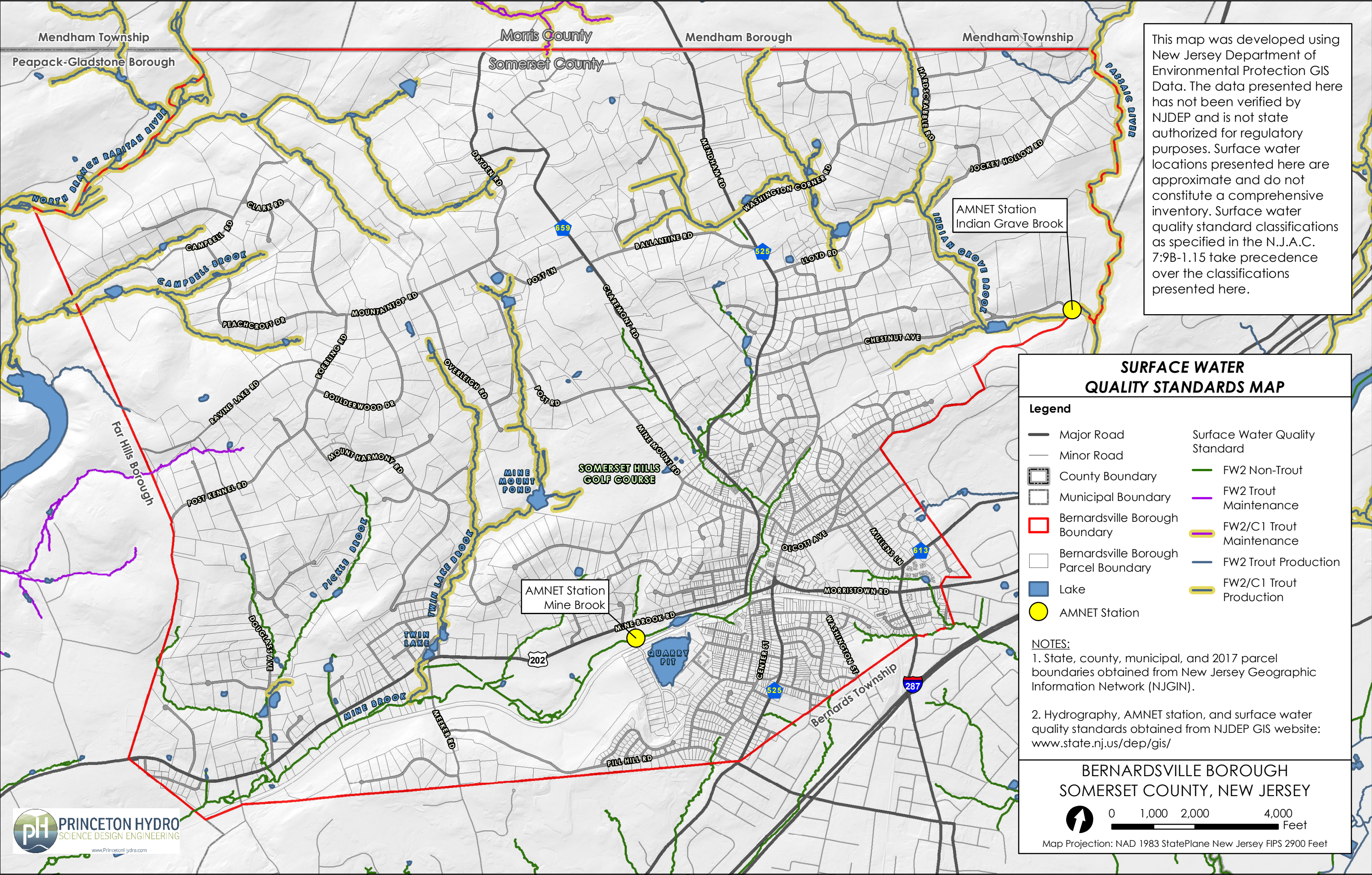
Flood hazard areas data were compiled by FEMA from Flood Insurance Rate Maps (dates unknown).

Flood prone areas data were compiled from USGS flood prone areas maps (dates unknown) by the New Jersey Department of Environmental Protection in 1986.

Subwatersheds (HUC14) and watershed management areas data were compiled by the New Jersey Geological Survey and the New Jersey Department of Environmental Protection from USGS data in 2000.







This map was developed using New Jersey Department of Environmental Protection GIS Data. The data presented here has not been verified by NJDEP and is not state authorized for regulatory purposes. Surface water locations presented here are approximate and do not constitute a comprehensive inventory. Surface water quality standard classifications as specified in the N.J.A.C. 7:9B-1.15 take precedence over the classifications presented here.

**SURFACE WATER  
QUALITY STANDARDS MAP**

- Legend**

  - Major Road
  - Minor Road
  - County Boundary
  - Municipal Boundary
  - Bernardsville Borough Boundary
  - Bernardsville Borough Parcel Boundary
  - Lake
  - AMNET Station
- Surface Water Quality Standard**

  - FW2 Non-Trout
  - FW2 Trout Maintenance
  - FW2/C1 Trout Maintenance
  - FW2 Trout Production
  - FW2/C1 Trout Production

**NOTES:**  
1. State, county, municipal, and 2017 parcel boundaries obtained from New Jersey Geographic Information Network (NJGIN).  
2. Hydrography, AMNET station, and surface water quality standards obtained from NJDEP GIS website: [www.state.nj.us/dep/gis/](http://www.state.nj.us/dep/gis/)

**BERNARDSVILLE BOROUGH  
SOMERSET COUNTY, NEW JERSEY**

0 1,000 2,000 4,000 Feet  
Map Projection: NAD 1983 StatePlane New Jersey FIPS 2900 Feet



## **5.3 SURFACE WATER QUALITY**

The surface water quality for rivers and creeks has been evaluated in New Jersey using various methods. In particular, the NJDEP uses a protocol termed Ambient Biological Monitoring Network (AMNET) for rapidly assessing water quality (see Section 5.3.2). In addition, under the Federal Clean Water Act Section 303 (d), states are required to list the status of their streams (N.J.S.A. 58:11A-7). The 303(d) list is generated using the AMNET and other stream monitoring data such as that generated by the NJDEP Clean Lakes Program, NJDEP Shellfish Monitoring Program, Fish Tissue Monitoring and NJDEP/USGS chemical and physical water quality monitoring.

### **5.3.1 NONPOINT SOURCE POLLUTION**

Nonpoint sources of pollution are somewhat difficult to identify since they do not discharge directly from a pipe, or a “point source.” The most common nonpoint pollutants include solid waste/floatables; sediment; nutrients; pesticides; metals, road salts; petroleum hydrocarbons and pathogens. These nonpoint sources may be transferred into receiving waters via stormwater that runs off of developed, impervious surfaces and from agricultural areas that are subject to erosion.

In addition to increased runoff, developed areas also accumulate pollutants on the land surface from atmospheric deposition. These pollutants are mobilized and transported to streams during storm events. Stormwater that runs off of pavement or is stored in detention basins is also often heated, which raises the temperature of the receiving waters. The consequences of nonpoint source pollution result in significant stream and habitat degradation.

### **5.3.3 AMNET MONITORING (AQUATIC INVERTEBRATE POPULATIONS)**

In order to determine the health of the streams that comprise the watersheds, the NJDEP performs monitoring of benthic macroinvertebrate populations using the Environmental Protection Agency’s Rapid Bioassessment Protocols – Level II procedure. Using this method, aquatic communities are examined for pollution tolerant and intolerant life forms and the results are used to compute a New Jersey Impairment Score and Biological Condition. The program is termed the Ambient Biological Monitoring Network (AMNET). Biological condition of a stream sample is based on 100 organism samples taken at the AMNET site. The benthic macroinvertebrate samples examined include representatives of various taxonomic families of insects and insect larvae, mollusks such as mussels, clams and snails, and crustaceans such as crayfish. Ratings of the stream condition are based on the level of pollution tolerance of the families collected, the ratio of pollution tolerant to pollution intolerant families, and the biodiversity of the system (percentage of single species dominance).



In New Jersey, 800 locations are sampled on a five-year rotating schedule. Biological impairment of streams may be caused by several major factors including nonpoint source pollution, point source pollution and/or a lack of stream corridor (riparian) buffers. Non-impaired streams are represented by maximum taxa richness, balanced groups and a good representation of pollution intolerant species. Moderately impaired communities are characterized by reduced richness of EPT taxa (Ephemeroptera-mayflies, Plecoptera –stoneflies, and Trichoptera -caddisflies); reduced community balance and reduced number of pollution intolerant taxa. Severely impaired communities are benthic communities that are drastically different from those in less impaired situations including a few dominant pollution tolerant macroinvertebrate taxa (NJDEP 2004 Ambient Stream Metadata). Pollution tolerant groups include worms (Oligochaeta), midges (Simuliidae), leeches (Hirudinia), and various snails (Gastropoda). The scoring system for impairment has been changed since the previous 2010 ERI, according the NJDEP 2012 Ambient Monitoring Network Report for the Raritan Water Region for Watershed Management Areas 7, 8, 9, 10 Round 4 Benthic Macroinvertebrate Data Report.

Between the start of the program (1992) up until 2004, a single statewide index, the New Jersey Impairment Score (NJIS), was used in assigning one of three assessment ratings, non-impaired, moderately impaired, and severely impaired. The NJIS was limited in that it used family level taxonomic identification for calculating scores and did not account for geographical differences in macroinvertebrate community structures. To resolve these limitations, starting with the mid 2004 data (Atlantic Region report), three indices are used for assessments; High Gradient Macroinvertebrate Index (HGMI), Coastal Plain Macroinvertebrate Index (CPMI), and Pinelands Macroinvertebrate Index (PMI). These indices account for the State's geo-physically different ecoregions and use genus level taxonomic identification for calculating scores. The higher level of identification allows for more resolute and accurate results at four assessment rating levels (rather than the three previously used); "excellent," "good," "fair," and "poor." The results are considered reflective of the water and/or habitat quality at each site. This information is used by the Department, primarily in assessing progress toward the goals of the Clean Water Act via the Integrated Water Quality Monitoring and Assessment Report. AMNET data are also integral for designation of Category 1 waters, based on exceptional ecological significance.

The monitoring stations located in and around Bernardsville use the HGMI rating. The study area for this rating includes northern New Jersey, above the geologic fall-line including the following ecoregions: North Central Appalachians, Central Appalachian Ridges and Valleys, Northeastern Highlands, Northeastern Coastal Zone, and Northern Piedmont.

The attributes and ranges are described below, as provided by NJDEP:

**Excellent** ( $\geq 63$ ): Minimal changes in structure of biological community and minimal changes in ecosystem function. Virtually all native taxa are maintained with some changes to biomass and/or abundance; ecosystem functions are fully maintained within the range of natural variability.

**Good** ( $< 63 - 42$ ): Some evident changes in structure of the biotic community and minimal changes in ecosystem function. Some changes in structure due to loss of some rare native taxa; shifts in relative abundance of taxa but sensitive-ubiquitous taxa are common and abundant; ecosystem functions are fully maintained.

**Fair** ( $< 42 - 21$ ): Moderate to major changes in structure of biological community and moderate changes in ecosystem function. Sensitive taxa are markedly diminished; conspicuously unbalanced distribution of major groups from that expected; organism condition shows signs of physiological stress; system function shows reduced complexity.

**Poor** ( $< 21$ ): Extreme changes in structure of biological community and major loss of ecosystem function. Extreme changes in structure; wholesale changes in taxonomic composition; extreme alterations from normal densities and distributions; organism condition is often poor; ecosystem functions are severely altered.

The second round of sampling of NJ streams included a habitat score system developed from revised USEPA criteria (Barbour, 1997). Parameters morphology, bank structural features, and riparian vegetation. The area evaluated included the sample site and meters considered in the evaluation included in-stream substrate, channel the adjacent area within a 100- to 200-foot radius. The qualitative habitat assessment involves four condition categories, rating each parameter as optimal, suboptimal, marginal or poor. Scores within the State range between 53 and 197. Habitat scores include four categories: Optimal (160-200), Sub-Optimal (110-159), Marginal (60-109) and Poor ( $< 60$ ).

Two AMNET biological monitoring stations are located in Bernardsville with an additional 3 stations within the vicinity of the Borough. Recording stations are included in Table 11. Impairment ratings vary within the municipality and surrounding waters. The Indian Grove Brook test site, located near its confluence with the Passaic River, is a C1 water rated as Non-Impaired with an Optimal habitat score. All other habitat scores within the Bernardsville vicinity fall within the Sub-Optimal category. The Passaic River habitat score showed a negative change for habitat score, and shifted from Optimal during the last round of testing to Sub-optimal during this round of testing. Mine Brook, which is a FW2-NT C2 water, had a Poor Impairment rating during the last round of testing, but increased in the current rating to Fair, indicating a positive change. All sites except Indian Grove Brook showed no change in rating. No other site scored a Poor Impairment rating within the vicinity of Bernardsville Borough.

Details of how the habitat score is calculated can be found here:

<https://www.nj.gov/dep/wms/bfbm/download/habitat.pdf>

Website: <https://www.nj.gov/dep/wms/bfbm/downloads.html#rar>



**TABLE 11:**  
**AMNET BIOLOGICAL CONDITION OF STREAMS IMPACTING**  
**BERNARDSVILLE BOROUGH**

Stream Name	Location	AMNET#	Previous Impairment Rating Round 3	Current Impairment Rating Round 4	Change in Rating	Previous Habitat Score Round 3	Current Habitat Score Round 4	Location
Indian Grove Brook	Bernardsville	AN0214	Excellent (73.80)	Excellent (74.81)	No Change	Optimal 197	Optimal 169	Hardscrabble Rd
Mine Brook	Bernardsville	AN0352	Poor (18.91)	Fair (33.32)	Positive Change	Sub-optimal 147	Sub-optimal 134	Bernardsville Rd
Mine Brook	Far Hills Borough	AN0353	Good (46.15)	Good (50.30)	No Change	Sub-optimal 115	Sub-optimal 130	Far Hills Rd.
Passaic River	Mendham Township	AN0213	Fair (27.15)	Fair (26.32)	No Change	Optimal 175	Sub-optimal 136	Tempe Wick Rd.
North Branch Raritan River	Bedminster	AN0351	Good (55.85)	Good (60.35)	No Change	Sub-optimal 147	Sub-optimal 157	Rt. 202

Source: NJDEP 2012 Ambient Monitoring Network Reports for the Raritan Water Region for Watershed Management Areas 7, 8, 9, and 10, Round 3 and 4 Benthic Macroinvertebrate Data; and Watershed Management Areas 3, 4, 5 ,6, Round 3 and 4 Benthic Macroinvertebrate Data

Under the Federal Clean Water Act Section 303(d), each state is required to list impaired waterbodies and in New Jersey, it is required as part of the water quality planning process in the state pursuant to the Water Quality Planning Act (N.J.S.A. 58:11A-7). New Jersey uses chemical and biological stream monitoring to determine these impaired waters. Water bodies cannot be removed from the 303(d) list until the water quality standards are met. The 303(d) list is divided into sublists or categories depending on the condition of the waterbody. The categories defined by NJDEP are as follows:

**Sublist 1:** There is sufficient data to assess all applicable designated uses for the waterbody and the assessment indicates full attainment for all designated uses.

**Sublist 2:** Water bodies are placed on this sublist when an assessment for an individual designated use is complete and results for that assessment indicates full attainment but other designated uses are unassessed, assessed as non-attain or have an approved TMDL. When all designated uses are assessed as full attain, these waterbodies will be moved to Sublist 1.

**Sublist 3:** Waterbodies are placed on this sublist when the designated use assessment indicated insufficient or no data to assess the designated use.

**Sublist 4:** The waterbody is impaired or threatened for one or more designated uses. There are three subcategories:

**Sublist 4A:** Waterbodies are placed on this sublist when the designated use is non-attaining due to pollutants and a TMDL (Total Maximum Daily Load) has been adopted in the New Jersey Register and approved by the USEPA.

**Sublist 4B:** Waterbodies are placed on this sublist when the designated use is non-attaining due to pollutants and other enforceable pollution control requirements are reasonably expected to result in the conformance with the applicable SWQS in the near future.

**Sublist 4C:** Waterbodies are placed on this sublist when the designated use is non-attaining and the impairment is not caused by a pollutant.

**Sublist 5:** Designated use assessment is complete and results for the assessment indicate nonattainment.

To view the full 2014 Integrated Water Quality and Monitoring Assessment Report, visit the NJDEP [https://www.nj.gov/dep/wms/bears/docs/2014\\_final\\_integrated\\_report.pdf](https://www.nj.gov/dep/wms/bears/docs/2014_final_integrated_report.pdf)

The Clean Water Act requires that each Sublist 5 (non-attaining for pollutants) waterbody is given a priority ranking of high (H), medium (M) or low (L) with the goal of lowering Total Maximum Daily Load (TMDL). The prioritization process considers various environmental, social and political factors. Evaluated criteria include source and parameters of impairment; additional data needs; TMDL complexity and nature; waterbody use and cultural or historic importance; efficiency concerns; watershed management activities; sensitive species concerns; and public interest. Table 11 provides the most recent available (2012) data for water body conditions for Sublist 5. The complete integrated list (Table 12) includes all sublists and various categories of water use.

**TABLE 12:**  
**2014 303(D) IMPAIRED WATERBODIES (SUBLIST 5); LIST FOR THE VICINITY OF BERNARDSVILLE BOROUGH WITH PRIORITY RANKING**

Unit ID	Assessment Unit ID	Parameter	Rank
WMA6 02030103010010-01	Upper Passaic River (above Osborn Mills)	pH	M
WMA6 02030103010070-01	Upper Passaic River (Dead River to Osborn Mills)	Arsenic	L
WMA6 02030103010070-01	Upper Passaic River (Dead River to Osborn Mills)	Oxygen, Dissolved	M
WMA6 02030103010090-01	Harrisons Brook	Cause Unknown	L
WMA8 02030105060030-01	NB Raritan River (including McVickers to India Brook)	Oxygen, Dissolved	M
WMA8 02030105060030-01	NB Raritan River (including McVickers to India Brook)	Temperature, water	M
WMA8 02030105060040-01	NB Raritan River (Peapack Brook to McVickers Brook)	Total Suspended Solids (TSS)	H
WMA8 02030105060070-01	Raritan River (Inc. Mine Brook to Peapack Brook.	Arsenic	L
WMA8 02030105060070-01	Raritan River (Inc. Mine Brook to Peapack Brook.	Cause Unknown	L



**TABLE 13:**  
**2014 303D INTEGRATED LIST (SUBLISTS 1-5)**  
**FOR WATERS WITHIN THE VICINITY OF BERNARDSVILLE BOROUGH**

WMA-Assessment Unit ID	Assessment Unit Name	CATEGORIES AND SUBLIST NUMBER*				
		Aquatic Life (Gen.)	Aquatic Life (Trout)	Recreation	Public Water Supply	Fish Consumption
WMA6 02030103010010-01	Upper Passaic River (above Osborn Mills)	5	5	4	2	3
WMA6 02030103010070-01	Upper Passaic River (Dead River to Osborn Mills)	5	N/A	4	5	3
WMA6 02030103010080-01	Dead River (above Harrisons Brook.)	2	N/A	3	3	3
WMA6 02030103010090-01	Harrisons Brook	5	N/A	3	3	3
WMA8 02030105060030-01	NB Raritan River (including McVickers to India Brook)	2	5	4	2	3
WMA8 02030105060040-01	NB Raritan River (Peapack Brook to McVickers Brook)	5	5	3	2	3
WMA8 02030105060070-01	Raritan River (including Mine Brook to Peapack Brook.)	5	3	3	5	3

\*See pg. 81-82 for an explanation of categories and sublists.

### 5.3.5 POINT SOURCE POLLUTION

Point source pollution comes from a defined “point” in the landscape such as an industrial or stormwater discharge pipe. Point source discharges to surface and groundwater are regulated by the NJDEP under the New Jersey Pollution Elimination Discharge System (NJPDES) program (N.J.A.C. 7:14a). Much of this program was created in 1972 by the Federal Clean Water Act. To accomplish the goals of the program, permits are issued that limit the mass and/or concentration of pollutants, which may be discharged into the ground or surface water. These types of permits often require monitoring and include maintenance and Best Management Practices to ensure that they are functioning properly. The types of permitted facilities range from campgrounds, schools and shopping centers to large industrial and municipal wastewater facilities. There are currently 16 approved Construction Activity Stormwater (GP) (5G3) permits, one (1) approved Tier A Municipal Stormwater General Permit (R9) permit, and one (1) approved Basic Industrial Stormwater GP - NJ0088315 (5G2) permit. There is one (1) approved Sanitary Wastewater (A) permit, one (1) approved Sludge Quality Category 2 (GP) (S2G) permit, and two (2) approved Sanitary Subsurface Disposal (GP) (T1) permits. There is one (1) Concrete Products Manufacturing (GP) (CPM) permit and one (1) Hot Mix Asphalt Producers (GP) (R4) permit that are listed as expired. All permits for Bernardsville currently on file with the NJDEP as of February 2018 on the Active Permit List, a majority of which are for stormwater, are listed below in Table 14.

**TABLE 14:**  
**NJDEP ACTIVE PERMIT (NJPDES) LIST FOR BERNARDSVILLE BOROUGH**

NJPDES Permit #	PI #	Facility Name	Facility Address	Permit Expiration	Discharge Category	Document Status
NJ0026387	46124	BERNARDSVILLE STP	166 MINE BROOK RD Bernardsville, NJ 07924	09/30/21	Sanitary Wastewater (A)	Approved
NJG0136247	50541	EASTERN CONCRETE MATERIALS INC	RT 202 S Bernardsville, NJ 07068	10/31/13	Concrete Products Manufacturing (GP) (CPM)	Expired
NJG0141488	161456	SOMERSET HILLS COUNTRY CLUB	180 MINE MOUNT RD Bernardsville, NJ 07924	10/31/23	Sanitary Subsurface Disposal (GP) (T1)	Approved
NJG0151068	222564	BERNARDSVILLE BORO	166 MINEHILL RD Bernardsville, NJ 07924	12/31/22	Tier A Municipal Stormwater General Permit (R9)	Approved
NJG0161438	46125	WELDON ASPHALT BERNARDSVILLE PLANT	RT 202-MINEBROOK RD Bernardsville, NJ 07924	04/30/14	Hot Mix Asphalt Producers (GP) (R4)	Expired
NJG0165689	291665	MEADOWBROOK INVENTIONS INC	260 MINE BROOK RD Bernardsville, NJ 07924	01/31/23	Basic Industrial Stormwater GP - NJ0088315 (5G2) (5G2)	Approved
NJG0179884	528402	Leone Minor Subdivision	Campbell Road Bernardsville, NJ 07924	02/28/22	Construction Activity Stormwater (GP) (5G3)	Approved
NJG0188352	549401	Single Family Home	101 Washington Corner Road Bernardsville, NJ 07924	02/28/22	Construction Activity Stormwater (GP) (5G3)	Approved
NJG0212202	46124	BERNARDSVILLE STP	166 MINE BROOK RD Bernardsville, NJ 07924	12/31/23	Sludge Quality Category 2 (GP) (S2G)	Approved
NJG0214833	604212	Single Family Home, Mr. & Mrs. Joseph Davi	399 Mendham Road Bernardsville, NJ 07924	02/28/22	Construction Activity Stormwater (GP) (5G3)	Approved
NJG0229181	648560	Silverman Residence	1-2 Chapin Road Bernardsville Boro, NJ 07924	02/28/22	Construction Activity Stormwater (GP) (5G3)	Approved
NJG0231941	655680	MOUNT AIRY ROAD CR 525, BERNARDSVILLE	Mount Airy Road Bernardsville, NJ 07924	02/28/22	Construction Activity Stormwater (GP) (5G3)	Approved
NJG0234036	662952	MEADOW BROOK FARM	260 MINE BROOK RD Bernardsville Boro, NJ 07924	10/31/23	Sanitary Subsurface Disposal (GP) (T1)	Approved
NJG0249211	712949	SINGLE FAMILY HOME	50 Round Top Rd Bernardsville Boro, NJ 07924	02/28/22	Construction Activity Stormwater (GP) (5G3)	Approved
NJG0253561	722632	SINGLE FAMILY HOME	10 Chapin Road Bernardsville, NJ 07924	02/28/22	Construction Activity Stormwater (GP) (5G3)	Approved
NJG0255131	726964	BERNARDS HIGH SCHOOL SITE IMPROVEMENTS	25 Olcott Ave Bernardsville, NJ 07924	02/28/22	Construction Activity Stormwater (GP) (5G3)	Approved
NJG0259900	739882	BERNARDSVILLE CENTRE, LLC - PHASE II	80 Morristown Road Bernardsville, NJ 07924	02/28/22	Construction Activity Stormwater (GP) (5G3)	Approved
NJG0266710	751333	DR'S DAVID & BARBRA SAYPOL	174 Sutton Place Bernardsville, NJ 07924	02/28/22	Construction Activity Stormwater (GP) (5G3)	Approved
NJG0266981	751745	BOBBY AND LINDA DALLAS	31 Boulderwood Drive Bernardsville Boro, NJ 07924	02/28/22	Construction Activity Stormwater (GP) (5G3)	Approved
NJG0268682	754709	40 CLARK ROAD BERNARDSVILLE	40 Clark Road Bernardsville, NJ 07924	02/28/22	Construction Activity Stormwater (GP) (5G3)	Approved
NJG0268895	755043	BERNARDSVILLE TURF FIELD	121 seney Dr Bernardsville Boro, NJ 07924	02/28/22	Construction Activity Stormwater (GP) (5G3)	Approved
NJG0269611	756598	MICHAEL LEPORE	61 Beverly Drive Bernardsville, NJ 07924	02/28/22	Construction Activity Stormwater (GP) (5G3)	Approved
NJG0274658	765981	NELSON PROJECT LOT DEVELOPMENT PLAN	8 STEVENS ROAD Bernardsville, NJ 07924	02/28/22	Construction Activity Stormwater (GP) (5G3)	Approved
NJG0277096	770988	THE HERITAGE AT CLAREMONT	88 Claremont Road Bernardsville, NJ 07924	02/28/22	Construction Activity Stormwater (GP) (5G3)	Approved

Source: NJDEP Data Miner, NJPDES Permitting Program, NJPDES Active Permit List  
(updated February 11, 2019)



## 5.4 SURFACE WATER QUALITY PROTECTION

### 5.4.1 RIPARIAN CORRIDORS

Riparian corridors are natural areas along waterbodies (river, stream, lake) that can connect large contiguous diverse habitat types that provide the associated waterbody with a buffer from anthropogenic disturbance. The riparian corridors in which waterbodies are located serve multiple functions in addition to protecting them, including providing food/shelter for a myriad of wildlife; improve water quality via removal of excess nutrients/sediment from nonpoint source surface water runoff; provide flood storage during/after significant rain events; reduces erosion potential of the associated waterbody; and provides open space/outdoor activity opportunities. Additionally, plant communities within these corridors help minimize deleterious impacts of nitrogen and phosphorus while providing dissolved and particulate organic food matter to the waterbody, which, in turn, maintain the high biological productivity and diversity typically associated with waterbodies in riparian corridors. In New Jersey, the loss of riparian corridor plant communities has largely been driven by development and agricultural practices.

The width of the preserved buffer associated with riparian corridors can vary at the local level, and is primarily driven by existing soil permeability and slopes adjacent to the waterbody. Typically, riparian corridors that possess less slope and soils that are largely sand do not require a buffer as wide as riparian corridors which possess steeper slopes and soils that are primarily loam or clay. Effective riparian yards should typically be 100 feet or wider (Welsch, 1991), regardless of the slopes/soils present within the riparian corridor.

New Jersey defines riparian zones as “the land and vegetation within and adjacent to a regulated water. Riparian zones exist along both sides of every regulated water and include the regulated water itself, except as provided at N.J.A.C. 7:13-2.3(c)1”. As of 2018, under the NJDEP Flood Hazard Area Control Act Rules (N.J.A.C. 7:13), the NJDEP regulates the removal of riparian zone vegetation within the riparian zone of all regulated waterbodies. Under the Flood Hazard rules, riparian zones can be 50, 150 or 300 feet, measured from the top of bank of the regulated water. A 300-foot riparian zone has been adopted to protect all Category 1 (C1) waters and all upstream tributaries within the same HUC-14 watershed. A 150-foot riparian zone is associated with the following regulated waters:

1. Any trout production water and all upstream waters (including tributaries);
2. Any trout maintenance water and all upstream waters (including tributaries) located within one mile of a trout maintenance water (measured along the length of the regulated water); and
3. Any segment of a water flowing through an area that contains a threatened or endangered species, and/or present or documented habitat for those species, which is critically dependent on the regulated water for survival, and all upstream waters (including tributaries) located within one mile of such habitat (measured along the length of the regulated water). A list of critically dependent species is available from the Department at the website set forth at N.J.A.C. 7:13-1.3.

And, for all other regulated waters not identified in the 150- or 300-foot riparian zone listed above, the width of the riparian zone is 50 feet. The wider the riparian zone associated with the regulated

water, the greater the amount of all aforementioned benefits/protection afforded to said waterbody. However, additional protection for all waterbodies can be provided by enacting local ordinances that complement or provide more stringent requirements than those enforced by NJDEP. Chapter 14 (14-4) of the Bernardsville Municipal Code sets municipal standards for riparian yards. Note: The riparian yard might be considerably different from the riparian zone regulated by the State. (See Riparian Zone Map, Page 87; Note: The map may not depict all regulated waters pursuant to NJAC 7:13- 2.2.)

Restoration of stream buffers on agricultural lands is supported by various programs administered by the New Jersey Division of the USDA Natural Resource Conservation Service (NRCS). The NRCS provides technical assistance through various programs, primarily the Conservation Technical Assistance Program (CTA). The CTA typically results in the development of a Conservation Plan for a farm that directs the landowner to available programs, such as the Farm Bill Program. A number of Farm Bill programs provide for conservation practices such as the Environmental Quality Incentives Program (EQIP), Wildlife Habitat Incentives Program (WHIP), Wetland Reserve Program (WRP), Conservation Reserve Program (CRP), Farm and Ranch Land Protection Program (FRPP) and the Grassland Reserve Program (GRP). These programs offer cost sharing opportunities for implementing conservation practices. The CRP is especially applicable to riparian buffer conservation. This program compensates farmland owners for the loss of land being converted to protect stream corridors and also provides funding to perform the actual restoration of the buffers.

## 5.4.2 STORMWATER MANAGEMENT

Increases in development and impervious surfaces result in increases of stormwater runoff quantity and velocity. The increase in quantity causes downstream areas to peak faster and higher than under natural or pre-development conditions and may result in downstream flooding and erosion problems.

As a result of the water quality and quantity issues associated with stormwater, New Jersey published two sets of rules in February 2004 that affect stormwater management. The first set of rules is Phase II New Jersey Pollutant Discharge Elimination System Stormwater Regulation Program Rule (N.J.A.C. 7:14A-1 et seq.). These rules address pollutants associated with existing stormwater runoff, as required under the Federal Clean Water Act. These rules govern the issuance of permits to certain public entities, including municipalities, which own or operate small municipal storm sewer systems (MS4s). The permit program establishes the Statewide Basic Requirements that must be implemented to reduce nonpoint source pollutant loads from these sources. The basic Statewide requirements include measures such as: the adoption of ordinances (litter control, pet waste, wildlife feeding, proper waste disposal, etc.); the development of a municipal stormwater management plan and implementing ordinances; requiring certain maintenance activities (such as street sweeping and catch basin cleaning); implementing solids and floatables controls; locating discharge points and stenciling catch basins; as well as a public education component.

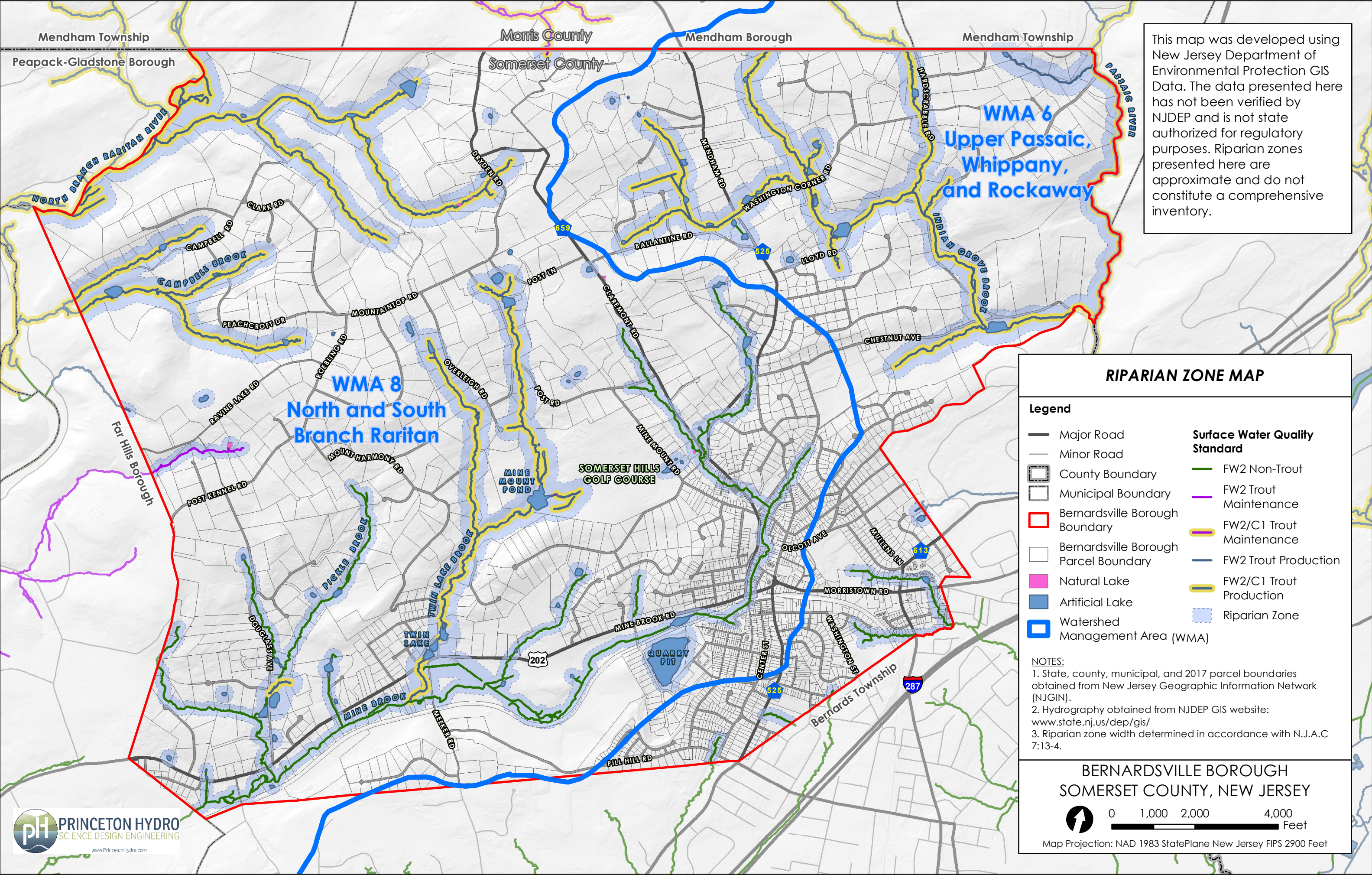
The second set of rules is the Stormwater Management Rules (N.J.A.C. 7:8-1 et seq.), which applies to stormwater systems associated with new (proposed) development. The Stormwater Management Rules apply to new development that will ultimately result in the disturbance of one or more acres of land, or in an increase in impervious surface by one-quarter of an acre or more (i.e., “major development”).



**STORM DRAIN**

BY PETER BIRNBAUM





This map was developed using New Jersey Department of Environmental Protection GIS Data. The data presented here has not been verified by NJDEP and is not state authorized for regulatory purposes. Riparian zones presented here are approximate and do not constitute a comprehensive inventory.



In 2006, the Borough adopted a stormwater management ordinance (Article 12-29 of the Zoning Ordinance) requiring that all major developments, as defined in the NJDEP Stormwater Management Rule (N.J.A.C. 7:8, et seq.), shall have their stormwater management designed in accordance with the Residential Site Improvement Standards (RSIS, N.J.A.C. 5:21) and the NJDEP Stormwater Management Rule (N.J.A.C. 7:8). These standards shall apply to all projects, residential and nonresidential, in all zone districts. This ordinance also included additional terms for Exempt Developments and Minor Developments. Design standards are required for minor developments, which are considered any development that does not meet the definition of exempt development or the definition of major development.

## **5.5 FLOODPLAINS AND THE FLOOD HAZARD AREA CONTROL ACT RULES**

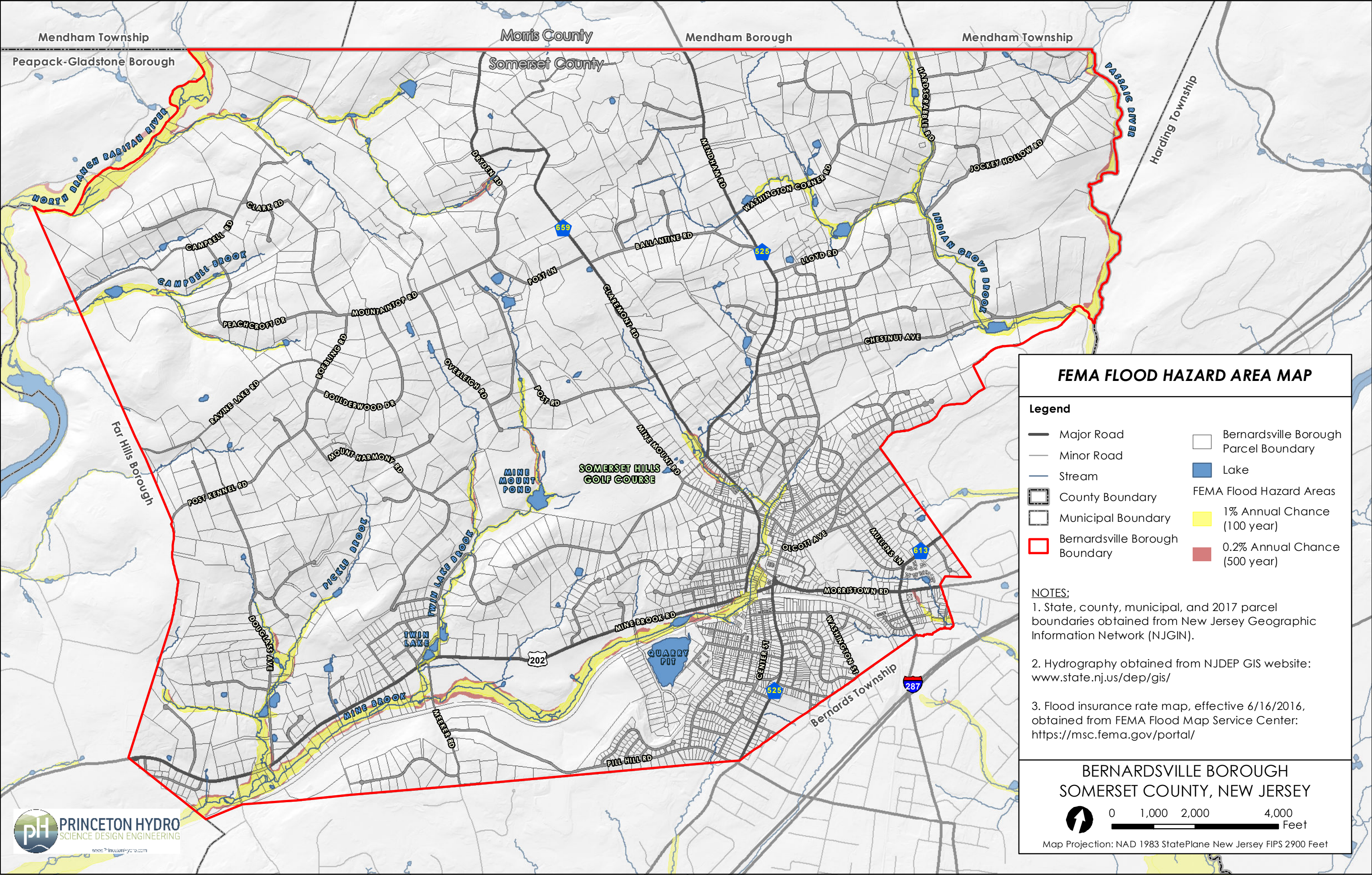
### **5.5.1 FLOOD HAZARD AREA CONTROL ACT RULES - DEFINITIONS**

The Flood Hazard Area Control Act Rules, NJAC 7:13, adopted on November 5, 2007 and amended effective April 16, 2018, implement the New Jersey Flood Hazard Area Control Act Rules, NJSA 58:16A-50 et seq. These rules acknowledge that development within a flood hazard area can exacerbate the intensity and frequency of flooding by reducing flood storage, increasing stormwater runoff and obstructing the movement of floodwaters.

A flood hazard area exists along every regulated water that has a drainage area of greater than fifty (50) acres. The Flood Hazard Area is the land and the space above that land, which lies below the flood hazard area design flood elevation. The inner portion of the flood hazard area is called the floodway and the outer portion of the flood hazard area is defined as the flood fringe. The regulations provide six (6) methods for establishing the Flood Hazard Area Design Flood elevation. It is important to note that the State of New Jersey has established and officially adopted Flood Hazard Areas for more than 2,500 miles of regulated waters. If a State Delineation exists for a given water, it must be used for all NJDEP applications. Flood profiles, mapping and corresponding computer models for delineated watercourses may be obtained from the NJDEP. If there are multiple delineations, the most conservative delineation prevails.

The floodway is the land and the space above the land which is mathematically determined to be required to carry and discharge flood waters resulting from the 100-year flood under certain conditions. The floodway includes the channel and often the land adjacent to the channel. The floodway is subject to high velocity flows during flooding events. The flood fringe, the portion of the flood plain lies contiguous with the floodway, still experiences flooding, but is inundated to a lesser degree than the floodway. Delineated Flood Hazard Areas have been established and officially adopted by the State of New Jersey for certain watercourses.





FEMA FLOOD HAZARD AREA MAP

**Legend**

- Major Road
- Minor Road
- Stream
- County Boundary
- Municipal Boundary
- Bernardsville Borough Boundary
- Bernardsville Borough Parcel Boundary
- Lake
- FEMA Flood Hazard Areas
  - 1% Annual Chance (100 year)
  - 0.2% Annual Chance (500 year)

**NOTES:**

1. State, county, municipal, and 2017 parcel boundaries obtained from New Jersey Geographic Information Network (NJGIN).

2. Hydrography obtained from NJDEP GIS website: [www.state.nj.us/dep/gis/](http://www.state.nj.us/dep/gis/)

3. Flood insurance rate map, effective 6/16/2016, obtained from FEMA Flood Map Service Center: <https://msc.fema.gov/portal/>

BERNARDSVILLE BOROUGH  
SOMERSET COUNTY, NEW JERSEY

0 1,000 2,000 4,000 Feet

Map Projection: NAD 1983 StatePlane New Jersey FIPS 2900 Feet



The flood hazard area design flood elevation is the peak elevation that floodwaters will reach a site during the flood hazard design flood. The flood hazard areas design flood is based on the 100- year flood, plus a certain factor of safety in non-tidal areas. This factor of safety is necessary to ensure that the public is protected from the impacts of flooding, which may increase over time due to development, climatic changes and other factors.

The Flood Insurance Program, administered by the U.S. Flood Emergency Management Agency (FEMA) has also prepared mapping and classifies floodplain areas in a manner similar to the State of New Jersey. Within the FHA rules (N.J.A.C. 7:13-3), NJDEP has established methodologies and circumstances for using FEMA floodplain mapping for determining the Flood Hazard Area for FHA applications. Mapping of Bernardsville's floodplains based on FEMA Flood Insurance Rate Maps (FIRM) mapping can be seen on the FEMA Flood Hazard Area Map (Page 89). The Mine Brook floodplain area includes the center of Bernardsville and the main thoroughfare, Mine Brook Rd. (Rt. 202) as indicated on the map (Page 89).

## **5.5.2 FLOOD HAZARD AREA CONTROL ACT RULES**

The Flood Hazard Area Control Act rules have regulatory authority over development activities within two (2) distinct and overlapping areas: 1) the flood hazard area and 2) the riparian zone. The flood hazard area is the area that is inundated by the flood hazard area design flood. The Riparian Zone is the land and vegetation within an adjacent to a regulate water. Some regulated waters have only a flood hazard area, some have only a riparian zone and most have both.

NJAC 7:13-2.4 identifies regulated activities under the Flood Hazard Area Control Act Rules, namely, the alteration of topography through excavation, grading and/or placement of fill, the clearing, cutting or removal of vegetation in a riparian zone, the creation of impervious surface, the storage of unsecured material, the construction, reconstruction, repair, alteration enlargement, elevation or removal of a structure and the conversion of a building into a single family home or duplex, multi-residence building or critical building.

There are several types of permits authorizations/approvals that can be obtained/issued. These include Verifications, Permits-by-Rule, General Permits, Individual Permits, Emergency Permits and General Permits by Certification. The Flood Hazard Area Control Act Rules include verifications at NJAC 7:13-5 which determine the limits of regulated areas onsite but does not authorize any construction activities. Development activities are authorized under Permits-by-Rule, General Permits, Individual Permits Emergency Permits, and General Permits-by-Certification. The permitting process is stream lined if the proposed activities comply with the specific conditions of the Permits-by-Rule, General Permits and/or General Permits-by-Certification. Permits-by-Rule do not require a formal NJDEP filing prior to commencing construction activities. The Department has determined that if the regulated activities are undertaken as prescribed for the above referenced permits/authorizations that the impact on flooding and the environment will be de minimus. If the proposed project does not comply with one of these authorizations/permits, an Individual Permit can be sought. A regulated activity or project that is subject to an individual permit must comply with the applicable area-specific requirements, NJAC 7:13-11 and the applicable activity specific requirements, NJAC 7:13-12.

The riparian zone is also regulated by the NJDEP under the Flood Hazard Area Control Act Rules per NJAC 7:13-4.1. A healthy riparian zone provides a variety of functions and value such as reducing adverse effects to water quality by removing nutrients and pollutants from stormwater runoff, moderating storm flows to streams providing flood storage capacity and stabilizing soils and stream banks naturally. The riparian zone is the land and vegetation within and adjacent to a regulated water and measured landward from the top of the bank and dependent on the environmental sensitivity of the watercourse.



The riparian zone can be either 50 feet, 150 feet, or 300 feet in width. For Category 1 streams and all upstream waters within the same HUC-14 subwatershed, the Riparian Zone would be 300 feet.

Any trout production water and all upstream waters, including tributaries, are subject to an 150-foot riparian zone. Riparian Zone of 150 feet is established for any trout maintenance water and all upstream waters (including tributaries) located within one mile of trout maintenance. Waters containing water-dependent endangered or threatened species habitat or within one mile upstream from habitat for certain water-dependent endangered and threatened species are subject to a 150-foot Riparian Zone. Any regulated waterbodies in Bernardsville that do not meet the above-mentioned criteria would have a 50-foot regulated Riparian Zone under the NJDEP Flood Hazard Control Act Rules. It appears that some tributary stream headwaters including areas along the Mine Brook in southernmost Bernardsville may be limited to a 50-foot Riparian Zone.

By regulating and limiting development in the Flood Hazard Area and Riparian Zone, not only is the floodplain protected as a resource, but potential property loss is minimized as well. Filling and development of floodplains removes the capacity of the floodplain to provide flood storage benefits which increase the likelihood of increased upstream and downstream flooding. Vegetated floodplains reduce the velocity of stormwater, thereby reducing erosion and increasing flood storage. Floodplains also provide vital habitat and travel corridors for wildlife.

### **5.5.3 RIVER BASIN FLOODING**

Since 1900, major floods in the Passaic River Basin have taken 26 lives and cost more than \$4.5 billion in total losses (USACE, 2009c). Increased residential and industrial development in the Basin has compounded the problem as the natural vegetation communities, which moderate flood flow through absorption of precipitation and provide groundwater recharge, are transformed to impervious surfaces that increase stormwater runoff. Major flood events, prompting Federal Disaster Declarations, occurred in 1968, 1971, 1972, 1975, 1984, 1992, 1999, and 2005 (USACE, 2009a). The U.S. Army Corps of Engineers (USACE) has attempted to curtail flood problems in the Passaic River Basin since 1936 after a major flooding event when Congress authorized USACE to conduct a river flood control survey (PRC, 2008); however, a comprehensive plan for the Passaic River has not yet been implemented (USACE, 2009a). In 1987, Congress authorized a mainstem flood mitigation plan that had at its centerpiece the development of an inlet water diversion tunnel system. Due to environmental concerns, the inlet development has not been advanced, and the plan has since been amended several times to include a buyout of the Floodway of the Central Passaic River Basin and to include other nonstructural measures and studies. Among the non-structural measures included in the plan is the acquisition of 5,350 acres of natural flood storage areas including 5,200 acres of wetlands. The Passaic Mainstream Flood Reduction Project currently underway includes the acquisition of floodplain wetlands and other vegetated communities for flood storage within the Passaic River Basin. The state has agreed to protect an additional 6,300 acres of floodway area. An additional 9,500 acres are protected as parkland, bringing the anticipated total of protected flood storage to 21,000 acres to prevent the worsening of flood damage. Over 3,300 acres of natural flood storage lands have been acquired to date, and acquisitions will continue (USACE, 2009b).

This is the watershed planning concept. Approximately two-thirds of Bernardsville is in the Raritan River Basin and the remaining is in the Passaic River Basin. The Mine Brook, which flows through downtown Bernardsville, experiences periodic severe flooding. Significant floods occurred on August 13-14, 1942; August 28, 1971; and August 22, 2013 during the hurricane and tropical storm season.

## 5.6 WASTEWATER MANAGEMENT

One in every four households in the U.S. relies on an individual onsite or small cluster system to treat wastewater. In Bernardsville, 75% of the town is served by Septic Systems (Bernards Township, Department of Health). There are 111 of these septic systems within the Bernardsville Sewer Service Area, of which, 36 are in an area with small lots and a high seasonal water table near Moraine Crest Park (Block 131, Lots 11.01 & 12).

According to USEPA, there are public health, environmental, and economic benefits to using septic systems, including reduction in the risk of disease transmission and human exposure to pathogens, removal of pollution from surface water, recharging of the groundwater, and reduction of large infrastructure and energy costs for the collection and treatment of wastewater (USEPA, Septic Systems Overview).

When properly designed, installed, operated and maintained, septic systems can provide environmentally sound and cost-effective wastewater treatment. Onsite disposal systems such as seepage pits or cesspools cannot legally be constructed today. Homes cannot be sold with cesspools and existing seepage pits must be in working order at the time of a property sale. Septic system rules are governed by NJDEP's Standards for Individual Subsurface Sewage Disposal Systems (NJAC 7:9A). Municipal responsibilities are defined in NJAC 7:9A-3.14.

### 5.6.1 MUNICIPAL GOVERNMENT ROLE

Municipal government's role in ensuring that septic systems work effectively helps safeguard public health from waterborne contaminants (e.g. toxics, nitrates, nutrients like phosphorus and nitrogen) as well as disease pathogens that can occur from failing septic systems. Under NJAC 7.9A-3:14, municipalities are at a minimum required to educate owners of septic systems (since 1990) on proper operation and maintenance practices. This education/notice must occur at the time of approval and at least every three years thereafter. Distribution of NJDEP's Homeowner's Guide to Septic Systems (<https://www.nj.gov/dep/dwq/pdf/septicmn.pdf>) satisfies this requirement. Homeowners in Bernardsville received flyers in their 2016 tax bills.

Installations of garbage disposals, connections of sump pumps, and downspouts to a septic system can overwhelm even a properly designed system and are regulated in some communities in NJ. Municipalities can adopt ordinances to manage these causes of large or sudden releases of wastewater. They can churn up solids in the bottom of the septic tank, allowing the suspended solids to enter the distribution box and laterals, leading to possible backups or breakout onto the surface.

Environmental and planning data, such as data on poorly draining soil conditions, high seasonal water tables, wetlands, restrictive soil layers, and shallow depths to bedrock, are available to help identify potential septic problem risk areas. Areas that have a relatively small lot size, in combination with any of these conditions, can be special focus areas for onsite investigation.



Further information on why properly functioning septic systems are important for your municipality is provided below from the ANJEC Resource Paper, "Septic Systems, Clean Water and your Municipality":

*Septic systems, when paired with individual onsite wells, allow water withdrawn through the wells to be recharged into the local aquifer. This helps foster a natural water balance in local watersheds and helps maintain groundwater levels, wetlands water levels and stream flows. Central sewers, particularly when paired with individual onsite wells, often export local groundwater to a distant discharge point, depleting the local groundwater and lowering the water table. Maintaining local water balance is important for ensuring that there is enough clean water available to meet everyone's needs.*

*Reliance of development patterns featuring individual well and septic systems can help control overall development density, protect natural resources and preserve the rural character of communities. For planning purposes, ...New Jersey requires a nitrate threshold of 2 mg/l, while more stringent levels apply in the New Jersey Highlands [Planning Area]. These higher standards can result in significantly larger minimum lot sizes than those calculated using the 10mg/l drinking water standard, and are more protective of groundwater resources.*

*Ensuring properly functioning septic systems requires a structured commitment by the municipality and the participation of landowners. NJDEP's Standards for Individual Subsurface Sewage Disposal Systems (NJAC 7:9A) provides the minimum controls and practices. Local ordinances can be more protective, provided it is justified by local conditions, and has been approved by NJDEP.*

Managing septic systems is a municipal responsibility that, when done properly, results in the protection of public health, surface and groundwater quality, and enhanced property values (ANJEC, 2017). Municipalities can follow NJDEP's Model Septic Management Ordinance and may adopt ordinances that allow for an appropriate level of septic management activity ([www.nj.gov/dep/wqmp/docs/septic\\_ordinance20091014.pdf](http://www.nj.gov/dep/wqmp/docs/septic_ordinance20091014.pdf)). Additionally, ANJEC's Resource Paper (referenced above) provides guidelines and sample ordinances for municipalities on managing septic system maintenance and water safety (ANJEC, 2017).

## 6. WETLANDS



**AMERICAN WHITE WATERLILY**

BY PRINCETON HYDRO



## 6.2 WETLAND RESOURCE VALUE CLASSIFICATION

The Freshwater Wetlands Protection Act (N.J.S.A. 13:9A) classifies wetlands according to resource value. Each wetland resource value classification has a corresponding transition area, or upland buffer, that must be maintained between the wetland and adjacent development to protect the integrity and viability of the wetland ecosystem (N.J.A.C.7:7A-2.5). There are three different resource value classifications: exceptional, ordinary and intermediate:

**Exceptional resource value wetlands** are the highest quality wetlands and require a 150-foot transition area. Exceptional resource value wetlands are those that drain to Freshwater 1 (FW-1) waters, Freshwater 2 (FW-2) trout production (TP) waters or their tributaries, or are present or documented habitat for threatened or endangered species.

**Ordinary resource value wetlands** are typically viewed as the lowest quality wetlands and do not require a transition area. Ordinary resource value wetlands do not exhibit the characteristics of exceptional resource value wetlands and include isolated wetlands that are surrounded by development of more than 50% and are less than 5,000 square feet in size. These wetlands include drainage ditches, swales, or detention basins.

**Intermediate resource value wetlands** include all freshwater wetlands not defined as exceptional or ordinary and require a 50-foot transition area.

NJDEP has the final authority to determine the resource value classification of wetlands. This is established when the NJDEP issues an LOI for a site. An LOI is obtained by applying to the NJDEP Land Use Regulation Program in accordance with the requirements found at N.J.A.C. 7:7A-3.

Most of the surface waters within northern Bernardsville are classified as Freshwater 2–Trout Production (FW2-TP) by NJDEP and associated wetlands would be expected to be of exceptional resource value and subject to a 150-foot regulated transition area. There are no Freshwater 1 (FW-1) waters within Bernardsville Borough. Considered Outstanding Natural Resource Waters, FW-1 waters are designed to be kept in a natural state and not subject to any wastewater discharges or increases in runoff. FW-1 waters should not be confused with Category 1 (C1) classification, which is a separate anti-degradation category and does not influence wetland transition area determinations (see Section 6.2, Water Quality Classification).

NJDEP Landscape Mapping of endangered and threatened wetland species within Bernardsville indicates the presence of three wetland-dependent species that would potentially influence the transition area: The Red-shouldered Hawk (*Buteo lineatus*), a State-Threatened, State-Endangered breeding forested wetlands breeder; Bald Eagle (*Haliaeetus leucocephalus*); Barred Owl (*Strix varia*); and the Wood Turtle (*Glyptemys insculpta*). It appears that most forested wetlands in northern Bernardsville would likely receive a 150-foot standard transition area buffer.

Remaining wetlands in Bernardsville, such as some of those associated with Mine Brook, would be more likely to be classified as intermediate resource value wetlands and would have an associated 50-foot width wetland transition area (buffer). The documentation of additional threatened or endangered species in Bernardsville may change the potential resource value of wetlands. The resource value, or width of the transition area, is established by the NJDEP on a case-by-case basis when an LOI application is submitted for NJDEP review and verification.

## 6.3 WETLAND COMMUNITIES

According to 2012 Land Use data, Bernardsville's NJDEP mapped wetlands include a total of approximately 162 acres; representing approximately 2% of the Borough's total land. There has been no significant change in total wetlands acreage since the 2010 ERI report. As previously stated, wetlands mapping does not substitute for a true delineation. Therefore, it is likely that additional wetlands exist within Bernardsville and onsite evaluation of areas mapped under other land uses may, on occasion, reveal the presence of freshwater wetlands. The wetland communities are classified following a system identified by Cowardin (1979), which separates wetlands into one of five basic ecological systems: Marine, Estuarine, Riverine, Palustrine, and Lacustrine. Bernardsville's wetlands are considered Palustrine. The types and approximate percentages of Palustrine wetlands within the Borough are included in the Table below.

**TABLE 15:**  
**NJDEP DISTRIBUTION OF WETLAND COMMUNITIES IN BERNARDSVILLE BOROUGH**

Wetland Type (defined by NJDEP)	Acres	% of Total
Agricultural Wetlands	42.1	26.0
Herbaceous Wetland	0.6	0.4
Urban Wetland	5.3	3.3
Wooded Wetland	113.9	70.3
<b>TOTAL</b>	<b>161.9</b>	<b>100%</b>

Source: NJDEP 2012 Land Use Data

Palustrine wetlands include all non-tidal wetlands dominated by trees, shrubs and persistent emergent vegetation. These wetlands are usually bordered by uplands, are shoreward of lakes and river channels, and typically include all wetlands termed marsh, bogs, swamps, and fens. Palustrine wetlands may include small, shallow intermittent or permanent ponds, such as vernal pools (see Wetlands and Vernal Pools Map, Page 102).

### Palustrine Deciduous Wooded Wetlands

Deciduous forested wetlands are the most abundant type of wetlands in New Jersey and clearly the most abundant in the Borough of Bernardsville, occupying approximately 70 percent of the total mapped



wetlands. Palustrine deciduous forested wetlands comprise approximately 114 acres of the Borough's mapped wetlands (see Table 15).

Within Bernardsville, most of the forested wetlands are contained within the floodplains of the municipal rivers and streams. Forested wetlands help to filter and purify water by absorbing and filtering pollutants and sediments from these waters. They also stabilize stream flows by temporarily storing floodwater and mitigating the effects of drought. The largest contiguous forested wetlands within Bernardsville are found along the North Branch Raritan River between Bernardsville and Peapack-Gladstone Borough and along Mine Brook near the southernmost portion of Bernardsville.

Forested wetlands include vegetation that is greater than 6 meters tall and may have a variety of water regimes ranging from permanently inundated to intermittently flooded. The dominant wetland forest vegetation of these wetlands includes red maple (*Acer rubrum*), American elm (*Ulmus americana*), black willow (*Salix nigra*), swamp white oak (*Quercus bicolor*), pin oak (*Quercus palustris*), sweet gum (*Liquidambar styraciflua*), box elder (*Acer negundo*), black gum (*Nyssa sylvatica*), river birch (*Betula nigra*), sycamore (*Platanus occidentalis*) and shadbush (*Amelanchier canadensis*) (Collins and Anderson, 1994).

Common understory shrubs in these wetlands include spicebush (*Lindera benzoin*), silky dogwood (*Cornus amomum*), smooth alder (*Alnus serrulata*), common elder (*Sambucus canadensis*), highbush blueberry (*Vaccinium corymbosum*), southern arrowwood, (*Viburnum dentatum*), buttonbush (*Cephalanthus occidentalis*), witch hazel (*Hamamelis virginiana*) and swamp azalea (*Rhododendron viscosum*). Vine species may include poison ivy (*Toxicodendron radicans*), Virginia creeper (*Parthenocissus quinquefolia*), riverbank wild grape (*Vitis riparia*), and Japanese honeysuckle (*Lonicera japonica*) (Collins and Anderson, 1994).

Numerous herbaceous understory species may be observed in these communities. Some of the more representative species include skunk cabbage (*Symplocarpus foetidus*), jack-in-the-pulpit (*Arisaema triphyllum*), marsh marigold (*Caltha palustris*), spring beauty (*Claytonia virginica*), trout lily (*Erythronium americanum*), tussock sedge (*Carex stricta*), cinnamon fern (*Osmunda cinnamomea*), marsh fern (*Thelypteris palustris*), sensitive fern (*Onoclea sensibilis*), clearweed (*Pilea pumila*), wood nettle (*Laportea canadensis*), and blueflag (*Iris versicolor*) (Collins and Anderson, 1994).

Some wetlands may also be classified as scrub/shrub wetlands. These wetlands include vegetation that is less than 6 meters tall and includes true shrubs or young trees, often representing a stage of succession following disturbances such as fire, logging or beaver activity. Shrub wetlands may also be a component of marsh wetlands otherwise dominated by herbaceous species. Shrub wetlands include a variety of water regimes ranging from permanently inundated to intermittently flooded. Wetland shrub species may include buttonbush (*Cephalanthus occidentalis*), red osier dogwood (*Cornus sericea*), silky dogwood (*Cornus amomum*), smooth alder (*Alnus serrulata*), common elder (*Sambucus canadensis*), swamp rose (*Rosa palustris*), highbush blueberry (*Vaccinium corymbosum*) and meadowsweet (*Spiraea tomentosa*).

### **Palustrine Emergent (Herbaceous) Wetlands**

Palustrine emergent wetlands are freshwater marshes dominated by persistent and non-persistent grasses, rushes, sedges, forbs and other herbaceous or grass like plants. Within Bernardsville NJDEP mapping (see Wetlands and Vernal Pools Map, Page 102) shows approximately 0.6 acres of palustrine emergent wetlands dominated by herbaceous species. However, it would be expected that herbaceous wetlands would be a larger component of the municipal land. These wetlands may be portions of other mapped wetland communities within Bernardsville including forested or modified agricultural wetlands. Small herbaceous wetlands may also be embedded within various upland communities such as pasture

or old field habitats.

Common plants in emergent or herbaceous wetlands will include broad leaved cattail (*Typha latifolia*), narrow leaved cattail (*Typha angustifolia*), common reed (*Phragmites australis*), tussock sedge (*Carex stricta*), great bulrush (*Scirpus validus*), common rush (*Juncus effusus*), swamp loosestrife (*Decodon verticillatus*), pickerelweed (*Pontederia cordata*), woolgrass (*Scirpus cyperinus*), tick-seed sunflower and similar species (*Bidens spp.*), blue flag (*Iris versicolor*), sweetflag (*Acorus calamus*), rice cutgrass (*Leersia oryzoides*), bur-reeds (*Sparganium spp.*), arrow arum (*Peltandra virginica*), pickerelweed (*Pontederia cordata*), purple loosestrife (*Lythrum salicaria*), arrow-leaved tearthumb (*Polygonum sagittatum*), water pepper (*Polygonum hydropiper*), and manna-grass (*Glyceria striata*) (Collins and Anderson, 1994).

### **Agricultural Wetland**

Approximately 42 acres of agricultural wetlands are identified within Bernardsville (see Wetlands and Vernal Pools Map, Page 102). These wetlands are primarily located along one section of Mine Brook in southern Bernardsville. Agricultural wetlands are types of modified wetlands that have been altered by human activities such as ditching, diking, filling, vegetation cutting or the installation of subsurface drainage.

### **Urban Wetlands**

Approximately 5 acres of urban wetlands are located in Bernardsville. These wetlands, as defined under the Anderson Classification System (Anderson et.al., 1976), would be identified as “cemetery on wetland,” “managed wetlands,” “maintained lawn greenspaces,” or “wetlands in rights-of-way”. Utility right-of-way wetlands are the most common urban wetlands (S. Ronan, ASGECI Personal Communication, 2009). Some urban wetlands may have some components of herbaceous wetlands or may be lawns dominated by maintained cool season grasses. Close inspection of soils and vegetation of heavily modified wetlands may reveal the presence of historic wetlands including redox (wetland) soils and small amounts of hydrophytic vegetation. Such urban wetlands will often revert back to the natural hydrophytic plant community if previously installed drainage features are abandoned. These areas can also be actively converted back to wetland with minimal effort by plugging ditches and drains or removing dikes. Reversion of agricultural or urban wetlands is sometimes part of a habitat enhancement or wetland mitigation (see Section 6.5, Wetland Mitigation).

## **6.4 VERNAL POOLS**

Vernal pools are ephemeral wetlands that fill annually in the winter and early spring from precipitation runoff or rising groundwater tables. They may be located within a forested, scrub/shrub or emergent wetland. Most years, they dry out during the summer and late fall, losing water through evapotranspiration or as the groundwater table drops. This wet/dry cycle and the low water oxygen levels prevent the establishment and breeding of fish, yet provide a unique temporary habitat for many species. The time of year that the pool fills and dries out will influence the community of animals that utilizes the pool. Numerous amphibians and invertebrates have evolved life cycles adapted to the exploitation of vernal pools. Some species are completely dependent on these pools (obligate Species) while others may use vernal pools, other wetlands, or open waters (facultative species) for reproduction. Vernal pools are also indispensable for biodiversity, with local populations often entirely dependent on a single pool. Vernal pools also provide an important source of water for a variety of other wildlife. Vernal pools are a unique



wildlife resource that have long been ignored or overlooked. They have been filled, drained, and used as road drainage detention ponds. Adjacent areas have been cleared and groundwater wells have lowered water tables. Fertilizers and pesticides have degraded water quality.

Vernal pools are a very valuable natural resource, and although often isolated from adjacent wetlands, are worthy of protection, along with adjacent upland buffers. Amphibian inhabitants of vernal pools may utilize adjacent forested habitat of up to 1,000 feet or more from the breeding pool (NJDEP, 2008b).

NJDEP uses four basic criteria to determine if a wetland is a certified vernal pool. A wetland certified by the State as a vernal pool must be: 1) a confined basin/depression lacking a permanent outlet, 2) harboring documented obligate or facultative vernal habitat species (as identified in N.J.A.C. 7:7A, Appendix 1), 3) maintaining water for at least two continuous months between March & September of a normal rainfall year, 4) free of fish populations or dries up at some time during a normal rainfall year (N.J.A.C. 7:7A-1.4).

NJ GIS Landscape Project v3.3 provides data on potential and confirmed vernal pools throughout New Jersey. The Wetland and Vernal Pool map created reveals the presence of 10 potential vernal pools within the Borough of Bernardsville; five of which are clustered near a tributary of Pickle Brook. Other locations include along Twin Lakes Brook, and lower tributaries of Mine Brook, near the headwaters of Campbell and Little Brooks and along Indian Grove Brook. The wetlands and vernal pool mapping identify the potential vernal pool areas within the Borough of Bernardsville. Each vernal pool location has been given a 1000-foot buffer on the mapping and is labeled as a potential vernal pool area. The 1000-foot buffer represents the area in which amphibians utilizing the potential vernal pool would most likely occur.

No vernal pools have been certified by NJDEP in Bernardsville. Vernal habitats are sometimes relatively small (<0.5acre) and may appear as nothing more than an ordinary wooded depression during certain times of the year. Consequently, field evaluations for vernal habitat/species within Bernardsville at the appropriate time of year would be required to fully determine the extent of vernal habitat and species. A field evaluation of potential vernal pool sites was conducted in April 2004 and did not result in any certifications. No field evaluations have been conducted since 2004.

Within Bernardsville, certain obligate vernal pool amphibian species may be targeted during surveys for adults, eggs and larvae. These obligate species must use vernal pools to successfully breed. Wood frogs (*Rana sylvatica*) and the spotted salamander (*Ambystoma maculatum*) would be the most likely obligate vernal species in Bernardsville and would utilize the pools in the early spring (March-April). According to the New Jersey Audubon Society (NJAS) website, wood frogs have been identified near the Passaic River in the Scherman–Hoffman Sanctuary. As a result, it is possible that this species may utilize vernal habitats in some forested areas of Bernardsville. In addition, NJAS indicates that spotted salamanders have been identified within Scherman–Hoffman, but are not as commonly seen.

The only other obligate amphibian species that may occur within Bernardsville is the marbled salamander (*Ambystoma opacum*). The female marbled salamander utilizes the vernal pools in the fall where she lays eggs and guards them as the pool fills. Additional amphibian species previously identified in Bernardsville that may occur in local vernal pools include spring peepers (*Pseudacris crucifer*), northern gray treefrogs (*Hyla concolor*), green frogs (*Rana clamitans*), pickerel frogs (*Rana palustris*), bullfrogs (*Rana catesbiana*), American toad (*Bufo americanus*) and red-spotted newts (*Notophthalmus viridescens*).

Currently, under NJDEP Freshwater Wetlands Protection Act Rules (N.J.A.C. 7:7A), vernal pools and adjacent wetland transition areas are protected from disturbance by prohibition of issuance of most general permits for activities in these vernal habitats. NJDEP has discretionary authority, however, to require an Individual Permit for a proposed disturbance to an isolated wetland considered a vernal pool.

## 6.5 WETLAND MITIGATION

Wetlands, such as the modified agricultural wetlands, may be converted to their original state as part of a mitigation project. Wetland mitigation is required for certain private or public projects that impact open waters and wetlands in New Jersey. The need for mitigation depends on the size of the impact and/or type of permit being obtained. Mitigation is the creation, preservation, enhancement, or restoration of wetlands required (often by NJDEP or U.S. Army Corps of Engineers - USACE) as compensation for wetlands impacted or lost during permitted activities such as road development. Mitigation may provide opportunities for landowners to sell wetlands that are otherwise not developable and have less economic value, or sell adjacent uplands they wish not to sell for development. The New Jersey Department of Transportation and other organizations are often required to purchase sites for mitigation as part of their permitting processes.

For those required to do wetland mitigation, it can be performed onsite or offsite or through land donations, monetary contributions, or through the purchase of Wetland Mitigation Bank credits. A Wetland Mitigation Bank is a pre-constructed wetland or an area of wetland/upland that has been preserved. Mitigation Banks are assigned to specific Watershed Management Areas (WMA) to compensate for wetland losses within that WMA. According to NJDEP Watershed Mapping (see URWA Water Resources Map, page 76), Bernardsville falls within WMA 6 (Passaic Drainage) and WMA 8 (Raritan Drainage). WMA 6 is served by two Wetland Mitigation Banks – Pio Costa and C + C Builders. The two Mitigation Banks serving WMA 8 are Transcontinental Gas Pipeline Corp. and Wyckoff's Mills. Only Wyckoff's Mills has available mitigation credit at this time.

More information on mitigation may be acquired through the Division of Land Use Regulation Mitigation Council webpage at [www.nj.gov/dep/landuse/fww/mitigate/mcouncil.html](http://www.nj.gov/dep/landuse/fww/mitigate/mcouncil.html). In addition, the USDA Natural Resource Conservation Service (NRCS) can direct farmers and other landowners to programs and organizations involved with wetland mitigation/restoration.

## 6.6 WETLAND REGULATIONS

Since July 1, 1988 the NJDEP Bureau of Freshwater Wetlands has regulated all disturbances in freshwater wetlands under the NJ Freshwater Wetlands Protection Act Rules (N.J.A.C. 7:7A-1.1 et seq.). Since July 1, 1989, they have regulated "transition areas" i.e. lands adjacent to wetlands. As per the freshwater wetlands law and regulations, municipalities cannot adopt local wetlands ordinances (N.J.S.A. 13:9B-30).

In March 1994, the NJDEP assumed the State's administration of the Federal wetlands program, Section 404 of the Federal Clean Water Act (33 U.S.C. §1251 et seq., 1972), for the majority of freshwater wetlands in the state. The USACE retained jurisdiction over all tidal wetlands, certain interstate waters



and wetlands and most freshwater wetlands within 1000 feet of tidal waters. The US Environmental Protection Agency (USEPA) the National Marine Fisheries Service (NMFS) and the US Fish and Wildlife Service retain some oversight over this program, reviewing permit applications for major discharges to wetlands and reviewing new Statewide General Permits and other changes to the Rules for consistency with the Federal 404 program.

Between July 1, 1988 and July 1, 1989, only activities in wetlands and open waters themselves were regulated by NJDEP. Since July 1, 1989, buffer or transition areas adjacent to wetlands have also been regulated. Regulated activities in wetlands include draining, flooding, cutting of vegetation, excavation, filling, and erection of structures. Similar activities are regulated in wetland transition areas.

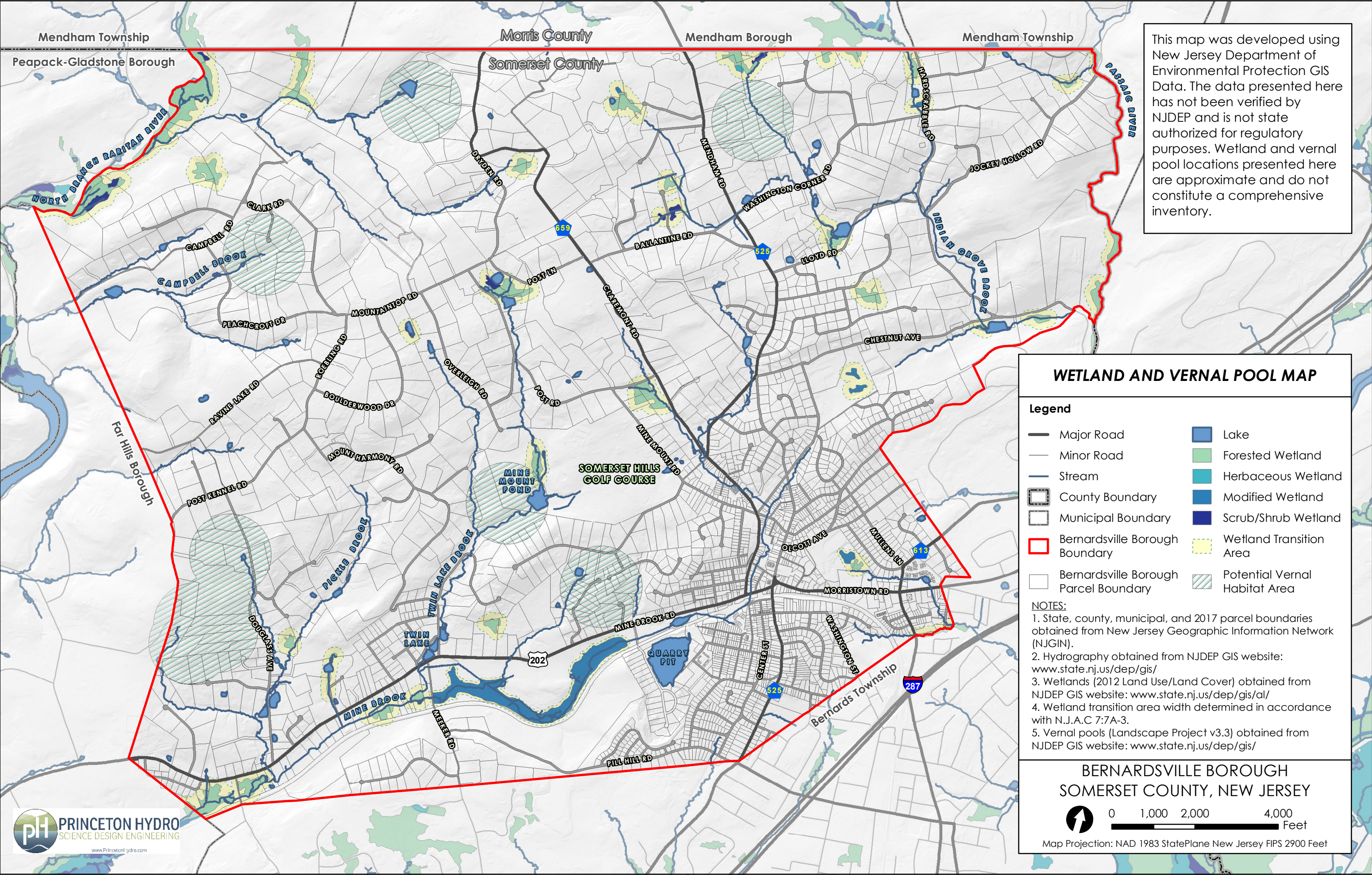
There are two types of permits than can be issued for wetlands disturbance: 1) General Permits and 2) Individual Permits. General Permits may also be issued for activities in wetland transition areas. General Permits can be granted for certain minor activities in wetlands subject to certain conditions. There are General Permits for wetlands encroachments related to multiple activities including: utility lines; outfalls; road crossings; disturbance of isolated wetlands; disturbance of ditches or swales; surveying; soils sampling; house additions; trails and boardwalks; docks and piers; dredging of ponds; fish and wildlife management activities; cleanup of hazardous waste; etc. For outfalls and road crossings, no more than 1/4 acre can be disturbed. For isolated wetlands, ditches and swales, no more than 1 acre can be disturbed. Additions to residential dwellings existing prior to July 1, 1988, are limited to less than 750 sq. ft. of fill with no impact to adjacent wetlands. If wetlands filling cannot be avoided, proposed activities should be limited to those activities authorized under the General Permit where at all possible.

Individual Permits are required for all other disturbances in wetlands not authorized under General Permits. These are very difficult to obtain. If the proposed activity is water dependent, and wetlands disturbance is minimized, a permit may be granted. For non-water dependent uses it must be proven that there is no other alternative location or design for the proposed project that would involve less or no wetlands disturbance. An alternative site to be considered can be on property owned by the applicant or on any property that could be obtained in the region. This requirement is very difficult to satisfy.

Mitigation, or creation of wetlands from uplands, at a ratio of 2:1 could be a condition of an Individual Permit, but is currently not required for most General Permits. Recent NJDEP wetland regulation revisions adopted in 2008 (N.J.A.C. 7:7A) require mitigation for several General Permits.

Activities in wetland transition areas must be authorized under a Transition Area Waiver. Granting of a wetland permit is accompanied by a waiver to disturb the associated transition area. If activities are limited to within a transition area, they may be approved under a Transition Area Averaging Plan Waiver. Under such a plan, the shape of a transition area may be adjusted as long as the total area of the standard transition area is not reduced and other minimum and maximum width requirements of the transition area are maintained. Selected activities within a transition area may be authorized under a Special Activities Waiver. These activities may include construction of road crossings or stormwater outfalls that would be authorized under a General Permit if they were conducted in wetlands. Where certain specific characteristics of slope and vegetative cover are present in the transition area and the development intensity is not high, a straight reduction of the transition area, without compensation, may be authorized under a waiver. Lastly, a Hardship Waiver may be granted under certain circumstances. Transition Area Waivers may require deed restrictions or other land use restrictions on remaining adjacent transition areas.





This map was developed using New Jersey Department of Environmental Protection GIS Data. The data presented here has not been verified by NJDEP and is not state authorized for regulatory purposes. Wetland and vernal pool locations presented here are approximate and do not constitute a comprehensive inventory.

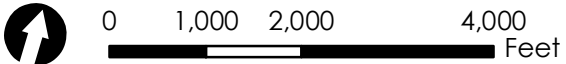
WETLAND AND VERNAL POOL MAP

Legend

- |   |                                 |
|---|---------------------------------|
| — Major Road                            | ■ Lake                          |
| — Minor Road                            | ■ Forested Wetland              |
| — Stream                                | ■ Herbaceous Wetland            |
| ▭ County Boundary                       | ■ Modified Wetland              |
| ▭ Municipal Boundary                    | ■ Scrub/Shrub Wetland           |
| ▭ Bernardsville Borough Boundary        | ■ Wetland Transition Area       |
| ▭ Bernardsville Borough Parcel Boundary | ▨ Potential Vernal Habitat Area |

- NOTES:
1. State, county, municipal, and 2017 parcel boundaries obtained from New Jersey Geographic Information Network (NJGIN).
  2. Hydrography obtained from NJDEP GIS website: [www.state.nj.us/dep/gis/](http://www.state.nj.us/dep/gis/)
  3. Wetlands (2012 Land Use/Land Cover) obtained from NJDEP GIS website: [www.state.nj.us/dep/gis/al/](http://www.state.nj.us/dep/gis/al/)
  4. Wetland transition area width determined in accordance with N.J.A.C 7:7A-3.
  5. Vernal pools (Landscape Project v3.3) obtained from NJDEP GIS website: [www.state.nj.us/dep/gis/](http://www.state.nj.us/dep/gis/)

BERNARDSVILLE BOROUGH  
SOMERSET COUNTY, NEW JERSEY



Map Projection: NAD 1983 StatePlane New Jersey FIPS 2900 Feet



## 7. LAND USE



PHOTO BY ED ENGLISH



## 7.1 LAND USE/ LAND COVER TYPES

Land Use/Land Cover types according to NJDEP for 2012 presented on the Land Use/Land Cover map (Page 106) in which six cover types are documented. These cover types include Agricultural, Forest, Wetland, Water, Urban, and Barren Land. These designations and their definitions have been derived from the Anderson Classification System (Anderson et. al, 1976), a standard land cover classification system, and edited by the NJDEP. The approximate acreages of these various cover types from 1995, 2002, 2007, and 2012 are summarized in Table 16 and descriptions of the land cover are listed below (see Section 6 for Wetland Descriptions). It is important to note that the total acres differ from 1995/2002 and 2007/2012. This could be due to differences in land use mapping methods between these events or differences in GIS analyses for the 2010 ERI and the updated ERI.

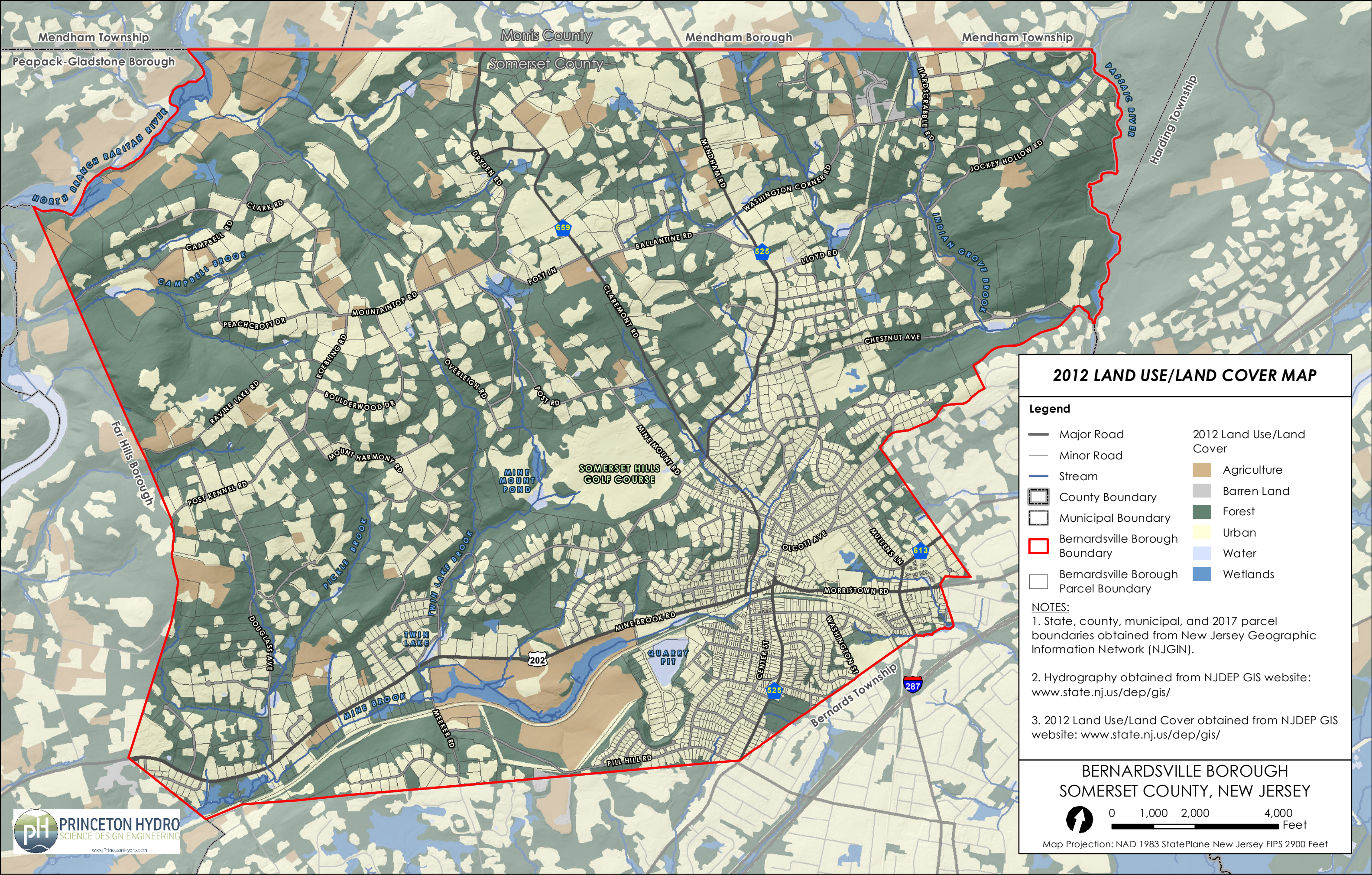
**TABLE 16:**  
**DISTRIBUTION OF BERNARDSVILLE LAND USE/LAND COVER TYPES**  
**1995-2002**

Land Cover	1995		2002		1995-2002	2007		2012		2007-2012
	Acres	%	Acres	%	Change (Acres)	Acres	%	Acres	%	Change (Acres)
AGRICULTURE	800.11	9.66%	653.20	7.89%	-146.91	587.22	7.11%	571.48	6.91%	- 15.74
BARREN LAND	81.69	0.99%	57.68	0.70%	-24.01	15.17	0.18%	16.17	0.20%	+ 1.00
FOREST	4,135.11	49.94%	3,948.77	47.69%	-186.34	3,872.69	46.86%	3,832.64	46.37%	- 40.05
URBAN	3,044.70	36.77%	3,392.19	40.97%	347.49	3,556.48	43.03%	3,611.58	43.70%	+ 55.10
WATER	46.93	0.57%	62.65	0.76%	15.72	70.70	0.86%	70.86	0.86%	+ 0.16
WETLANDS	171.68	2.07%	165.75	2.00%	-5.93	162.41	1.97%	161.94	1.96%	- 0.48
TOTAL	8,280.22	100%	8,280.24	100%		8,264.66	100%	8,264.66	100%	



Land use changes between 1995 and 2012 tend to be scattered throughout the western two-thirds of Bernardsville. Fewer land use changes have occurred in the medium and high-density developed areas in southeastern Bernardsville and in the vicinity of the Passaic River near Scherman-Hoffman. NJDEP Land Use/Land Cover mapping indicates that the increase of urban coverage (which includes residential development) represents the greatest land use/land cover change in Bernardsville between 1995 and 2012, with an increase of approximately 567 acres. Most of the conversion to urban land was the development of rural single unit housing or low-density housing on former agriculture and forest. A good portion of this development corresponds with a loss of agricultural land (approximately 229 acres) and deciduous forest (approximately 302 acres). Forest cover became increasingly fragmented by scattered low-density residential development. The NJDEP Land Use/Land Cover mapping also indicates several additional minor coverage changes. It is important to consider that some changes may in part be due to variations or refinements in the mapping techniques and technologies between 1995 and 2002. Low or medium-density suburban housing also occurred on other land cover types including lands that had been urban under a different use or on barren land, particularly portions of the quarry property in southern Bernardsville.





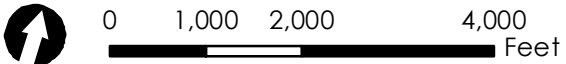
## 2012 LAND USE/LAND COVER MAP

### Legend

- |   |                          |
|---|--------------------------|
| — Major Road                            | 2012 Land Use/Land Cover |
| — Minor Road                            | Agriculture              |
| — Stream                                | Barren Land              |
| ▭ County Boundary                       | Forest                   |
| ▭ Municipal Boundary                    | Urban                    |
| ▭ Bernardsville Borough Boundary        | Water                    |
| ▭ Bernardsville Borough Parcel Boundary | Wetlands                 |

- NOTES:
1. State, county, municipal, and 2017 parcel boundaries obtained from New Jersey Geographic Information Network (NJGIN).
  2. Hydrography obtained from NJDEP GIS website: [www.state.nj.us/dep/gis/](http://www.state.nj.us/dep/gis/)
  3. 2012 Land Use/Land Cover obtained from NJDEP GIS website: [www.state.nj.us/dep/gis/](http://www.state.nj.us/dep/gis/)

## BERNARDSVILLE BOROUGH SOMERSET COUNTY, NEW JERSEY

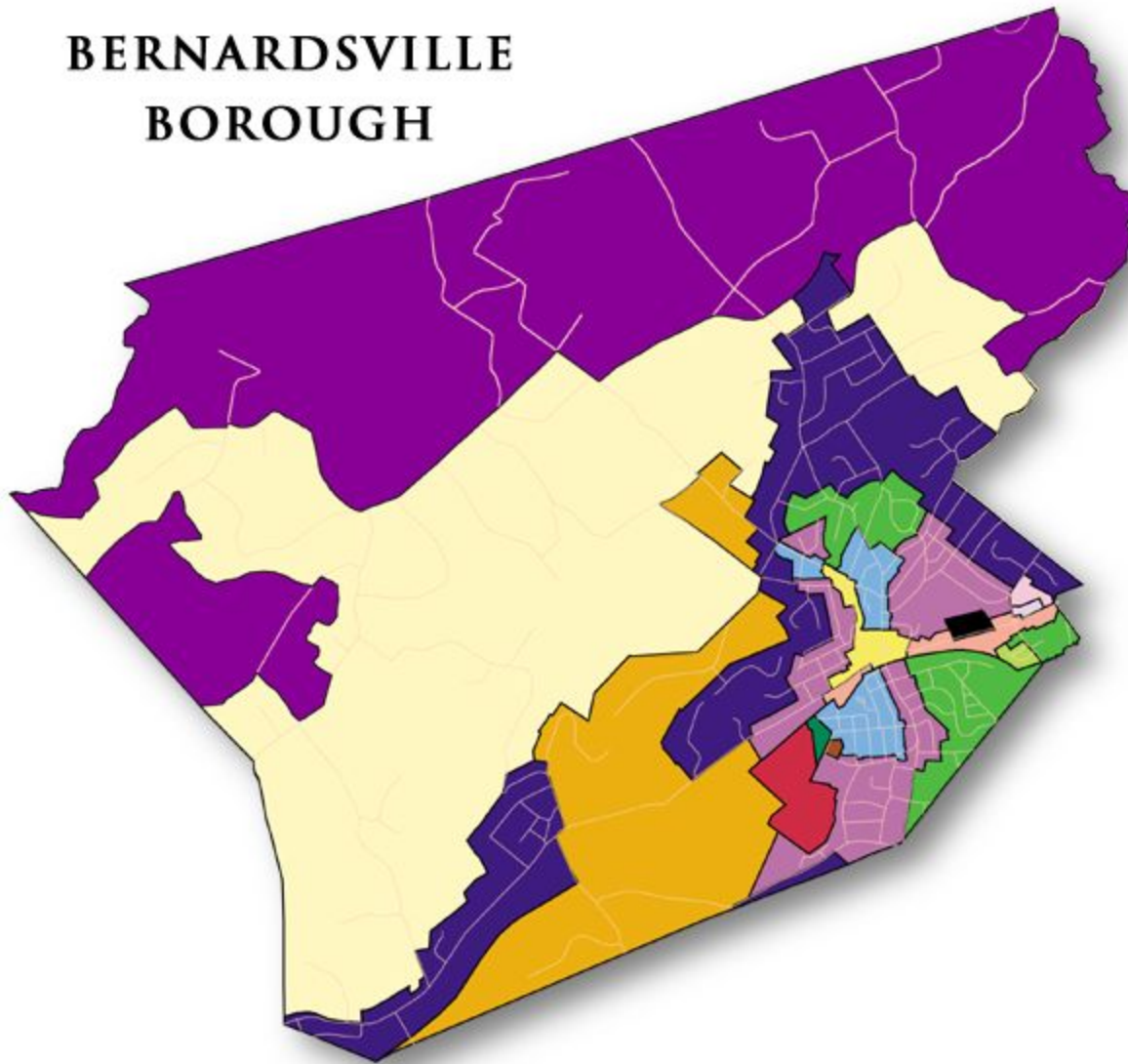


Map Projection: NAD 1983 StatePlane New Jersey FIPS 2900 Feet



















# Zoning Map of Bernardsville Borough

BERNARDSVILLE  
BOROUGH



## ZONING LEGEND

	R - 1 - 10
	R - 1
	R - 1A
	R - 2
	R - 3
	R - 4
	R - 5
	R - 8
	R - 10A
	R - 10B
	B - 1
	C - 1
	HD
	I
	I - 2
	O - B

## Zoning Code Definitions

R 1-10	Residence District
R-1	Residence District
R-1A	Residence District
R-2	Residence District
R-3	Residence District
R-4	Residence District
R-5	Residence District
R-6	Residence District
R-7	Residence District
R-8	Attached Residence District
R-10A	Multi-Family Housing District
R-10B	Multi-Family Housing District
B-1	Business District
C-1	Commercial District
HD	Highway Development
I	Industrial District
I-2	Light Industrial District
O-B	Office Building District

Reproduced from Bernardsville  
Borough website:  
[www.bernardsvilleboro.org](http://www.bernardsvilleboro.org)

## 7.2 LAND USE DESCRIPTIONS

### 7.2.1 URBAN COVERAGE

NJDEP urban land coverage includes a variety of land uses that include structures, man-made impervious surfaces, single family residences, multiple unit dwellings, and mobile homes. It may include mixed residential areas at varying densities. Residential areas comprise the majority of urban land within Bernardsville and are easily identified by the house patterning or their proximity to urban centers. Urban coverage includes all non-agricultural intensive land use, where the landscape has been altered substantially by human activities. These areas include roads and supporting transportation structures, cemeteries, commercial buildings, communications facilities, industrial areas, governmental facilities, schools, maintained lawn, right-of-way, services, stormwater basins, or other built up lands. These lands may be covered by impervious surfaces and or associated patches of lawns, road infields, etc.

NJDEP 2012 Land Use/Land Cover mapping (Page 106) identifies approximately 3,612 acres or 43.7% of Bernardsville Borough as urban. Since 2007, the urban land cover has increased 55 acres, which equates to an 0.67% increase of overall land cover that is urban. The most concentrated areas of urban land are concentrated around southeastern Bernardsville and are a combination of primarily medium or low-density housing and some commercial/service uses. Areas classified as urban north and west of this are primarily categorized as single unit rural housing. In addition, golf courses such as the Roxiticus Golf Club, the Somerset Hills Country Club and similar maintained recreation areas are identified as urban land in Bernardsville. Urban patches are interspersed with forests and farmland throughout the community.

### 7.2.2 BARREN LAND COVERAGE

Barren Land refers to areas of land that have thin soil, sand or rocks and a lack of vegetative cover. Vegetation in these areas, if present, is widely spaced. Barren land areas may be naturally occurring (such as beaches or rock faces). In Bernardsville, the largest barren land area is the Bernardsville Quarry in the southernmost portion of the Borough. From 2007 to 2012, the total barren land increased by one acre.

Other barren land areas in the Bernardsville 2012 coverage appear to be primarily “transitional areas.” This refers to lands in which site preparation for development has begun. It may be for commercial, residential or industrial areas under construction. The barren land identified in eastern Bernardsville near Chestnut Avenue is now a ball field for Bernardsville Middle School and other barren land areas are now primarily residences.



## 7.2.3 FOREST COVERAGE

According to NJDEP 2012 Land Use/Land Cover Data, forest coverage in Bernardsville is approximately 3,833 acres and has decreased by 40 acres since 2007. Looking back even further, forest cover has decreased by 302 acres since 1995, a significant decrease over time. Forested corridors exist throughout much of the western half of Bernardsville with an additional large forest concentration in the Scherman-Hoffman area. The forest coverage in Bernardsville is listed as deciduous forest cover with generally greater than 50% crown closure. Some patches of forest with 10 to 50% crown closure are interspersed within this community. The upland deciduous forest community listed below is typical of those found in Bernardsville. A partial vegetation listing of species found in four open areas of Bernardsville in Table 15 provides additional insight into the general vegetative composition of Bernardsville Forests and other natural communities in the municipality.

### 7.2.3.1 UPLAND DECIDUOUS FOREST

The mature deciduous forests of Bernardsville are mixed oak and hickory forests co-dominated by red oak (*Quercus rubra*), white oak (*Quercus alba*) and black oak (*Quercus velutina*). Other common forest species identified in Bernardsville forests are shagbark hickory (*Carya ovata*) and other *Carya* species, chestnut oak (*Quercus prinus*), white ash (*Fraxinus americana*), red maple (*Acer rubrum*), sugar maple (*Acer saccharum*), American beech (*Fagus grandifolia*), black birch (*Betula lenta*) and tulip poplar (*Liriodendron tulipifera*).

Understory species expected in Bernardsville's forests include arrowwood (*Viburnum dentatum*), maple-leaf Viburnum (*Viburnum acerifolium*), blackhaw Viburnum (*Viburnum prunifolium*), spicebush (*Lindera benzoin*), highbush blueberry (*Vaccinium corymbosum*), and pinxter flower (*Rhododendron periclymenoides*). Certain aggressive invasive species have been identified in Bernardsville's forests including the Japanese barberry (*Berberis thunbergii*), Asiatic bittersweet, (i) and many others (see Table 17).

The December 2016 "State of the Raritan Report" also reports a decreasing trend in upland forest in the Raritan River Watershed Region, with over 18,000 acres of upland forest converted to urban land from 1986-2012. The report explains, "Upland forests reduce soil erosion, filter runoff and increase groundwater recharge and therefore elevate and protect water quality," and attributes the overall decline in the amount of upland forest with an associated increase in negative impacts to water quality in the region.

Additionally, research conducted by Jay Kelly of Raritan Valley Community College in March 2018 found that deer population growth in the Northeast, mostly due to extermination of predators, cessation of commercial hunting, warming winters, and suburban development, has led to a lack of forest regeneration.

### 7.2.3.2 SCRUB/SHRUB FORESTS

Upland shrub forests mapped within the region would typically be represented by successional lots, old fields or other previously disturbed areas. When vegetation is determined to be over 20 feet in height, it is mapped as forest by NJDEP Land Use Mapping. These forests may be old agricultural areas abandoned or left fallow for a period of time or portions of open canopy within a forest. Opportunistic

'pioneer species' initially colonize these areas. In old field communities, annual, biennial, and eventually perennial herbaceous plants are the pioneer species. Early succession herbaceous plants expected would include goldenrods (*Solidago spp*) (see Appendix B, Photos), ragweed (*Ambrosia artemisiifolia*), foxtails (*Setaria spp.*), wild carrot (*Daucus carota*), horseweed (*Conyza canadensis*), asters (*Aster spp.*), oxeye daisy (*Chrysanthemum leucanthemum*), wild garlic (*Allium vineale*), thistle (*Cirsium spp*), panic grasses (*Panicum spp.*) broomsedge (*Andropogon spp*) little bluestem (*Schizachyrium scoparium*), and many others (Collins and Anderson, 1994).

As time passes, woody species may begin to develop in these areas and become shrub dominated secondary growth forests depending on various factors such as deer herbivory, fire, etc. Species typically include gray birch (*Betula populifolia*), black cherry (*Prunus serotina*) and Eastern red cedar (*Juniperus virginiana*). The eastern red cedar is a common successional tree and is identified throughout Bernardsville's successional areas. Other species may include sassafras (*Sassafras albidum*), black locust (*Robina pseudoacacia*), staghorn sumac (*Rhus typhina*), winged sumac (*Rhus coppalina*) and smooth sumac (*Rhus glabra*), various dogwoods (*Cornus spp.*) and autumn olive (*Eleagnus umbellate*). Vines within the old field secondary growth communities include Japanese honeysuckle (*Lonicera japonica*), *Virginia creeper* (*Parthenocissus quinquefolia*) and *poison ivy* (*Toxicodendron radicans*). An example of a local successional community may be observed in Little Brook Sanctuary.

### **7.2.3.2 CONIFEROUS FOREST/ CONIFEROUS SHRUBLAND**

Most coniferous forest under NJDEP mapping typically identifies pitch pine or pitch pine dominated mixed forest in the state. Bernardsville, however, contains several different conifer species in small stands scattered amongst its forests and residences.

As previously mentioned, different habitats containing coniferous trees in Bernardsville include successional areas dominated by Eastern red cedar. In addition, stands of coniferous species such as Norway spruce (*Picea abies*), red pine (*Pinus resinosa*) or white pine (*Pinus strobus*) exist in Bernardsville. Little Brook Sanctuary and the surrounding area contain examples of pine dominant forest stands. Small patches of mixed conifer stands may also be observed in the Brigade Area park. Coniferous stands may be of particular interest as they may be used as roosting areas for owl species in conjunction with farmlands or deciduous forest.

Founded in 1867, the New York based Torrey Botanical Society is one of the most respected botanical organizations in the world. The Society is comprised of amateur and professional botanists who visit local natural areas (typically around New York City) to monitor its flora and ecology. Table 16 provides an inventory of tree species observed by Dr. Patrick Cooney, former Field Trip Coordinator of the Torrey Botanical Society, observed during visits to open space areas in Bernardsville during 2004 and 2005. Plant inventories of various natural areas in the tri-state area may be found at the website [www.nynjctbotany.org](http://www.nynjctbotany.org). While this data is from 2004-2005, there has been no updates to this site since then, and is the only list available.

Lists are derived from visits to four locations: William S. Post Natural Area, Scherman-Hoffman Wildlife Preserve, Little Brook Sanctuary and Brigade Area Park trails. While this is a partial list of species, it provides a reliable overview of the vegetation that would be typically observed within the municipality's natural areas. Table 16 provides additional insight into the composition of Bernardsville's vegetation communities. Invasive species observed during these visits have been noted in the Table.



**TABLE 16:**  
**PARTIAL LIST OF PLANTS, SHRUBS AND TREES IN BERNARDSVILLE**  
**OPEN SPACE**

TREES -Latin	Invasive	Common Name	Post	Scherman	Little Brook	Brigade Park
<i>Acer platanoides</i>	X	Norway maple	X			X
<i>Acer rubrum</i>		red maple	X	X		X
<i>Acer saccharum</i>		sugar maple	X	X		
<i>Betula alleghaniensis</i>		yellow birch	X	X		
<i>Betula lenta</i>		black birch	X	X	X	X
<i>Carpinus caroliniana</i>		musclewood	X	X		X
<i>Carya ovata</i>		shagbark hickory	X		X	
<i>Cornus florida</i>		flowering dogwood		X	X	X
<i>Carya tomentosa</i>		mockernut hickory	X			
<i>Fagus grandifolia</i>		American beech	X	X		X
<i>Fraxinus americana</i>		white ash	X		X	X
<i>Fraxinus pennsylvanica</i>		green ash	X			
<i>Illex opaca</i>		American holly			X	
<i>Juniperus virginiana</i>		red cedar	X		X	X
<i>Liriodendron tulipifera</i>		tulip tree	X	X		X
<i>Ostrya virginiana</i>		Hop hornbeam			X	
<i>Picea abies</i>		Norway spruce			X	X
<i>Pinus strobus</i>		white pine			X	
<i>Pinus resinosa</i>		red pine			X	
<i>Prunus serotina</i>		black cherry	X		X	X
<i>Quercus alba</i>		white oak	X	X	X	X
<i>Quercus prinus</i>		chestnut oak			X	X
<i>Quercus rubra</i>		red oak	X	X	X	X
<i>Quercus velutina</i>		black oak		X	X	
<i>Robinia pseudoacacia</i>		black locust			X	X
<i>Sassafras albidum</i>		sassafras				X
<i>Tsuga canadensis</i>		Eastern hemlock				X
<i>Ulmus americana</i>		American elm	X			

SHRUBS -Latin	Invasive	Common Name	Post	Scherman	Little Brook	Brigade Park
<i>Alnus serrulata</i>		smooth alder	X			
<i>Berberis thunbergii</i>	X	Japanese barberry	X	X	X	X
<i>Chimaphila maculata</i>		striped wintergreen		X		
<i>Euonymus alatus</i>	X	burning bush				X
<i>Hamamelis virginiana</i>		witch hazel	X	X		
<i>Ilex verticillata</i>		winterberry holly	X			
<i>Ligustrum sp.</i>	X	privet	X		X	X
<i>Lindera benzoin</i>		spicebush	X	X	X	X
<i>Lonicera mackii</i>	X	Amur honeysuckle				X
<i>Lonicera Sp.</i>	X	honeysuckle			X	
<i>Lonicera morrowii</i>	X	Morrow's honeysuckle	X	X		
<i>Mitchella repens</i>		partridgeberry	X			
<i>Philadelphus sp.</i>		mock orange	X			X
<i>Rhamnus frangula</i>	X	European buckthorn				X
<i>Rhododendron periclymenoides</i>		pinxter flower	X			
<i>Rosa multiflora</i>	X	multiflora rose	X	X	X	X
<i>Rubus occidentalis</i>		black raspberry			X	X
<i>Rubus phoenicolasius</i>	X	wineberry	X	X	X	X
<i>Vaccinium corymbosum</i>		highbush blueberry	X			
<i>Vaccinium pallidum</i>		hillside blueberry		X		
<i>Viburnum dentatum</i>		arrowwood viburnum	X			
<i>Viburnum lentago</i>		nannyberry viburnum	X			
<i>Viburnum prunifolium</i>		blackhaw viburnum	X		X	

Vines -Latin	Invasive	Common Name	Post	Scherman	Little Brook	Brigade Park
<i>Celastrus orbiculatus</i>	X	Asiatic bittersweet	X	X	X	X
<i>Lonicera japonica</i>	X	Japanese honeysuckle	X	X		X
<i>Parthenocissus quinquefolia</i>		Virginia creeper	X			
<i>Smilax rotundifolia</i>		round-leaved greenbrier	X	X		
<i>Toxicodendron radicans</i>		poison ivy	X	X	X	X
<i>Vitis sp.</i>		grape	X	X	X	X



HERBS -Latin	Invasive	Common	Post	Schermann	Little Brook	Brigade Park
<i>Agrimonia sp.</i>		Agrimony				X
<i>Alliaria petiolata</i>	X	garlic mustard	X		X	X
<i>Allium vineale</i>		field garlic	X		X	
<i>Arctium sp.</i>		burdock				X
<i>Arisaema triphyllum</i>		Jack-in-the-pulpit	X			
<i>Asclepias tuberosa</i>		butterflyweed		X		
<i>Aster spp.</i>		aster	X	X		
<i>Barbarea vulgaris</i>		common wintercress	X			
<i>Cardamine pensylvanica</i>		Pennsylvania bittercress	X			
<i>Cardamine rhomboidea</i>		spring cress	X			
<i>Cerastium vulgatum</i>		mouse-ear chickweed	X			
<i>Chrysosplenium americanum</i>		golden saxifrage	X			
<i>Cimicifuga racemosa</i>		black snakeroot				
<i>Cirsium sp</i>		thistle	X			
<i>Duchesnea indica</i>		Indian strawberry	X			
<i>Erythronium americanum</i>		trout lily	X		X	
<i>Eupatorium rugosum</i>		white snakeroot	X			
<i>Galium aparine</i>	X	cleavers	X			X
<i>Gallium sp.</i>		bedstraw				X
<i>Glechoma hederacea</i>		gill-over-the-ground	X			
<i>Goodyera pubescens</i>		downy rattlesnake plantain		X		
<i>Guem canadense</i>		white avens			X	
<i>Impatiens sp.</i>		jewelweed	X			
<i>Lobelia inflata</i>		Indian tobacco				X
<i>Monarda fistulosa</i>		bergamot		X		
<i>Maianthemum canadense</i>		Canada mayflower	X			
<i>Narcissus sp.</i>	X	daffodil	X			
<i>Orchis spectabilis</i>		showy orchis		X		
<i>Panax trifolius</i>		dwarf ginseng		X		

## 7.2.4 AGRICULTURAL COVERAGE

Agricultural land comprises approximately 6.9% of Bernardsville's land cover under the 2012 NJDEP Land Use/Land Cover data. Since 2007, there has been a decrease of 16 acres of agricultural land. Agricultural land is found scattered throughout northern and western Bernardsville. The largest concentrations are identified along the central portion of Mine Brook and along the northwestern boundary of the community near Little Brook and the North Branch Raritan River (see Land Use/Land Cover Map page 106). The vast majority of this land is listed as cropland or pastureland. Other minor agricultural uses such as vineyards have been identified by Land Use/ Land Cover in the past in Bernardsville.

## 7.2.5 IMPERVIOUS SURFACE

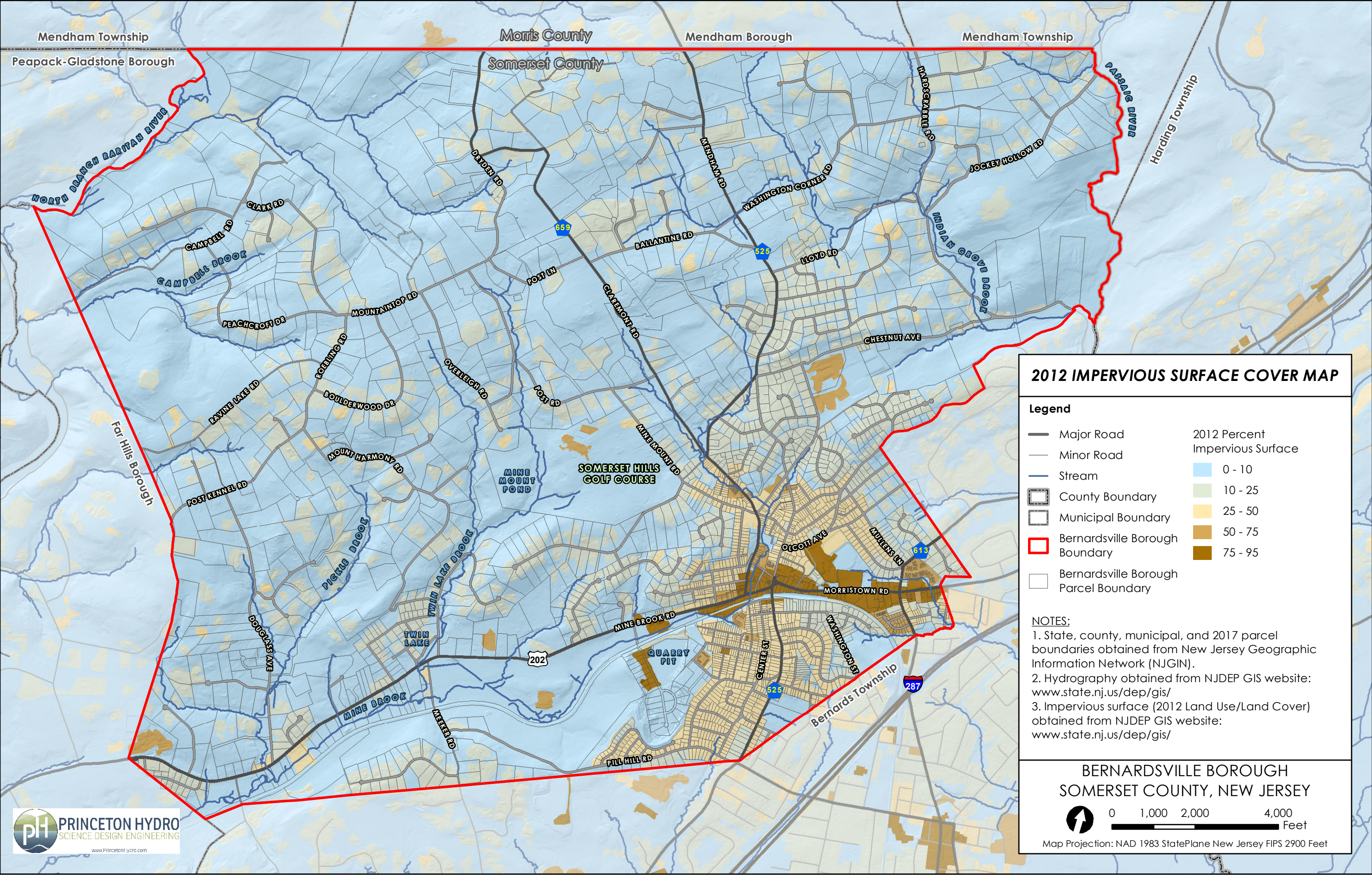
NJDEP defines impervious surface as an "area that has been covered by a layer of material that is highly resistant to infiltration by water." Impervious surfaces include concrete, asphalt, driveways, basketball courts, concrete patios, swimming pools and buildings. Recently, NJDEP added a "impervious surface layer" to the Land Use/Land Cover mapping data. The NJ GIS Open Data explains this process: as the land use/land cover of each polygon was mapped from 2012 aerial photography, a visual estimate was also made of the amount of impervious surface in each. This estimate was recorded as a percentage of the total polygon area, in 5% increments. These percentages can be used to determine the total acreage of impervious surface in any area of interest.

In Bernardsville, the total impervious surface increased by 16 acres, from approximately 643 acres in 2007 (7.8% of Borough) to approximately 659 acres in 2012 (8.0% of Borough). These impervious surfaces do not allow runoff to seep into the ground and increase stormwater runoff. The installation of impervious surfaces usually involves the removal of vegetation and topsoil, and leads to soil compaction and sealing. The sealing of soils by impervious materials is, normally, detrimental to its ecological functions. Soil sealing may effectively limit the exchange of water, gas, and biomass between urban soils and the atmosphere and an increasing pressure is being exerted on adjacent, non-sealed areas. (Lorenz 2009, Scalenghe 2009). Converting forested or vegetated areas to impervious surfaces like roads, roofs, or parking lots is having a negative impact on biodiversity and carbon pools (Seto 2012). The negative effects span from loss of plant production and natural habitats to increased floods, pollution, and health risks and consequently higher social costs (Scalenghe 2009).

According to NJDEP, one method for reducing this is to minimize the total surface area of impervious surfaces such as concrete sidewalks and asphalt driveways. A paving surface that allows water to soak in may seem impossible, but there are many materials that provide the durability of concrete while allowing rainwater to filter down into the ground.

If a new patio, walkway, or driveway is being planned, there are several alternatives to concrete. Significant strides have been made in the last few decades in developing porous asphalt pavement. This material is similar to conventional asphalt in durability, but it contains a much smaller percentage of very fine particles. As a result, the asphalt allows water to soak through into the soil below (NJDEP Clean Water NJ Program, 2018). Porous pavement/asphalt is used in a variety of climates and allows water to infiltrate into the ground thus not remaining in the pores and freezing, which commonly damages concrete and asphalt surfaces. In Bernardsville, porous pavement will be laid in the Northeastern area of the Bernardsville Centre parking lot when it is repaved per approved design specifications.





2012 IMPERVIOUS SURFACE COVER MAP

**Legend**

- Major Road
- Minor Road
- Stream
- County Boundary
- Municipal Boundary
- Bernardsville Borough Boundary
- Bernardsville Borough Parcel Boundary

**2012 Percent Impervious Surface**

- 0 - 10
- 10 - 25
- 25 - 50
- 50 - 75
- 75 - 95


**NOTES:**

1. State, county, municipal, and 2017 parcel boundaries obtained from New Jersey Geographic Information Network (NJGIN).

2. Hydrography obtained from NJDEP GIS website: [www.state.nj.us/dep/gis/](http://www.state.nj.us/dep/gis/)

3. Impervious surface (2012 Land Use/Land Cover) obtained from NJDEP GIS website: [www.state.nj.us/dep/gis/](http://www.state.nj.us/dep/gis/)

BERNARDSVILLE BOROUGH  
SOMERSET COUNTY, NEW JERSEY

 0 1,000 2,000 4,000 Feet

Map Projection: NAD 1983 StatePlane New Jersey FIPS 2900 Feet



## 7.2.6 WATER

All areas within the landmass of New Jersey that are periodically water covered are included in this category. Types of water bodies include Streams and Canals; Natural Lakes; Artificial Lakes; and Bays and Estuaries. Not included in this category are water treatment and sewage treatment facilities.

Between 2007 and 2012, the New Jersey Land Use/Land Cover data was updated, and as part of this effort, many additional water features previously unmapped were captured during this 2012 update. However, from 2007 to 2012, the open water land cover area did not change significantly in Bernardsville. The 2012 data shows total acreage at 70.86 acres, covering 0.86% of the total acreage in Bernardsville.

## 7.3 CONSERVATION FOCAL AREAS

According to NJDEP, the identification of Conservation Focal Areas uses an approach that differs from that used to identify habitats for individual species provide for conservation planning for Species of Greatest Conservation Need (SGCN) at broader scale, and is the second main component of New Jersey's 2017 State Wildlife Action Plan revision. Focal Areas identify specific geographic areas of New Jersey's landscapes that present the best opportunities for effective conservation action that will benefit all wildlife, including the full suite of SGCNs. Just as identifying a subset SGCNs as Focal Species serves to focus planning efforts on the most «actionable» species, delineation of Conservation Focal Areas aims to hone the focus of our planning by identifying specific geographic areas that provide the best conservation opportunities. By assessing the threats to these species and areas and then developing implementable conservation actions to address them, a blueprint for conservation of NJ's wildlife can be created.

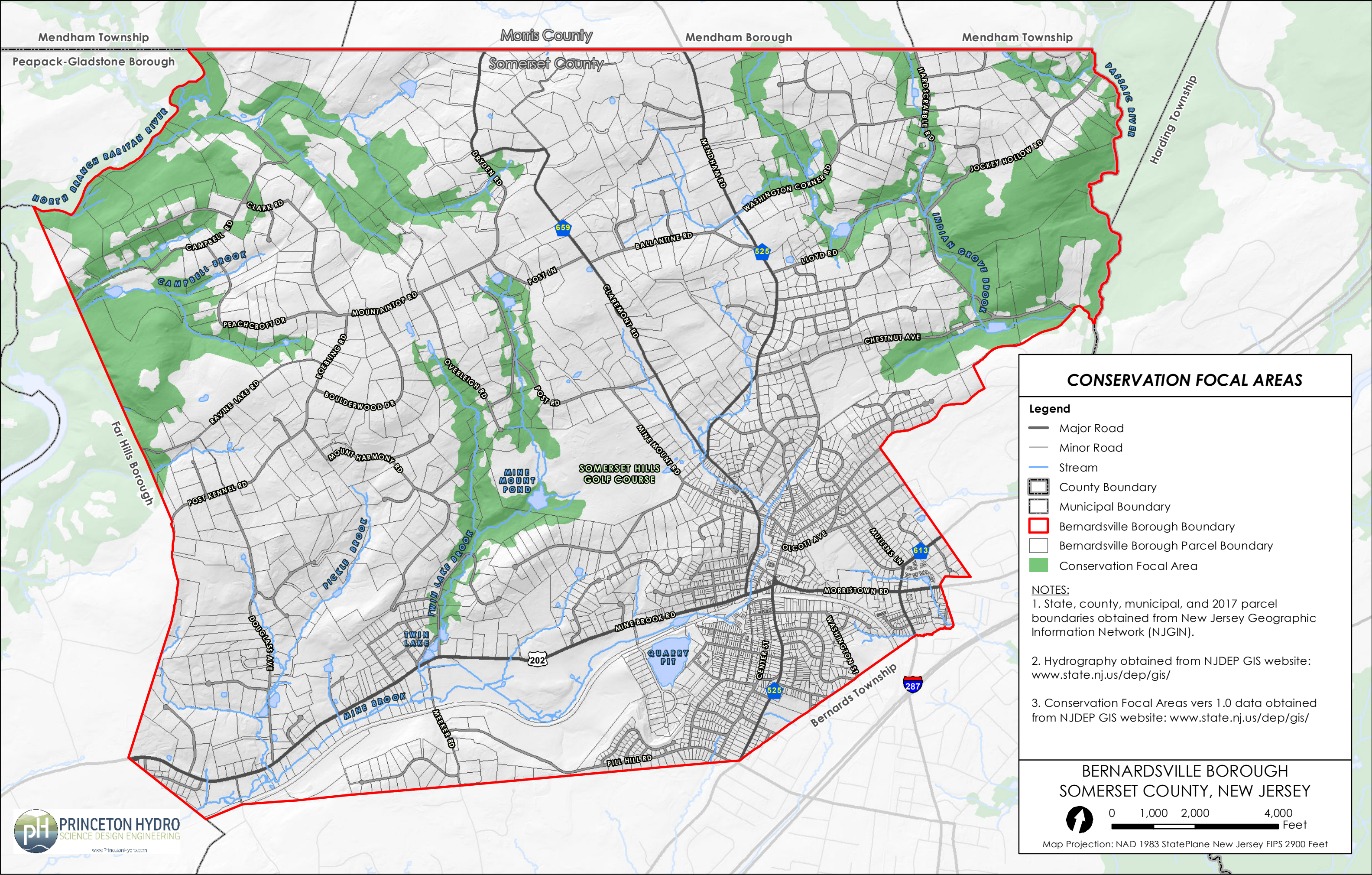
NJDEP has identified three objectives that highlight the importance of delineating Conservation Focal Areas in New Jersey. They include:

- Provide a data-driven approach for geographically focusing conservation action within New Jersey's Landscape Regions that incorporates metrics of landscape ecological condition, existing conservation infrastructure, existing fish & wildlife habitats, biodiversity, and negative human influences.
- Incorporate a regional perspective/context that addresses ecosystems of importance to the Northeast Region that are found in New Jersey.
- Emphasize riparian corridors that serve to connect larger tracts of habitat in an otherwise fragmented landscape.



Using the Conservation Focal Area data 1.0 obtained from New Jersey's GIS website, a map of Conservation Focal Areas in Bernardsville was created (Page 118). This map identifies portions of the Raritan and Passaic River Headwaters Conservation Focal Area, covering approximately 1,532 acres within the borough boundaries. The first area is in the northwestern region, surrounding the south of the North Branch of the Raritan River and Campbell Brook. The second large region is in the center of the borough along Twin Lake Brook and Mine Mount Pond. The third region is in the northeastern corner of the borough, the majority of it covering the area between the Passaic River, Jockey Hollow Road, Indian Grove Brook, and Chestnut Ave, with corridors along Hardscrabble Road, Lloyd Road, and Washington Corner Road. The two northern regions continue into the bordering towns (Far Hills Borough, Peapack-Gladstone Borough, Mendham Township, and Harding Township). Given the goal of creating a comprehensive conservation area, it would be in the best interest of the Borough of Bernardsville to work with the respective bordering towns to collaborate on conservation efforts.







## 7.4 OPEN SPACE

The Borough of Bernardsville currently contains a variety of municipal, nonprofit, county and state and federal open space areas, many of which contain significant natural and historic resources (see Appendix E Open Space Inventory). Various open space areas within the Borough, such as golf courses, are primarily utilized for recreation purposes. Table 17 lists the approximate acreages of these open space areas. The Borough has established an Open Space Advisory Committee. The duties of the Committee, pursuant to Volume I of the Revised General Ordinances of the Borough of Bernardsville are as follows:

1. Develop a comprehensive open space program for consideration by the Planning Board in connection with the Planning Board's preparation of the Borough Master Plan.
2. Evaluate the importance of specific Borough lands for recreational use (both active and passive), stream corridor protection, and preservation of aesthetic, cultural and historic value, establishment and maintenance of greenways and general preservation and conservation.
3. Identify specific sites and recommend acquisition of open space and other lands.
4. Recommend that the governing body apply for specific county, state and nonprofit foundation grants to supplement the Borough's Open Space Trust Fund for the acquisition of these lands.
5. Interact with other boards, commissions, committees, and citizen groups to obtain broad public input for the development of the open space program and to provide the Mayor and Council with information for dissemination to the residents of the Borough.
6. Assist in the implementation of open space programs established by the Mayor and Council.
7. Comment to the Planning Board and the Board of Adjustment on the potential for open space preservation opportunities in applications that involve lands that have special open space and recreational potential.
8. Submit a report at the end of each calendar year to the Mayor and Council including specific budget requests for ongoing activities and the status of grant applications and awards

In 2016, Bernardsville Borough published a 2016 Open Space and Recreation Plan Update, which was a follow-up to the 2002 Open Space and Recreation Plan. The report highlights the Borough's commitment to conservation:

“The Borough of Bernardsville is committed to protecting the beauty of its rural landscape. Its forested hillsides and agricultural valleys grace the riparian corridors of its rivers and streams framing its historic downtown and neighborhoods. Recreational lands are at a premium, and securing the permanent protection of open spaces for natural resource conservation and to offer new opportunities for field space and hiking is a priority for the Borough.”

The plan set forth to meet the following goals, which reflect the Borough’s commitment to protecting its landscape and the resources upon which it relies for its community’s health, recreation, and quality of life:

- Promote the permanent conservation of the Borough’s unique and exceptional scenic, agricultural and recreational lands;
- Preserve the integrity of the Borough’s sensitive environmental resources and ecosystems;
- Provide opportunities for “active” (facility-based) and “passive” (resource-based) recreational facilities to meet the needs of present and future Borough residents;
- Protect the ecological integrity of the Borough’s landscape by stewarding and managing open space and recreation lands to ensure their long-term viability, health, and sustainability; and
- In partnership with others, support the protection of greenways and blueways to expand contiguous open space lands.

The 2016 Open Space and Recreation Plan Update offers an updated set of strategies and a timetable to implement the goals and recommendations within this Plan. This Action Plan facilitates not only the Borough’s preservation programs but serves as a vehicle for continued dialogue about recreation and land preservation needs. The Action Plan suggests specific actions for short-term, mid-term, long-term, and ongoing that the Borough should take in order to implement the Open Space and Recreation Plan.

**TABLE 17:**  
**OPEN SPACE IN BERNARDSVILLE BOROUGH (2016)**

Land Type	Acres
National Parks & Open Space	175.81
State Parks & Open Space	44.01
County Parks & Open Space	108.41
Municipal Parks & Open Space	222.65
Nonprofit Preserved Land	225.56

Source: Open space property records and conservation easements were obtained from The Borough of Bernardsville Open Space and Recreation Plan Update (2016). Vacant Properties (Class 1); Commercial and Industrial Properties (Class 4A,4B) >2 Acres; Residential Properties (Class 2; R-1, R1-A, R-1-10 Zoning); Farmland Assessed Properties (Class 3A, 3B); Country Club Properties (Class 1, 1SC); and Church, Charitable, and Educational Properties (Class 15A, 15B) were not included above. These properties are identified in the Open Space and Recreation Plan because of their potential for subdivision and potential for open space preservation. (See Appendix E Open Space Inventory for reference.) Additionally, a list of Conservation Easements included in the 2016 Open Space Plan is referenced in Appendix E Open Space Inventory.





PHOTO BY ED ENGLISH

## SIGNIFICANT OPEN SPACE NATURAL AREAS WITHIN BERNARDSVILLE:

**LITTLE BROOK SANCTUARY** is a Somerset County owned facility on Steven's Lane in Bernardsville. The sanctuary is a patchwork of successional fields, deciduous forest and coniferous forest. Two forks of Little Brook run through the Sanctuary. The site contains hiking trails adjacent to a narrow stream valley. Pockets of red and white pine exist onsite as well as an elevated old field dominated by little bluestem and eastern red cedar.

**SCHERMAN-HOFFMAN PRESERVE** is located on Hardscrabble Road in eastern Bernardsville, Basking Ridge and Harding Township, the 276-acre site is run by the NJ Audubon Society and contains nature/hiking trails that connect to the historic Patriot's Path and the Morristown National Historic Site (Brigade Area). This site contains mature hardwood forest dominated by oaks and hickories as well as rich mesic forested areas dominated by yellow birch and American beech and floodplain forest by the Passaic River. The site also contains early successional fields. The site contains a well-maintained trail system up to 1.3 miles long and includes an environmental education facility - The Hoffman Center for Environmental Education. The site supports over 200 vertebrate species during the course of a year and is an extremely popular site among birders. Endangered species onsite include the Wood Turtle and Species of Special Concern in the Cooper's Hawk.

**JOCKEY HOLLOW NATIONAL HISTORIC PARK BRIGADE AREA** is a federally-owned property that is part of the Morristown National Historic Site. The site contains forested trails that connect to Scherman -Hoffman Sanctuary and the Cross Estate, which was acquired by the National Park Service in 1975 to connect the Brigade Area to the main encampment at Jockey Hollow. The Cross Estate is well known for its elaborate formal gardens.

**MORaine CREST PROPERTY** is located between Mount Airy Road and Orchard Street, west of Route 287. The site was acquired for active and passive recreation facilities, including ballfields, a play area, tennis courts, and a nature area with walkways (Open Space, 2016). The park is wooded and contains stream channels and possible freshwater wetland areas with a moderate slope.

**MORRISTOWN NATIONAL HISTORICAL PARK** (Cross Estate and Cross Estate Gardens) was purchased by the National Park Service in 1975, the Cross Estate is considered a part of the New Jersey Brigade unit within the greater Morristown National Historical Park (see Figure 6). This federally-owned area includes 176 acres in the northeastern corner of Bernardsville, making it the largest tract of public open space in the Borough. Cross Estate Gardens provides visitors with an opportunity to learn about native vegetation and its importance to Native Americans and colonists. In addition, the Cross-Estate grounds offers hiking trails with connections to Jockey Hollow, Lewis Morris Park, and the Scherman-Hoffman Wildlife Sanctuary, owned by the New Jersey Audubon Society. (Open Space, 2016)

**PETERS TRACT** is a 33-acre Borough-owned parcel consisting of hardwood forest located between Claremont and Mendham Roads, with very limited access. No trails currently exist but there has been interest in creating trails for future passive recreation. The nonprofit-owned William Post Natural Area is situated across from Peters Tract on the other side of Claremont Road, but no formal trails exist in this site as well. (Open Space, 2016)

**WILLIAM POST NATURAL AREA** is owned by the Raritan Headwaters Association, the William Post Natural Area offers protection to the Mine Brook stream corridor, which continues through the downtown area and along the scenic Route 202 corridor before joining the North Branch of the Raritan River, a crucial source of drinking water for many New Jersey residents. This 22-acre site does not contain any actively maintained trails, but several deer paths permit opportunities for passive recreation. (Open Space, 2016)



## 8. WILDLIFE



**BUTTERFLY**

COURTESY OF PRINCETON HYDRO

## 8.1 FISHERIES

River herring (alewife, *Alosa pseudoharengus* and blueback herring, *Alosa aestivalis*,) and the American shad (*Alosa sapidissima*) are important species that have supported one of the oldest documented fisheries in North America. These species are anadromous, referring to their spawning migration upriver from the sea. They are vital in marine ecosystem food webs: providing food for larger and economically important predatory species such as striped bass (*Morone saxatilis*), itself another anadromous species. Although portions of both the lower Passaic and Raritan rivers support anadromous species, they would not be expected to occur in the North Branch and Passaic River near Bernardsville due to the multiple dams and similar downstream impediments. This is a watershed issue as these species rely upon suitable habitat and water quality downstream of Bernardsville and are thus affected by activities in the municipality.

NJDEP has conducted surveys of streams within or near Bernardsville Borough. These surveys include the Fish Index of Biotic Integrity (FIBI) for the North Branch of the Raritan River and the Passaic River. The following freshwater species have been identified during these surveys:

**TABLE 18:**  
**FRESHWATER SPECIES IDENTIFIED IN NORTH BRANCH**  
**OF RARITAN RIVER AND PASSAIC RIVER**

Common Name	Latin Name
American Brook Lamprey	<i>Lethenteron appendix</i> +
American Eel	<i>Anguilla rostrata</i> +
Banded Killifish	<i>Fundulus diaphanus</i> +
Blacknose Dace	<i>Rhinichthys obtusus</i> *
Bluegill	<i>Lepomis macrochirus</i> * +
Brown Trout	<i>Salmo trutta</i> *
Common Shiner	<i>Luxilus cornutus</i> *
Creek Chub	<i>Semotilus atromaculatus</i> *
Green Sunfish	<i>Lepomis cyanellus</i> +
Largemouth Bass	<i>Micropterus salmoides</i> * +
Longnose Dace	<i>Rhinichthys cataractae</i> *
Margined Madtom	<i>Noturus insignis</i> +
Oriental Weatherfish	<i>Misgurnus anguillicaudatus</i> +
Pumpkinseed Sunfish	<i>Lepomis gibbosus</i> *
Rainbow Trout	<i>Oncorhynchus mykiss</i> *
Redbreast Sunfish	<i>Lepomis auritus</i> +
Redfin Pickerel	<i>Esox americanus</i> * +
Rock Bass	<i>Ambloplites rupestris</i> +



Common Name	Latin Name
Satinfin Shiner	<i>Cyprinella analostana</i> +
Sea Lamprey	<i>Petromyzon marinus</i> +
Shield Darter	<i>Percina peltata</i> +
Smallmouth Bass	<i>Micropterus dolomieu</i> +
Spotfin Shiner	<i>Cyprinella spiloptera</i> +
Spottail Shiner	<i>Notropis hudsonius</i> +
Swallowtail Shiner	<i>Notropis procne</i> +
Tessellated Darter	<i>Etheostoma olmstedii</i> *+
Western Mosquitofish	<i>Gambusia affinis</i> +
White Sucker	<i>Catostomus commersoni</i> *+
Yellow Bullhead	<i>Ameiurus natalis</i> +
Yellow Perch	<i>Perca flavescens</i> +

\* Species identified in Passaic River IBI Survey (FIVI095a-R4) on 6/7/2016

+ Species identified in North Branch of Raritan River (NJS11-171-R4) on 9/2/2015

Note: There is no IBI Survey Data for the Mine Brook at this time.

Source: Fish IBI Website: <https://www.state.nj.us/dep/wms/bfbm/ibipagemain.htm>

The following additional species were included in the 2010 ERI report, and are potentially existing within the surface waters of Bernardsville:

Common Name	Scientific Name
Black Crappie	<i>Pomoxis nigromaculatus</i>
Bluespotted Sunfish	<i>Eleacanthus gloriosus</i>
Brook Trout	<i>Salvelinus fontinalis</i>
Chain Pickerel	<i>Esox niger</i>
Channel Catfish	<i>Ictalurus punctatus</i>
Common Carp	<i>Cyprinus carpio</i>
Common Shiner	<i>Luxilus cornutus</i>
Creek Chubsucker	<i>Erimyzon oblongus</i>
Fathead Minnow	<i>Pimephales promelas</i>
Golden Shiner	<i>Notemigonus crysoleucas</i>
Goldfish	<i>Carassius auratus</i>
Mummichog	<i>Fundulus heteroclitus</i>
White Crappie	<i>Pomoxis annularis</i>

The NJDEP Bureau of Freshwater & Biological Monitoring (BFBM) conducted FIBI studies in New Jersey's streams and waterbodies for the years 2000 to present on a five year cycle. Data collected from the FIBI Monitoring Network sample point locations measure the health of the stream based upon multiple attributes of the resident fish assemblage. Attributes include (but are not limited to) species diversity, ratio (trout and white suckers), numbers of fish collected and fish with anomalies. A stream or water body's FIBI score and rating is based on the deviation from reference conditions and post-2012, High Gradient FIBI are classified as either "poor" (0-25), "fair" (26-50), "good" (51-75), or "excellent" (76-100).

**Excellent (76-100)** Comparable to the best situations with minimal human disturbance: all regionally expected species for the habitat and stream size, most intolerant forms are present and there is a balanced trophic structure

**Good (51-75)** Comparable to reference stream considered to be minimally impacted.

**Fair (26-50)** Comparable to reference conditions, but some aspects of biological integrity may not resemble the qualities of these minimally impacted streams. On average, biological metrics are within the lower portion of the range of reference sites.

**Poor (0-25)** Significant deviation from reference conditions, with many aspects of biological integrity not resembling the qualities of minimally impacted streams, indicating some degradation.

Note: Pre-2012, FIBI rating categories were the following: Excellent=45-50; Good=37-44; Fair=29-36; Poor=10-28; Very Poor=0-9.

Results of stream testing within the vicinity of Bernardsville are listed in Table 19 below.

**TABLE 19:**  
**FISH INDEX OF BIOTIC INTEGRITY - STREAMS NEAR BERNARDSVILLE**  
**(2015-PRESENT)**

FIBI ID/Name	Location	IBI Rating	IBI Score
Passaic River FIBI095a-R4 Sample Date: 06/07/2016	Scherman-Hoffman Wildlife Sanctuary, Harding Township, NJ	Good	72.43
South Branch Raritan River NJS2016-040-R4 Sample Date: 08/10/2016	Vemoy Road, Lebanon Township, NJ	Fair	56.51

Source: NJDEP Bureau of Freshwater & Biological Monitoring (BFBM) FIBI studies, Northern Fish IBI (High Gradient) (2015 - Present), <https://www.state.nj.us/dep/wms/bfbm/ibiround4page.htm>

Note: The sentinel station on the Passaic River was relocated several hundred meters upstream from the previous monitoring location (FIBI095). The 2016 IBI score at FIBI095a was similar to prior scores at the downstream location (FIBI095).



## **8.2 THREATENED AND ENDANGERED WILDLIFE SPECIES**

One indicator of stress on the state's ecosystems is the growing number of species that are designated as rare, threatened or endangered species. NJDEP Division of Fish and Wildlife defines Endangered Species as those whose prospects for survival in New Jersey (state-listed), or Nationally (Federally-listed) are in immediate danger because of a loss or change in habitat, over-exploitation, predation, competition, disease, disturbance or contamination. NJDEP defines Threatened Species as those in New Jersey (State-listed) or nationally (Federally-listed) who may become endangered if conditions surrounding them begin to or continue to deteriorate. These threatened and endangered species are identified and protected in accordance with the Nongame Species Conservation Act. (N.J.S.A. 23:2A-1 et seq.)

New Jersey uses two programs to identify and monitor endangered, threatened, and/or rare ecological communities. The New Jersey Natural Heritage Program uses GIS mapping to identify rare plant and animal species and create a comprehensive inventory. The Landscape Project was developed initially by New Jersey Division of Fish and Wildlife Endangered and Nongame Species Program (ENSP) in 1994, and was adopted to utilize a landscape level approach to imperiled species protection. Both programs offer a method for identifying and monitoring critical biological resources.

To determine the presence of Endangered or Threatened species in Bernardsville, we requested a Natural Heritage Database and Landscape Project search for locational information of rare species and ecological communities through the NJDEP's Office of Natural Lands Management.

## **8.2 THE NATURAL HERITAGE PROGRAM**

Established in 1984 the Natural Heritage Program compiles information from a broad range of resources including museum and herbarium collection records, fieldwork, publications, and expert identifications. In partnering with other state and non-public agencies the Natural Heritage Program centralizes data, providing a single comprehensive resource to identify valuable ecological resources in the state. Through the efforts of the Natural Heritage Program and its partners the database is continually updated to maintain a current inventory. Not all of the areas in the state have been field verified, as creating this inventory is an intensive and evolving process. With caution this information can be used to prepare environmental impact assessments, identify priority areas for conservation and protection, and aid in land use planning. As of May 2018, the Natural Heritage Database does not contain any records for rare plant species or ecological communities in the New Jersey Natural Heritage Database.

## 8.4 LANDSCAPE PROJECT

The Landscape Project started in 1994 in response to a need for information regarding critical and suitable habitat in New Jersey. As residents of a dense and continually urbanizing state, New Jersey wildlife populations face intense pressure and threats. The Landscape Project offers a vehicle to lessen these pressures and ensure the vitality of suitable and critical habitat for animal communities. 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.

In 2002, utilizing a combination of land cover data and an extensive database of rare species locations, the Landscape Project published GIS mapped areas of critical importance for imperiled species within five distinct landscape region or habitat type including: grassland, forest, forested wetland, emergent wetland and beach dune. Grasslands must meet a minimum size of 18 hectares (44.46 acres) to be recognized by the Landscape Project. Forests must meet a minimum core size of 10 hectares (24.7 acres). The Landscape Project delineates critical habitat patches based on the species present and their conservation status, which are ranked from common to most rare.

The habitat patches are then assigned a Rank of 1 through 5, based on the status of the species present as follows:

**Rank 5:** Presence of one or more Federally - listed threatened or endangered species.

**Rank 4:** Presence of one or more State - listed endangered species.

**Rank 3:** Presence of one or more State - listed threatened species.

**Rank 2:** Presence of one or more occurrence of non-listed State priority species.

**Rank 1:** Habitat patches with minimum habitat specific suitability size requirement for threatened or endangered or priority species, but do not intersect with any confirmed occurrence.

Ultimately, this information can assist state, local and private agencies in prioritizing areas that could be preserved to protect habitat for rare species. This information also serves to alert officials to ensure that any future development minimizes disturbances to these critical habitat areas.

As of May 2018, the Landscape Project (Version 3.3) species-based patches identified fourteen (14) rare wildlife species or wildlife habitat on-site and one (1) additional species within the immediate vicinity of Bernardsville. Full list is in Table 20.



**TABLE 20:**  
**IDENTIFIED THREATENED AND ENDANGERED SPECIES DOCUMENTED IN OR WITHIN THE VICINITY OF BERNARDSVILLE**

Species	Scientific Name	Status	Source
Bald Eagle	<i>Haliaeetus leucocephalus</i>	E (Nest, Foraging)	Landscape Project
Barred Owl	<i>Strix varia</i>	T	Landscape Project
Brown Thrasher	<i>Toxostoma rufum</i>	SC (Breeding)	Landscape Project
Cooper's Hawk	<i>Accipiter cooperii</i>	SC (Nest)	Landscape Project
Great Blue Heron	<i>Ardea herodias</i>	SC	Landscape Project
Red-shouldered Hawk	<i>Buteo lineatus</i>	E (Nest)	Landscape Project
Veery	<i>Catharus fuscescens</i>	SC (Breeding)	Landscape Project
Wood Thrush	<i>Hylocichla mustelina</i>	SC (Breeding)	Landscape Project
Worm-eating Warbler	<i>Helmitheros vermivorum</i>	SC (Breeding)	Landscape Project
Bobcat	<i>Lynx rufus</i>	E	Landscape Project
Indiana Bat (Maternity Colony, Roost)	<i>Myotis sodalis</i>	E, LE	Landscape Project
Northern Myotis	<i>Myotis septentrionalis</i>	LT	Landscape Project
Eastern Box Turtle	<i>Terrapene carolina carolina</i>	SC	Landscape Project
Wood Turtle	<i>Glyptemys insculpta</i>	T	Landscape Project
<b>Additional Species Documented Within the Immediate Vicinity of Bernardsville</b>			
Spotted Turtle	<i>Clemmys guttata</i>	SC	Landscape Project

**E = State Endangered**

**T = State Threatened**

**LE = Federally-Listed Endangered**

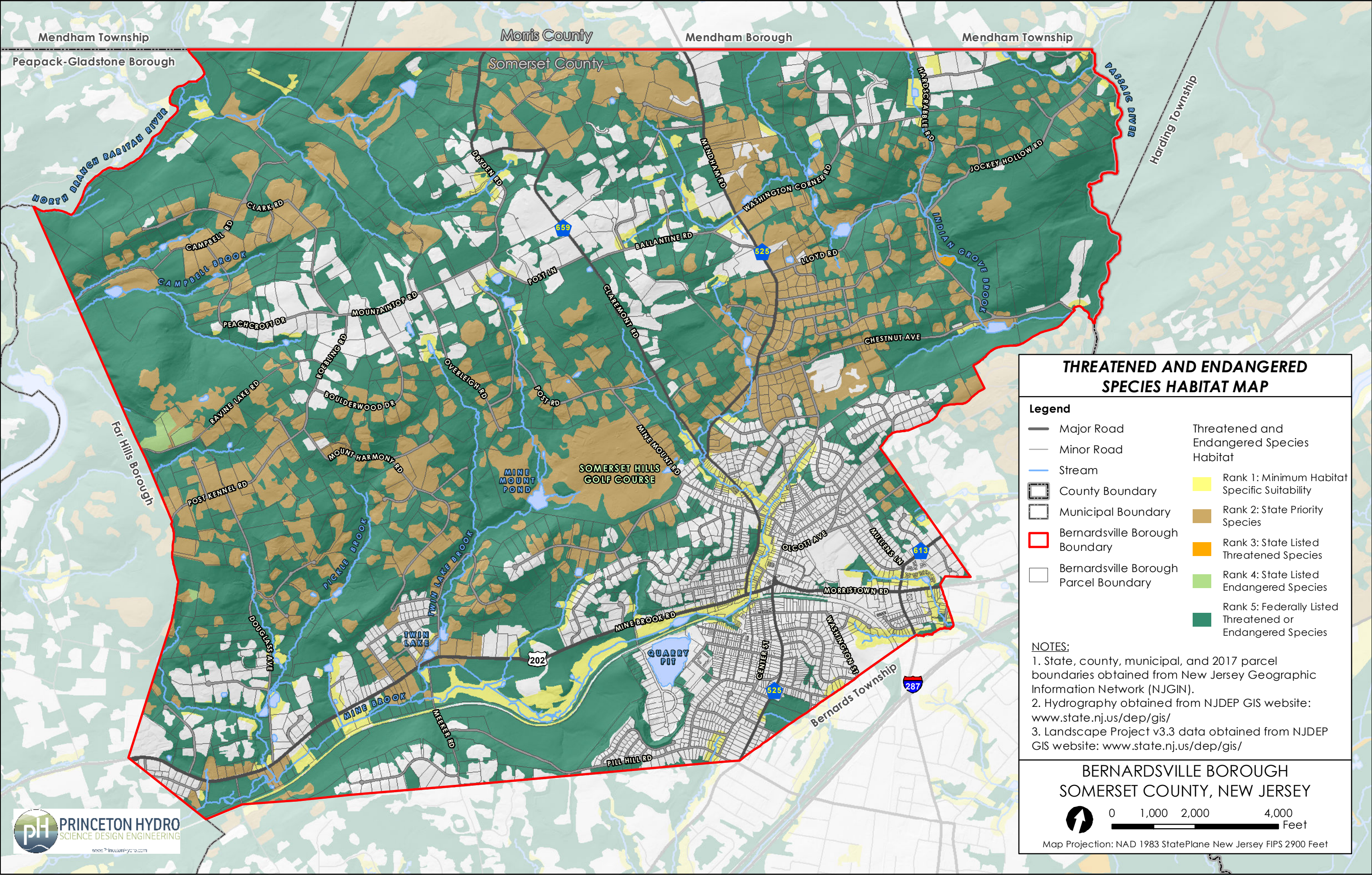
**LT = Federally-Listed Threatened**

**SC= State Species of Special Concern**

## 8.5 CHANGES IN T&E SPECIES

In the 2010 ERI, the following species were identified as Threatened or Endangered: Cooper's Hawk, Red-shouldered Hawk, Wood Turtle, Grasshopper Sparrow, Barred Owl, and the Northern Goshawk. Since 2010, three additional state-endangered species have been identified in Bernardsville: Bald Eagle, Indiana Bat, and Bobcat. Additionally, the Cooper's Hawk is still present, but longer has a state-threatened status. It is now listed as a state species of special concern. And, the Grasshopper Sparrow and Northern Goshawk were no longer identified in Bernardsville. The federally-listed Threatened Northern Myotis was also listed as present in Bernardsville.







## 8.6 BERNARDSVILLE'S ENDANGERED AND THREATENED SPECIES DESCRIPTIONS

### 8.6.1 BALD EAGLE

One of the nation's most beloved birds, the Bald Eagle (*Haliaeetus leucocephalus*) is a dark brown, broad-winged raptor with an iconic white head and tail. They are often spotted high in the sky, soaring over the treetops or perched on an open branch. The State-endangered Bald Eagle hunts fish, mammals, and birds and can be found harassing other birds for scavenged meals.

As a result of the use of the pesticide dichloro-diphenyl-trichloroethane, commonly known as DDT, the number of nesting pairs of bald eagles in the state declined to only one by 1970 and remained there into the early 1980s. Use of DDT was banned in the United States in 1972. That ban, combined with restoration and management efforts by the NJ Division of Fish and Wildlife's Endangered and Nongame Species Program (ENSP), resulted in population increases to 23 pairs by 2000, 48 pairs by 2005, 82 pairs by 2010, and 150 pairs by 2015. ENSP recovery efforts – implemented since the early 1980's – have resulted in a steady recovery as New Jersey's eagle population has rebounded from the edge of extirpation. The federal government removed the Bald Eagle from its list of Endangered Species in August, 2007, in recognition of the national resurgence in the eagle population in the lower 48 states. The population of wintering bald eagles has grown along with the nesting population, especially in the last ten years. This growth reflects increasing populations in NJ and the northeast, as each state's recovery efforts continue to pay off for eagles (Smith & Clark, 2017).

Bald Eagles nesting in New Jersey face many threats, with disturbance and habitat loss the greatest threats in our state. In addition, contaminants in the food web may negatively affect the eagles nesting in some areas of NJ (Smith & Clark, 2017). In Bernardsville, the NJDEP Landscape Project data identified Bald Eagle nesting and foraging habitat. It is important to protect their nests from human disturbance, which can cause the species to change its behavior. In general, people on foot evoke the strongest negative reaction (Buehler 2000). When eagles change their behavior in reaction to people, they cease doing what is best for their survival and the well-being of their eggs and young. Ultimately, that reduces the survival of individuals and the population.

### 8.6.2 BARRED OWL

Barred owls require large tracts of undisturbed forest dominated by mature and old growth stands and high canopy cover (Bosakowski et al. 1987; Bosakowski 1989) similar to those required for red-shouldered hawk. Barred owls require a few mature trees (approx. 20-inch diameter at breast height (dbh) for nesting. Large tree habitat with cavities is necessary for nest sites as well as open flyway space below the canopy for hunting (Devereux and Mosher 1984). Barred owls have been known to use hawk nests when tree cavities are not available (Beans and Niles, 2003). Bosakowski, et al. (1987) noted that wetlands were used significantly more by barred owls than by other sympatric nesting owls.

The reason for a preference for wetlands seems to be two-fold. The first reason appears to be related to wetland prey, such as voles and frogs, which often account for a significant portion of the barred owl's diet (Bosakowski and Smith 1992). The second reason is that large wetland complexes are often undeveloped and often represent the last remaining refuges for forest species. Barred owls will nest immediately outside of wetlands if suitable nest sites within the wetland are unavailable (Beans and Niles 2003).

Barred owl territories are very large (mean = 676 acres) and encompass the entire home range (Nicholls and Fuller 1987). Owl sites were located a considerable distance (mean = 2,204 feet) from houses and other buildings (Bosakowski and Smith 1997), showing a significant avoidance of human disturbance and habitat alteration in the Pequannock Watershed. Although they generally avoid human disturbance, barred owls have also been noted to nest within suburbanized areas (NJDEP 2002). The barred owl resides in forests and demonstrates long-term site fidelity in areas that remained undisturbed (Bent 1938; Bosakowski et al. 1987).

Records from the NJDEP Division of Parks and Forestry's Natural Heritage Project indicate that the barred owl has been reported within a one-mile vicinity of Bernardsville. Due to the extensive presence of red-shouldered hawk habitat identified by NJDEP within Bernardsville, it is reasonable to assume that nesting barred owl may occur within the Borough as they are typically sympatric, and slightly more tolerant of disturbance than red-shouldered hawks (Scott Angus, Biologist, ASGECI, personal communication, 2008).

### **8.6.3 RED-SHOULDERED HAWK**

Red shouldered hawks are medium sized hawks of the mature hardwood or mixed forest (Bosakowski et al. 1992). In addition to small mammals, red-shouldered hawks prefer to eat small reptiles and amphibians. In northern New Jersey, red-shouldered hawks are found in lowland hardwood, mixed or coniferous forests or upland mixed and coniferous forests. Nesting habitat is typically associated with water bodies including swamps and other forested wetlands associated with rivers or ponds (Bednarz and Dinsmore 1981; Bednarz and Dinsmore 1982; Bosakowski et al. 1992). Red shouldered hawks prefer large forest patch sizes (Robbins et al. 1989) with average home range sizes estimated at 188 acres (Craighead and Craighead 1956).

Bent (1937) reported nests that were regularly utilized over a fifty-year period. The species however is among the most sensitive of all the nesting forest raptors with regard to human disturbance and development (Bosakowski 1990; Bosakowski and Smith 1997).

During breeding, red-shouldered hawks will incessantly scream and fly around the nest in circles when they detect a human (or pet) intruder near their nest site (150-250 yards). Disturbance reduces incubation and brooding, as chicks are left alone and vulnerable to predators. Creation of fragmentation and edge habitat favors great horned owls (Bednarz and Dinsmore 1981; Bednarz and Dinsmore 1982) which can access hawk nests and prey upon hawks (Wiley, 1975).

NJDEP Landscape Mapping identifies red-shouldered hawk breeding habitat in patches throughout western Bernardsville (primarily west of Claremont and Chapin Roads). These forested areas have been determined to A: contain the proper forest structure to support the red-shouldered hawk and B: be contiguous with a documented breeding location.



## 8.6.4 BOBCAT

As a medium-sized cat that stands about two feet tall, the elusive yellow to reddish-brown Bobcat (*Lynx rufus*) is the most widely distributed native wild cat in North America. Generally, they hunt both by night and day, although there is evidence to suggest that most hunting takes place at dawn and dusk. They are extremely shy animals that are seldom seen by humans although as numbers have increased in northern parts of the state more and more people are seeing bobcats (NJDEP). The NJDEP Landscape Project data showed Bobcat was spotted on a road in Bernardsville.

Massive deforestation, development, and changes in agricultural practices among other factors in the late 1800s and early 1900s, led to its decline in some areas of the country by the 1970s, particularly the Northeast and Midwest. The NJ Division of Fish and Wildlife conducted a restoration project where 24 bobcats captured in Maine were released in northern New Jersey from 1978-1982. By the 1990's reports of bobcat sightings began to increase. Today, bobcat reports from northern NJ are on the increase.

Unfortunately, so are the numbers of bobcats killed by automobiles on our roadways. In 2017, for example, 11 bobcats were confirmed killed by vehicles. Over 70% of bobcats struck by vehicles in New Jersey are less than 2 years old, likely because these young cats are naïve to road hazards and because they often disperse long distances, crossing unfamiliar habitat including many roads, to find a territory of their own. Residents should keep an eye out for Bobcat when traveling through the suburban landscape of Bernardsville.

## 8.6.5 INDIANA BAT

Between April and August, Indiana bats inhabit upland forests, floodplains and riparian forests of northern New Jersey. The bats roost under loose bark of forest trees during the day. Dead trees or trees with flaky bark such as the shagbark hickory are of particular importance for summer roosting habitat. Other important tree species include bitternut and pignut hickories, sycamore, red oak, white oak, sugar maple, white ash, and cottonwood. One study (Garner and Gardner, 1992) found that 75% of the roost trees were in uplands while the remaining 25% were in riparian habitats. Roost trees also typically have southern sun exposure and are found in forest clearings or edges.

At night in the summer, Indiana bats forage for insects around streams, lakes and reservoirs. Trees in the riparian floodplains are a particularly important part of the foraging habitat. Other forage areas include above the forest canopy, over early successional clearings, over croplands, pasture and other agricultural areas.

Around August, the bats begin to congregate around the hibernacula and build up fat reserves for their winter dormancy (Harvey 1992). Hibernacula are naturally occurring caves and abandoned mine shafts. There are only two known Indiana bat hibernacula in New Jersey, both of which are in Morris County. From 1975 to 1995, the Indiana bat population dropped from more than 120,000 to approximately 20,000 individuals (USFWS 2001). Threats to Indiana bats include destruction of hibernating and maternity colonies; vandalism or sealing of hibernacula; forest fragmentation and other habitat loss; and use of pesticides and other environmental contaminants. Because Indiana bats utilize relatively few hibernacula and concentrate in large colonies that may number in the tens of thousands, a single catastrophic event such as a disease outbreak could have significant impacts on the entire population (Beans and Niles, 2003).

Indiana bat maternal summer roosting areas are in close proximity to Bernardsville Borough and it is expected that the forested areas and wetlands of Bernardsville would provide foraging habitat and potential shelter for the bats. The USFWS would typically request a tree (6 inch or greater Diameter at Breast Height, DBH) clearing timing restriction from April 1 to September 30 for projects. Under certain circumstances such as public works projects requiring tree removal, the USFWS may request forest data including photos, project description, tree sizes, and other information to determine if the timing restriction is required or if a survey is required.

## 8.6.6 WOOD TURTLE

As described by the NJDEP, the Wood Turtle (*Glyptemys insculpta*) is distinguished by the sculpted or grooved appearance of its carapace, or upper shell. Each season a new annulus, or ridge, is formed, giving each scute (a scale-like horny layer) a distinctive pyramid-shaped appearance. As the turtle ages, natural wear smooths the surface of the shell. While the scutes of the carapace are brown, the plastron, or underneath the shell, consists of yellow scutes with brown or black blotches on each outer edge. The legs and throat are reddish-orange. The male wood turtle has a concave plastron while that of the female is flat or convex. The male also has a thicker tail than the female. Unlike other turtle species that favor either land or water, the wood turtle resides in both aquatic and terrestrial environments. Aquatic habitats are required for mating, feeding, and hibernation, while terrestrial habitats are used for egg laying and foraging. Freshwater streams, brooks, creeks, or rivers that are relatively remote provide the habitat needed by these turtles. Consequently, wood turtles are often found within streams containing native Brook Trout (*Salvelinus fontinalis*) (NJDEP, Wood Turtle)

Carroll and Ehrenfeld (1978) demonstrated that wood turtles displaced up to 2 km were well within their home range. In addition to linear movements following watercourses, it is well documented that wood turtles travel beyond the riparian zone during the summer months. The NJDEP Landscape Project has identified the state-threatened Wood Turtle as present in Bernardsville as “occupied habitat.”

Historically, the wood turtle was a fairly common species within suitable habitat in New Jersey. By the 1970s, however, declines were noted as wood turtles were absent from many historic sites due to habitat loss and stream degradation. Consequently, the wood turtle was listed as a threatened species in New Jersey in 1979. In 1995, the wood turtle was proposed for inclusion on the federal endangered species list. Despite declines in several northeastern states, populations were considered stable enough throughout the species’ entire range to deny listing. However, the wood turtle was considered by the U.S. Fish and Wildlife Service as a species that, “although not necessarily now threatened with extinction may become so unless trade in them is strictly controlled” (U.S. Fish and Wildlife Service 1995). As a result, international trade of these turtles is strictly monitored and regulated through the CITES Act (Convention on International Trade in Endangered Species of Wild Flora and Fauna Act). The New Jersey Endangered Species Act prohibits the collection or possession of wood turtles.



## 8.7 ADDITIONAL FEDERALLY-LISTED SPECIES

### 8.7.1 NORTHERN MYOTIS

The Northern Myotis (*Myotis septentrionalis*) (also known as the Northern Long-eared bat) has a wide range across northwestern North America, east to Newfoundland, and south through most of eastern North America, including the central and south-central U.S. states. There has been an active season sighting of this species in Bernardsville, according to the NJDEP Landscape Project database.

The Northern Myotis hibernates in caves and mines in the winter, as they prefer the cool temperatures provided. They are found, swarming in surrounding wooded areas in autumn. During late spring and summer, the bat roosts beneath the loose bark of trees or in tree crevice and forages in upland forests. Unlike other myotids, these bats often roost alone with the exception of maternal colonies. Due to the bats' dependence on dense forest, timber cutting can threaten maternity colonies and other roost sites. The bats feed on small insects such as moths, beetles, and caddisflies and use echolocation to navigate and find their prey.

This bat is one of the most impacted by white-nose syndrome, a fungal disease that affects hibernating bats. It is considered one of the worst wildlife diseases in modern times having killed millions of bats across North America ([whitenosesyndrome.org](http://whitenosesyndrome.org)). The Northern Myotis is suffering a staggering 98% reduction in numbers in WNS-affected areas. Due to declines caused by white-nose syndrome and continued spread of the disease, the northern long-eared bat was listed as threatened under the Endangered Species Act on April 2, 2015. USFWS also developed a final 4(d) rule, which published in the Federal Register on January 14, 2016. The 4(d) rule specifically defines the "take" prohibitions.

## 8.8 ADDITIONAL WILDLIFE SPECIES

### 8.8.1 NON-LISTED WILDLIFE

While regulatory issues regarding wildlife typically focus on threatened and endangered species, it is important to consider the diversity of non-listed wildlife existing in the natural communities of Bernardsville. Often, the presence and diversity of these non-listed species are a significant indicator of overall habitat quality. Furthermore, there are indications that some of these species, while not officially listed, are becoming increasingly uncommon within our region. Appendix A of this report provides a checklist of terrestrial vertebrate species potentially existing within Bernardsville. Appendix A was created using the following sources: S. Angus/ASGECI Staff (List Editor), NJDEP Reptiles and Amphibians of NJ (Schwartz and Golden, 2002) Schermann-Hoffman Wildlife List Prepared by Steve

Byland (2002), and M. Anderson and D. Freiday (2003). In addition to the common species identified, some of the checklist species are historically located within the county while other species would only be represented by occasional transients.

The numbers and diversity of neotropical migrant bird species are important factors in determining the health of a forest. Neotropical migrant bird species are those species that breed in temperate North America and migrate south to overwinter in the Caribbean Islands, Mexican lowlands, and Central and South America. Most species are insect-eating passerines and other songbird species of the forest interior (Bradshaw 1992). Species include warblers, thrushes, orioles, tanagers, grosbeaks, vireos, hummingbirds, flycatchers, swallows and swifts. Forest loss or fragmentation in the Northeast, and increasing losses of wintering habitat in the tropics threaten many neotropical migrant species (Rich and Dobkin, 1994). Diversity of forest interior neotropical migrant species in a forest has been correlated to the size of the tract (Robbins et al. 1989). Changes in forest structure and introduction of opportunistic edge species such as cowbirds impact forest bird populations.

National Audubon Society has identified 314 species of North American birds that are currently threatened by climate change (<http://climate.audubon.org/>). They used extensive citizen science data and detailed climate layers to develop models that characterize the relationship between the distribution of each species and climate. Then, forecasted species distributions to future time periods based on climate estimates described by the Intergovernmental Panel on Climate Change (IPCC). 52 of the 314 species identified are climate threatened and endangered birds from New Jersey have also been recorded in Somerset County within the last two years according to the Cornell Lab of Ornithology eBird (<https://ebird.org/explore>). It is important to understand the threats to the current bird species that may be present in Bernardsville, in order to continue to protect them.

**TABLE 21:**  
**CLIMATE THREATENED AND ENDANGERED**  
**BIRDS RECORDED IN SOMERSET COUNTY**

Common Name	Scientific Name
American Black Duck	<i>Anas rubripes</i>
American Kestrel	<i>Falco sparverius</i>
American Wigeon	<i>Anas americana</i>
Bald Eagle	<i>Haliaeetus leucocephalus</i>
Baltimore Oriole	<i>Icterus galbula</i>
Brown Creeper	<i>Certhia americana</i>
Bufflehead	<i>Bucephala albeola</i>
Common Goldeneye	<i>Bucephala clangula</i>
Common Loon	<i>Gavia immer</i>
Common Merganser	<i>Mergus merganser</i>
Double-crested Cormorant	<i>Phalacrocorax auritus</i>
Gadwall	<i>Anas strepera</i>
Golden-crowned Kinglet	<i>Regulus satrapa</i>
Greater Scaup	<i>Aythya marila</i>
Greater White-fronted Goose	<i>Anser albifrons</i>



Common Name	Scientific Name
Hairy Woodpecker	<i>Picoides villosus</i>
Hermit Thrush	<i>Catharus guttatus</i>
Herring Gull	<i>Larus argentatus</i>
Hooded Merganser	<i>Lophodytes cucullatus</i>
Hooded Warbler	<i>Setophaga citrina</i>
Horned Grebe	<i>Podiceps auritus</i>
Lesser Scaup	<i>Aythya affinis</i>
Mallard	<i>Anas platyrhynchos</i>
Merlin	<i>Falco columbarius</i>
Northern Harrier	<i>Circus cyaneus</i>
Northern Saw-whet Owl	<i>Aegolius acadicus</i>
Northern Shoveler	<i>Anas clypeata</i>
Orchard Oriole	<i>Icterus spurius</i>
Ovenbird	<i>Seiurus aurocapilla</i>
Pine Warbler	<i>Setophaga pinus</i>
Purple Finch	<i>Haemorhous purpureus</i>
Red-breasted Merganser	<i>Mergus serrator</i>
Red-breasted Nuthatch	<i>Sitta canadensis</i>
Redhead	<i>Aythya americana</i>
Ring-billed Gull	<i>Larus delawarensis</i>
Ring-necked Duck	<i>Aythya collaris</i>
Rusty Blackbird	<i>Euphagus carolinus</i>
Scarlet Tanager	<i>Piranga olivacea</i>
Short-eared Owl	<i>Asio flammeus</i>
Swamp Sparrow	<i>Melospiza georgiana</i>
Tree Swallow	<i>Tachycineta bicolor</i>
Tundra Swan	<i>Cygnus columbianus</i>
White-breasted Nuthatch	<i>Sitta carolinensis</i>
White-throated Sparrow	<i>Zonotrichia albicollis</i>
Wild Turkey	<i>Meleagris gallopavo</i>
Willow Flycatcher	<i>Empidonax traillii</i>
Wood Duck	<i>Aix sponsa</i>
Wood Thrush	<i>Hylocichla mustelina</i>
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>
Yellow-throated Vireo	<i>Vireo flavifrons</i>

## 8.9 FOREST FRAGMENTATION AND CORRIDORS

Fragmentation of forested areas by means of development isolates stands from the main forest complex, increasing the amount of edge habitat and decreasing the amount of forest interior habitat. Negative effects of forest habitat fragmentation are well documented for breeding birds (Robinson, 1988; Robinson and Wilcove 1994; Herkert 1994; Robinson et al. 1997). Large tracts of contiguous forested areas are necessary to support breeding populations of migratory songbirds (Robbins et al. 1989; Robinson et al. 1997) as well as forest dwelling raptors (Bosakowski et al. 1992; Bosakowski 1994; Bosakowski and Speiser 1994). Most forest interior species will only nest within a forest “core” that is at least 90 meters (295 feet) from the nearest forest edge. In addition, the forest core must be a minimum of about 10 hectares (25 acres) in size (Dawson et al. 1993). Fragmented forests are characterized by high levels of edge-related nest predation, brood parasitism, or both and prove undesirable for many area sensitive species. In addition, forest fragmentation facilitates the spread of exotic and invasive species, both vegetative and mammalian, that can dramatically change the habitat structure of the forest. Demographic data suggest that populations of many forest-breeding species in severely fragmented landscapes may be “sinks” that produce too few young to compensate for adult mortality. Rates of parasitism and predation are so much lower in large forested landscapes that they may act as “sources” that produce a surplus of young that are able to colonize small tracts in fragmented landscapes (Robinson et al. 1997). Immigration and recolonization are critical for long-term regional survival of local populations, particularly for imperiled species. The loss of habitat is the primary reason for the decline in species and affects plants, mammals, birds, reptiles, amphibians, fish, and invertebrates.

Habitat corridors are linear landscape elements that provide wildlife the ability to move between habitat patches. The best corridors are those that are the widest possible and those that connect the largest patches of habitat. Forest interior and neotropical migrant birds, although able to disperse effectively, have been found to have a higher probability of using wider corridors (Keller et al. 1993). Hodges and Kremetz (1996) recommend that the minimum corridor width be no less than 100 meters (330 feet). This will provide adequate width for forest interior dwellers. Most imperiled species are habitat specialists, meaning that they only survive within a specific type of habitat. In addition, they only occur in limited numbers, so it is critical that areas of suitable habitat are connected via adequate corridors. This allows individuals to migrate between habitats and interbreed with subpopulations. This concept is particularly important for many small mammals, reptiles, amphibians, and some invertebrates. Many of these creatures can be entirely prohibited from dispersing if impeded by barriers such as roads or unsuitable habitat. Corridors between natural communities help to mitigate the impacts of habitat fragmentation and species isolation. Corridors allow species with limited dispersal capabilities such as herptiles an effective means to disperse.

The forested corridor can be broadened or improved by allowing preserved lands to revert to their natural state or through planting of native species to “jump start” the process. Where feasible, establishing connectivity between the preserved forest patches mentioned above should be considered. In addition, expanding the width of forested corridors may improve the overall habitat quality of the Borough’s forests. Forest fragmentation and connectivity should always be considered during development review. Projects should be designed to limit forest fragmentation and/or the destruction of forest core area.



NJDEP will be releasing “Connecting Habitat Across New Jersey” (CHANJ) data, which will (1) depicting areas crucial for habitat connectivity (called “cores” and “corridors”), and (2) provide a menu of implementation actions for securing, restoring, and/or reconnecting habitats within those key areas. While the data is not available at this time, it should be incorporated into future ERIs and planning documents (website: <https://www.njfishandwildlife.com/ensp/chanj.htm>).

## **8.10 REGULATORY PROTECTION FOR T&E SPECIES**

The U.S. Fish and Wildlife Service protects Federally listed endangered and threatened wildlife and plant species and their habitat under the 1973 Endangered Species Act. Under Section 7 of this Act, Federal agencies are required to consult with the USFWS to ensure that the actions they authorize, fund, or carry out will not jeopardize listed species. In the event that proposed actions are determined to jeopardize a listed species, the USFWS must offer reasonable alternatives that will meet the goals of the proposed action without jeopardizing the listed species.

Under Section 9 of the Act, private landowners are prohibited from the «take» of endangered or threatened species. It is unlawful to endanger the livelihood of a listed species and this provision is extended to the habitat required by the species for its survival. Section 10 of the Act provides for the preparation of Habitat Conservation Plans. This provision is made to protect the rights of private landowners to develop or use their land even though they have endangered species on their property. These landowners can receive an “incidental take permit” provided they develop a Habitat Conservation Plan that provides for the conservation of the species.

The State of New Jersey has its own Endangered Species Act, the Endangered and Nongame Species Conservation Act (N.J.S.A. 23:2A-13 et seq), which resulted in the listing of State endangered animal species (N.J.A.C. 7:25-4:13) and a Nongame Species list, including threatened species (N.J.A.C. 7:25 4.179(a)). As part of this Act, all New Jersey animals appearing on the Federal list are also included on this State list. Endangered plants in New Jersey have been identified in accordance with the Endangered Plant Species List Act (N.J.S.A. 13:1B-15.151 et seq.).

State listed endangered and threatened wildlife species that are dependent upon wetlands can have increased protection to their wetland habitat under the Freshwater Wetlands Protection Act Rules. Federally listed plant species are also afforded protection under this Act. A freshwater wetland that is habitat for an endangered or threatened species is considered exceptional resource value (N.J.A.C. 7:7A-2.4(b)2) and is given a standard transition area width of 150 feet (N.J.A.C. 7:7A-2.4(d)). More stringent review of wetland permit applications is also performed.

The NJ Flood Hazard Area Control Act rules also provide for protection by providing a 150-foot regulated riparian zone for certain water-dependent state listed endangered and threatened animal and plant species habitats (see Section 5.5).

## 9. CLIMATE



**WILDFLOWERS**  
BY MARK GALLAGHER



## 9.1 CLIMATE & WEATHER

Weather refers to short-term (days to weeks or months) changes in the atmosphere whereas climate describes what the weather is like over a long period of time (decades to centuries) in a specific area. Bernardsville, New Jersey has a climate typical of its larger geographic region and, thus, state or regional data are applicable to understanding local climatic conditions. New Jersey's climate is characterized by moderately cold and occasionally snowy winters and warm, humid summers (Runkle et al., 2017).

NOAA's National Centers for Environmental Information (NCEI) (Formerly the National Climatic Data Center [NCDC]) calculates Climate Normals, three-decade averages of climatological variables, including temperature and precipitation, for over 9,800 stations across the United States. One such station is located at Somerset Airport in Bedminster (Station: SOMERVILLE SOMERSET AIRPORT, NJ US USW00054785), approximately 8 miles southwest of the Bernardsville town center. Climate Normals for the 1981 – 2010 period of record at this station indicate that average monthly temperatures ranged from 29.0 °F in January to 73.9 °F in July (Anthony Arguez et. al., 2010). Temperature averages by season were 31.3 °F in winter, 49.8 °F in spring, 71.8 °F in summer, 53.8 °F in autumn. Average annual precipitation was 47.39 inches, with monthly averages ranging from 2.17 inches in February to 5.27 inches in July. Precipitation averages by season were 9.06 inches in winter, 12.66 inches in spring, 13.54 inches in summer, and 12.13 inches in autumn.

Average temperatures in New Jersey have increased by 3 degrees Fahrenheit over the past century. Heat waves are projected to be more intense while cold waves are projected to become less intense (Runkle et al., 2017). Precipitation has been highly variable but tends toward wetter than average conditions over the last decade (Runkle et al., 2017). Winter and spring precipitation and extreme weather events, be they storms, heat waves, or droughts, are projected to increase by mid-century (Robinson 2014).

For more information on the climate of New Jersey, visit the Office of the State Climatologist's website at: <https://climate.rutgers.edu/stateclim/?section=njcp&target=NJCoverview>.

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## PRINCETON HYDRO MAPPING SOURCES:

1. State, county, and municipal boundaries obtained from New Jersey Geographic Information Network (NJGIN).
2. Hydrography obtained from NJDEP GIS website: [www.state.nj.us/dep/gis/](http://www.state.nj.us/dep/gis/)
3. 2015 orthoimagery obtained from NJ Office of Information Technology (NJOIT), Office of Geographic Information Systems (OGIS).
4. Conservation Focal Areas vers 1.0 data obtained from NJDEP GIS website: [www.state.nj.us/dep/gis/](http://www.state.nj.us/dep/gis/)
5. Flood insurance rate map, effective 6/16/2016, obtained from FEMA Flood Map Service Center: <https://msc.fema.gov/portal/>
6. Groundwater recharge obtained from the obtained from the New Jersey Geological and Water Survey digital geodata series website: <http://www.state.nj.us/dep/njgs/geodata/index.htm>
7. Impervious surface (2012 Land Use/Land Cover) obtained from NJDEP GIS website: [www.state.nj.us/dep/gis/](http://www.state.nj.us/dep/gis/)
8. 2012 Land Use/Land Cover obtained from NJDEP GIS website: [www.state.nj.us/dep/gis/](http://www.state.nj.us/dep/gis/)
9. Open space property records and conservation easements obtained from The Borough of Bernardsville Open Space and Recreation Plan Update - 2016.
10. Riparian zone width determined in accordance with N.J.A.C 7:13-4.
11. Septic system yield obtained from the NJ Highlands Council.
12. 2008 LiDAR data obtained from NJ Office of Information Technology (NJOIT), Office of Geographic Information Systems.
13. Farmland class obtained from NRCS, USDA, Soil Survey Geographic (SSURGO) Database for Somerset County, New Jersey.
14. SSURGO Soils obtained from NRCS, USDA, Soil Survey Geographic (SSURGO) Database for Somerset County, New Jersey.
15. AMNET station and surface water quality standards obtained from NJDEP GIS website: [www.state.nj.us/dep/gis/](http://www.state.nj.us/dep/gis/)
16. Landscape Project v3.3 data obtained from NJDEP GIS website: [www.state.nj.us/dep/gis/](http://www.state.nj.us/dep/gis/)
17. 2008 LiDAR data obtained from NJ Office of Information Technology (NJOIT), Office of Geographic Information Systems.
18. Study area is the Borough of Bernardsville. Borough boundary obtained from New Jersey Geographic Information Network (NJGIN).
19. USGS Topo Base Map obtained from USGS, The National Map Services: <https://viewer.nationalmap.gov/services/>
20. Known contaminated sites obtained from NJDEP DataMiner website: <https://www13.state.nj.us/DataMiner>. Closed and unspecified sites excluded
21. Well head protection areas obtained from the New Jersey Geological and Water Survey digital geodata series website: <http://www.state.nj.us/dep/njgs/geodata/index.htm>
22. Wetlands (2012 Land Use/Land Cover) obtained from NJDEP GIS website: [www.state.nj.us/dep/gis/al/](http://www.state.nj.us/dep/gis/al/)
23. Wetland transition area width determined in accordance with N.J.A.C 7:7A-3.
24. Vernal pools (Landscape Project v3.3) obtained from NJDEP GIS website: [www.state.nj.us/dep/gis/](http://www.state.nj.us/dep/gis/)

# APPENDIX A

## WILDLIFE (TERRESTRIAL VERTEBRATE) INVENTORY LISTS



**AMERICAN ROBIN**

BY MARK GALLAGHER



## BIRD SPECIES POTENTIALLY WITHIN BERNARDSVILLE BOROUGH

\* = Confirmed or potential breeder in or around Bernardsville

Scientific Name	Common Name
<i>Empidonax virens</i>	Acadian Flycatcher
<i>Empidonax alnorum</i>	Alder Flycatcher
<i>Botaurus lentiginos</i>	American Bittern
<i>Anas rubripes</i>	American Black Duck
<i>Fulica americana</i>	American Coot
<i>Corvus brachyrhynchos</i>	American Crow*
<i>Carduelis tristis</i>	American Goldfinch*
<i>Falco sparverius</i>	American kestrel*
<i>Setophaga ruticilla</i>	American Redstart*
<i>Turdus migratorius</i>	American Robin*
<i>Spizella arborea</i>	American Tree Sparrow
<i>Anas americana</i>	American Wigeon
<i>Philohela minor</i>	American Woodcock*
<i>Branta bernicla</i>	Atlantic Brant
<i>Haliaeetus leucocephalus</i>	Bald Eagle
<i>Riparia riparia</i>	Bank Swallow*
<i>Hirundo rustica</i>	Barn Swallow*
<i>Strix varia</i>	Barred Owl*
<i>Dendroica castanea</i>	Bay-breasted Warbler
<i>Ceryle alcyon</i>	Belted Kingfisher*
<i>Catharus bicknelli</i>	Bicknell's Thrush
<i>Miniotilta varia</i>	Black and White Warbler*
<i>Coragyps atratus</i>	Black Vulture
<i>Coccyzus erythrophthalmus</i>	Black-billed Cuckoo*
<i>Dendroica fusca</i>	Blackburnian Warbler
<i>Nycticorax nycticorax</i>	Black-crowned Night Heron
<i>Dendroica striata</i>	Blackpoll Warbler
<i>Dendroica caerulescens</i>	Black-throated Blue Warbler
<i>Dendroica virens</i>	Black-throated Green Warbler
<i>Cyanocitta cristata</i>	Blue Jay*
<i>Poliophtila caerulea</i>	Blue-gray Gnatcatcher*
<i>Anas discors</i>	Blue-winged Teal

## BIRD SPECIES POTENTIALLY WITHIN BERNARDSVILLE BOROUGH (CONT.)

\* = Confirmed or potential breeder in or around Bernardsville

Scientific Name	Common Name
<i>Vermivora pinus</i>	Blue-winged Warbler*
<i>Dolichonyx oryzivorus</i>	Bobolink*
<i>Buteo platypterus</i>	Broad-winged Hawk
<i>Certhia americana</i>	Brown Creeper
<i>Toxostoma rufum</i>	Brown Thrasher*
<i>Molothrus ater</i>	Brown-Headed Cowbird*
<i>Branta canadensis</i>	Canada Goose*
<i>Wilsonia canadensis</i>	Canada Warbler
<i>Dendroica tigrina</i>	Cape May Warbler
<i>Thryothorus ludovicianus</i>	Carolina Wren*
<i>Dumetella carolinensis</i>	Catbird*
<i>Bombycilla cedrorum</i>	Cedar Waxwing*
<i>Dendroica cerulea</i>	Cerulean Warbler
<i>Dendroica pensylvanica</i>	Chestnut-sided Warbler*
<i>Chaetura pelagica</i>	Chimney Swift*
<i>Spizella passerina</i>	Chipping Sparrow*
<i>Herndon pyrrhonota</i>	Cliff Swallow
<i>Tyto alba</i>	Common Barn Owl*
<i>Quiscalus quiscula</i>	Common Grackle*
<i>Gavia immer</i>	Common Loon
<i>Mergus merganser</i>	Common Merganser
<i>Chordeiles minor</i>	Common Nighthawk
<i>Carduelis flammea</i>	Common Redpoll
<i>Gallinago gallinago</i>	Common Snipe
<i>Geothlypis trichas</i>	Common Yellowthroat*
<i>Oporornis agilis</i>	Connecticut Warbler
<i>Accipiter Cooperii</i>	Cooper's Hawk*
<i>Junco hyemalis</i>	Dark-eyed Junco
<i>Phalacrocorax auritus</i>	Double-crested Cormorant
<i>Picoides pubescens</i>	Downy Woodpecker*
<i>Sialia sialis</i>	Eastern Bluebird*
<i>Tyrannus Tyrannus</i>	Eastern Kingbird*
<i>Sturnella magna</i>	Eastern Meadowlark*
<i>Sayornis phoebe</i>	Eastern Phoebe*
<i>Otus asio</i>	Eastern Screech Owl*
<i>Meleagris gallopavo</i>	Eastern Wild Turkey*



## BIRD SPECIES POTENTIALLY WITHIN BERNARDSVILLE BOROUGH (CONT.)

\* = Confirmed or potential breeder in or around Bernardsville

Scientific Name	Common Name
<i>Contopus virens</i>	Eastern Wood Pewee*
<i>Sturnus vulgaris</i>	European Starling*
<i>Hesperiphona vespertinus</i>	Evening Grosbeak
<i>Spizella pusilla</i>	Field Sparrow*
<i>Corvus ossifragus</i>	Fish Crow
<i>Passerella iliaca</i>	Fox Sparrow
<i>Anas strepera</i>	Gadwall
<i>Aquila chrysaetos</i>	Golden Eagle
<i>Regulus satrapa</i>	Golden-crowned Kinglet
<i>Vermivora chrysoptera</i>	Golden-winged Warbler
<i>Ammodramus savannarum</i>	Grasshopper Sparrow*
<i>Catharus minimus</i>	Gray-cheeked Thrush
<i>Larus marinus</i>	Great Black-backed Gull
<i>Ardea herodias</i>	Great Blue Heron*
<i>Myiarchus crinitus</i>	Great Crested Flycatcher*
<i>Casmerodius albus</i>	Great Egret
<i>Bubo virginianus</i>	Great Horned Owl*
<i>Tringa melanoleuca</i>	Greater Yellowlegs
<i>Butorides striatus</i>	Green Heron*
<i>Anas crecca</i>	Green-winged Teal
<i>Picoides villosus</i>	Hairy Woodpecker*
<i>Catharus guttatus</i>	Hermit Thrush
<i>Larus argentatus</i>	Herring Gull
<i>Lophodytes cucullatus</i>	Hooded Merganser
<i>Wilsonia citrina</i>	Hooded Warbler
<i>Eremophila alpestris</i>	Horned Lark*
<i>Carpodacus mexicanus</i>	House Finch*
<i>Passer domesticus</i>	House Sparrow*
<i>Troglodytes aedon</i>	House Wren*
<i>Passerina cyanea</i>	Indigo bunting*
<i>Oporornis formosus</i>	Kentucky Warbler
<i>Charadrius vociferus</i>	Killdeer*
<i>Leucophaeus atricilla</i>	Laughing Gull
<i>Ixobrychus exilis</i>	Least Bittern*
<i>Empidonax minimus</i>	Least Flycatcher*
<i>Calidris minutilla</i>	Least Sandpiper

## BIRD SPECIES POTENTIALLY WITHIN BERNARDSVILLE BOROUGH (CONT.)

\* = Confirmed or potential breeder in or around Bernardsville

Scientific Name	Common Name
<i>Tringa flavipes</i>	Lesser Yellowlegs
<i>Melospiza lincolni</i>	Lincoln's Sparrow
<i>Asio otus</i>	Long-eared Owl
<i>Seiurus motacilla</i>	Louisiana Waterthrush*
<i>Dendroica magnolia</i>	Magnolia Warbler
<i>Anas platyrhynchos</i>	Mallard*
<i>Cistothorus palustris</i>	Marsh Wren
<i>Falco columbarius</i>	Merlin
<i>Zenaida macroura</i>	Mourning Dove*
<i>Oporornis philadelphia</i>	Mourning Warbler
<i>Cygnus olor</i>	Mute Swan*
<i>Vermivora reficapilla</i>	Nashville Warbler
<i>Colinus virginianus</i>	Northern Bobwhite
<i>Cardinalis cardinalis</i>	Northern Cardinal*
<i>Poecile carolinensis</i>	Northern Chickadee*
<i>Colaptes auratus</i>	Northern Flicker*
<i>Accipiter gentilis</i>	Northern Goshawk
<i>Circus cyaneus</i>	Northern Harrier
<i>Mimus polyglottos</i>	Northern Mockingbird*
<i>Icterus galbula</i>	Northern Oriole*
<i>Parula americana</i>	Northern Parula
<i>Anas acuta</i>	Northern Pintail
<i>Stelgidopteryx serripennis</i>	Northern Rough-winged Swallow*
<i>Aegolius acadicus</i>	Northern Saw-whet Owl
<i>Anas clypeata</i>	Northern Shoveler
<i>Pipilo erythrophthalmus</i>	Northern Towhee*
<i>Seiurus noveboracensis</i>	Northern Waterthrush
<i>Contopus borealis</i>	Olive-sided Flycatcher
<i>Icterus spurius</i>	Orchard Oriole*
<i>Pandion haliaetus</i>	Osprey
<i>Seiurus aurocapillus</i>	Ovenbird*
<i>Dendroica palmarum</i>	Palm Warbler
<i>Falco peregrinus</i>	Peregrine Falcon
<i>Podilymbus podiceps</i>	Pied-billed Grebe
<i>Dryocopus pileatus</i>	Pileated Woodpecker*
<i>Carduelis pinus</i>	Pine Siskin



## BIRD SPECIES POTENTIALLY WITHIN BERNARDSVILLE BOROUGH (CONT.)

\* = Confirmed or potential breeder in or around Bernardsville

Scientific Name	Common Name
<i>Dendroica pinus</i>	Pine Warbler
<i>Dendroica discolor</i>	Prairie Warbler*
<i>Protonotaria citrea</i>	Prothonotary Warbler
<i>Carpodacus purpureus</i>	Purple Finch
<i>Progne subis</i>	Purple Martin*
<i>Melanerpes carolinus</i>	Red-bellied Woodpecker*
<i>Sitta canadensis</i>	Red-breasted Nuthatch
<i>Vireo olivaceus</i>	Red-eyed Vireo*
<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker
<i>Buteo lineatus</i>	Red-shouldered Hawk*
<i>Buteo jamaicensis</i>	Red-tailed Hawk
<i>Gavia stellata</i>	Red-throated Loon
<i>Agelaius phoeniceus</i>	Red-Winged Blackbird*
<i>Larus delawarensis</i>	Ring-billed Gull
<i>Aythya collaris</i>	Ring-necked Duck
<i>Phasianus colchicus</i>	Ring-necked Pheasant*
<i>Columba livia</i>	Rock Dove*
<i>Pheucticus ludovicianus</i>	Rose-breasted Grosbeak*
<i>Buteo lagopus</i>	Rough-legged Hawk
<i>Regulus calendula</i>	Ruby-crowned Kinglet
<i>Archilochus colubris</i>	Ruby-throated Hummingbird*
<i>Oxyura jamaicensis</i>	Ruddy Duck
<i>Euphagus carolinus</i>	Rusty Blackbird
<i>Passerculus sandwichensis</i>	Savannah Sparrow
<i>Piranga olivacea</i>	Scarlet Tanager*
<i>Accipiter striatus</i>	Sharp-shinned Hawk
<i>Asio flammeus</i>	Short-eared Owl
<i>Plectrophenax nivalis</i>	Snow Bunting
<i>Chen caerulescens</i>	Snow Goose
<i>Egretta thula</i>	Snowy Egret
<i>Tringa solitaria</i>	Solitary Sandpiper
<i>Vireo solitarius</i>	Solitary Vireo
<i>Melospiza melodia</i>	Song Sparrow*
<i>Actitis macularia</i>	Spotted Sandpiper*
<i>Catharus ustulatus</i>	Swainson's Thrush
<i>Melospiza georgiana</i>	Swamp Sparrow

## BIRD SPECIES POTENTIALLY WITHIN BERNARDSVILLE BOROUGH (CONT.)

\* = Confirmed or potential breeder in or around Bernardsville

Scientific Name	Common Name
<i>Vermivora peregrina</i>	Tennessee Warbler
<i>Tachycineta bicolor</i>	Tree Swallow*
<i>Parus bicolor</i>	Tufted Titmouse*
<i>Cathartes aura</i>	Turkey Vulture
<i>Bartramia longicauda</i>	Upland Sandpiper
<i>Catharus fuscescens</i>	Veery*
<i>Rallus limicola</i>	Virginia Rail*
<i>Vireo gilvus</i>	Warbling Vireo*
<i>Anthus rubescens</i>	Water Pipit
<i>Sitta carolinensis</i>	White-breasted Nuthatch*
<i>Zonotrichia leucophrys</i>	White-Crowned Sparrow
<i>Vireo griseus</i>	White-eyed Vireo*
<i>Zonotrichia albicollis</i>	White-throated Sparrow
<i>Empidonax traillii</i>	Willow Flycatcher*
<i>Wilsonia pusilla</i>	Wilson's Warbler
<i>Troglodytes troglodytes</i>	Winter Wren
<i>Aix sponsa</i>	Wood Duck*
<i>Hylocichla mustelina</i>	Wood Thrush*
<i>Helmitheros vermivorus</i>	Worm-eating Warbler*
<i>Dendroica petechia</i>	Yellow Warbler*
<i>Empidonax flaviventris</i>	Yellow-bellied Flycatcher
<i>Sphyrapicus varius</i>	Yellow-bellied Sapsucker
<i>Coccyzus americanus</i>	Yellow-billed Cuckoo*
<i>Icteria virens</i>	Yellow-breasted Chat
<i>Dendroica coronata</i>	Yellow-rumped Warbler
<i>Vireo flavifrons</i>	Yellow-throated Vireo*
<i>Dendroica dominica</i>	Yellow-throated Warbler*



## MAMMALS POTENTIALLY WITHIN BERNARDSVILLE BOROUGH

Scientific Name	Common Name	Common
<i>Castor canadensis</i>	Beaver	
<i>Eptesicus fuscus</i>	Big Brown Bat	X
<i>Ursus americanus</i>	Black Bear	X
<i>Rattus rattus</i>	Black Rat	
<i>Rattus norvegicus</i>	Brown Rat	X
<i>Tamias striatus</i>	Eastern Chipmunk	X
<i>Sylvilagus floridanus</i>	Eastern Cottontail	X
<i>Canis latrans, var.</i>	Eastern Coyote	X
<i>Scalopus aquaticus</i>	Eastern Mole	X
<i>Pipistrellus subflavus</i>	Eastern Pipistrel	
<i>Urocyon cinereoargenteus</i>	Gray Fox	
<i>Sciurus carolinensis</i>	Gray Squirrel	X
<i>Lasiurus cinereus</i>	Hoary Bat	
<i>Mus musculus</i>	House Mouse	X
<i>Myotis sodalus</i>	Indiana Bat	X
<i>Myotis lucifugus</i>	Little Brown Bat	
<i>Sorex dispar</i>	Long-tailed Shrew	
<i>Mustela frenata</i>	Long-tailed Weasel	
<i>Sorex cinereus</i>	Masked Shrew	
<i>Zapus hudsonius</i>	Meadow Jumping Mouse	
<i>Microtus pennsylvanicus</i>	Meadow Vole	X
<i>Neovison vison</i>	Mink	
<i>Ondatra zibethicus</i>	Muskrat	X
<i>Plecotus auritus</i>	N. Long Eared Bat	
<i>Didelphis marsupialis</i>	Opossum	X
<i>Erethizon dorsatum</i>	Porcupine	
<i>Procyon lotor</i>	Raccoon	X
<i>Lasiurus borealis</i>	Red Bat	
<i>Vulpes vulpes</i>	Red Fox	X
<i>Tamiasciurus hudsonicus</i>	Red Squirrel	
<i>Lutra canadensis</i>	River Otter	
<i>Blarina brevicauda</i>	Short-tailed Shrew	X
<i>Mustela erminea</i>	Short-tailed Weasel	
<i>Lasionycteris noctivagans</i>	Silver-Haired Bat	
<i>Myotis leibii</i>	Small-Footed Myotis	
<i>Glaucomys volans</i>	Southern Flying Squirrel	
<i>Mephitis mephitis</i>	Striped Skunk	X
<i>Peromyscus leucopus</i>	White-footed Mouse	X
<i>Odocoileus virginianus</i>	White-tailed Deer	X
<i>Marmota monax</i>	Woodchuck	X
<i>Napaeozapus insignis</i>	Woodland Jumping Mouse	

## AMPHIBIANS POTENTIALLY WITHIN BERNARDSVILLE BOROUGH

Scientific Name	Common Name	Common
<i>Bufo americanus</i>	American Toad	X
<i>Rana catesbeiana</i>	Bullfrog	X
<i>Hemidactylium scutatum</i>	Four-toed Salamander	
<i>Bufo woodhousii fowleri</i>	Fowler's Toad	
<i>Rana clamitans melanota</i>	Green Frog	X
<i>Ambystoma opacum</i>	Marbled Salamander	X
<i>Pseudacris triseriata kalmi</i>	Nj Chorus Frog	
<i>Acris c. crepitans</i>	Northern Cricket Frog	
<i>Desmognathus f. fuscus</i>	Northern Dusky Salamander	X
<i>Hyla versicolor</i>	Northern Gray Treefrog	
<i>Pseudotriton r. ruber</i>	Northern Red Salamander	
<i>Plethodon g. glutinosus</i>	Northern Slimy Salamander	
<i>Hyla c. crucifer</i>	Northern Spring Peeper	X
<i>Eurycea b. bislineata</i>	Northern Two-lined Salamander	X
<i>Rana palustris</i>	Pickerel Frog	X
<i>Plethodon c. cinereus</i>	Red-Backed Salamander	X
<i>Notophthalmus v. viridescens</i>	Red-spotted Newt	
<i>Rana spenocephala</i>	Southern Leopard Frog	X
<i>Ambystoma maculatum</i>	Spotted Salamander	
<i>Rana sylvatica</i>	Wood Frog	X



## REPTILES POTENTIALLY WITHIN BERNARDSVILLE BOROUGH

Scientific Name	Common Name	Common
<i>Clemmys muhlenbergi</i>	Bog Turtle	
<i>Graptemys geographica</i>	Common Map Turtle	
<i>Terrapene c. carolina</i>	Eastern Box Turtle	X
<i>Thamnophis s. sirtalis</i>	Eastern Garter Snake	X
<i>Heterodon platyrhinos</i>	Eastern Hognose Snake	
<i>Kinosternon s. subrubrum</i>	Eastern Mud Turtle	
<i>Chrysemys p. picta</i>	Eastern Painted Turtle	X
<i>Thamnophis s. sauritus</i>	Eastern Ribbon Snake	
<i>Virginia v. valeriae</i>	Eastern Smooth Earth Snake	
<i>Carphophis a. amoenus</i>	Eastern Worm Snake	
<i>Coluber c. constrictor</i>	Northern Black Racer	X
<i>Storeria d. dekayi</i>	Northern Brown Snake	X
<i>Storeria o. occipitomaculata</i>	Northern Red-bellied Snake	
<i>Diadophis punctatus edwardsi</i>	Northern Ringneck Snake	
<i>Nerodia s. sipedon</i>	Northern Water Snake	X
<i>Pseudemys scripta elegans</i>	Red-eared Slider	X
<i>Chelydra s. serpentina</i>	Snapping Turtle	X
<i>Clemmys guttata</i>	Spotted Turtle	
<i>Sternotherus odoratus</i>	Stinkpot	X
<i>Clemmys insculpta</i>	Wood Turtle	
<i>Elaphe o. obsoleta</i>	Black Ratsnake	
<i>Lampropeltis t. triangulum</i>	Eastern Milk Snake	X
<i>Eumeces fasciatus</i>	Five-Lined Skink	
<i>Agkistrodon contortrix</i>	Northern Copperhead	

### Appendix A Sources:

Scott Angus, ASGECI Staff Biologist – Editor

NJDEP Reptiles and Amphibians of NJ (Schwartz and Golden, 2002)

Schermann-Hoffman Wildlife List Prepared by Steve Byland (2002) and M. Anderson and D.Freiday (2003)

# APPENDIX B

## NJDEP DATA MINER KNOWN CONTAMINATED SITES IN BERNARDSVILLE BOROUGH 2018



BY ED ENGLISH



## NJDEP Data Miner Known Contaminated Sites in Bernardsville Borough 2018

The sites below have a status of "Active," "Pending," "Closed with Conditions," and "Other" as noted in the table. Source: NJDEP Data Miner, July 2018

PI Number	PI Name	Address	Zip Code	Active	Pending	Closed	Closed with Conditions	Other
1779	LINDERS FRENCH CLEANERS	130 MORRISTOWN (RTE 202) & CHILDS RDS	07924	X				
20372	SOMERSET HILLS COUNTRY CLUB	180 MINE MOUNT RD	07924	X				
457337	35 PAGE HILL ROAD	35 PAGE HILL RD	07924	X				
606998	101 PEACHCROFT DRIVE	101 PEACHCROFT DR	07924	X				
613044	OLD MILL MANOR INC	25 MILL ST	07924	X				
G000031039	21 POST KUNHARDT ROAD	21 POST KUNHARDT RD	07924	X				
G000037453	TYSLEY ROAD GROUNDWATER CONTAMINATION	TYSLEY RD	07924	X				
G000011688	CROSS ESTATE LANDFILL	61C JOCKEY HOLLOW RD	07924		X			
G000023243	72-1 MINE BROOK ROAD	72-1 MINE BROOK RD	07924		X			
G000023878	15 OLD TOWN COURT	15 OLD TOWN CT	07924		X			
G000031702	30 MORRISTOWN ROAD	30 MORRISTOWN RD	07924		X			
G000033500	122 MORRISTOWN ROAD	122 MORRISTOWN RD	07924		X			
G000036259	15 TYSLEY RD	15 TYSLEY RD	07924		X			
G000040784	17 MORRISTOWN RD	17 MORRISTOWN RD	07924		X			
569779	51 CRESTVIEW DRIVE	51 CRESTVIEW DR	07924				X	
G000039612	RITE AID OF NJ INC	123 MORRISTOWN RD	07924					X

### Definitions from NJDEP (<https://www.state.nj.us/dep/srp/kcsnj/>):

"Active" sites are those sites having one or more active cases or remedial action permits where contamination has been confirmed. These sites may have any number of pending and/or closed cases.

"Pending" sites are those sites having one or more pending cases, no active cases, and any number of closed cases. Sites/cases with remedial action permits are not included in this category.

"Closed" sites are those sites having only closed cases. Sites in this classification have no active or pending cases. Sites/cases with remedial action permits are not included in this category.

"Closed with Conditions" sites are those sites that were remediated with engineering or institutional control and appropriately capped per the regulations in place at the time of such remedy.

"Other" is a category listed in NJDEP Data Miner's Known Contaminated Sites Municipal Report (All Sites) but is not defined by NJDEP on their website, and therefore, the category definition is unknown at this time.

Detailed information describing the case history at a site, including active cases, is available through the NJDEP Data Miner's Site Search Report or Active Case Report, by using the Site Remediation Program Interest (PI) Number, which is provided above report. The Data Miner reports will provide the current data available in the database: <https://www13.state.nj.us/DataMiner>

## NJDEP Data Miner Known Contaminated Sites in Bernardsville Borough 2018 - NO STATUS

The sites below were included in the NJDEP Data Miner report, however, no status was listed.

Source: NJDEP Data Miner, July 2018, <https://www13.state.nj.us/DataMiner>

PI Number	PI Name	Address	Zip Code	Active	Pending	Closed	Closed with Conditions	Other
988	LOVE VALERO	134 MORRISTOWN RD	07924					
2335	113 115 MORRISTOWN RD	113 115 MORRISTOWN RD	07924					
2725	AUTOMATIC WATER CONDITIONING CO	169 MORRISTOWN RD	07924					
3447	S SANDY SARANTOS	53 TOWER MTN DR	07924					
6468	BERNARDSVILLE FORD INC	27 29 MORRISTOWN RD	07924					
10531	WILLIAM J CHERNAUK MD	160-1 JOCKEY HOLLOW RD	07924					
10607	AL J RUSSO	51 OLD COLONY RD	07924					
11630	AL BRANDNER	18 ROLLING HILL RD	07924					
11693*	TEXACO SERVICE STATION #100110	RTE 202 & CHURCH ST	07924					
12053	DUFFY TRANSPORTATION	119 MORRISTOWN RD	07924					
12534	BERNARDSVILLE SEWER PLANT	166 MINE BROOK RD	07924					
12597	BERNARDSVILLE AMOCO / COMMERCIAL PROPERTY	82 MINE BROOK RD	07924					
22418	PUTNAM LEE CRAFTS	130 STEVENS LN	07931					
25049	BERNARDSVILLE BORO	166 MINE BROOK RD	07924					
27065	GERALD P CLANCY	230 MENDHAM RD	07924					
27216	WHITLOCK RESIDENCE	380 MINE BROOK RD	07924					
30896	NAPA AUTO PARTS	18 20 QUIMBY LN	07924					
32637	MORRISON AVE PUMPING STATION	MORRISON AVE	07924					
32638	CHILDS ROAD PUMPING STATION	122 MORRISTOWN RD & CHILDS RD	07924					
33935	BERNARDSVILLE PETROELUM GROUP NJ 0089	91 MINE BROOK RD	07924					
134051	COMMERCIAL PROPERTY	82 MINE BROOK RD	07924					
161470	GARDNER MOTOR COMPANY	65 MORRISTOWN RD	07924					
284753	SOMERSET HILLS CLASSICS	4 CENTER ST	07924					
294286	12 MINE BROOK ROAD	12 MINE BROOK RD	07924					
300003	THE PALMER SCHOOL	22 CHURCH ST	07924					
446703	THE CHILDRENS CTR	88 CLAREMONT RD	07924					
446776	ROBINS NEST NURSERY SCHOOL	321 MINE BROOK RD	07924					
446780	ST JOHNS ON THE MOUNTAIN NURSERY PROPOSED	379 MT HARMONY RD	07924					
509003	71 ANDERSON HILL ROAD	71 ANDERSON HILL RD	07924					
515311	10 BODNAR STREET	10 BODNAR ST	07924					



### **NJDEP Data Miner Known Contaminated Sites in Bernardsville Borough 2018 - NO STATUS**

The sites below were included in the NJDEP Data Miner report, however, no status was listed.

Source: NJDEP Data Miner, July 2018, <https://www13.state.nj.us/DataMiner>

PI Number	PI Name	Address	Zip Code	Active	Pending	Closed	Closed with Conditions	Other
521630	TEWKSBURY ASSOCIATES	17 23 RT 202 & 19 QUIMBY LN	07924-2112					
584408	COLONIAL CLEANERS	105 MORRISTOWN RD	07924					
600891	ESTATE OF MARION PETERS STINE	380 CLAREMONT RD	07924					
625297	41 TURNBULL LN	41 TURNBULL LN	07924					
735354	BAER CONCRETE	37 39 OLD QUARRY RD	07924					
G000007809	BERNARDSVILLE QUARRY LANDFILL	21 31 OLD QUARRY RD	07924					
G000011630	4 MINE BROOK ROAD	4 MINE BROOK RD	07924					
G000036365	SAINT JOHN ON THE MOUNTAIN CHURCH	379 MT HARMONY RD	07924					
G000037487	NOVO MOTORS	67 69 MINE BROOK RD	07924					
G000039276	BERNARDSVILLE VW	118 RTE 202	07924					

## NJDEP Data Miner Known Contaminated Sites in Bernardsville Borough 2018 - CLOSED

The sites below have status of "Closed" in the NJDEP Data Miner report.

Source: NJDEP Data Miner, July 2018, <https://www13.state.nj.us/DataMiner>

PI Number	PI Name	Address	Zip Code	Active	Pending	Closed	Closed with Conditions	Other
241	BERNARDSVILLE SERVICE STATION IN	RTE 202 & CHURCH ST	07920			X		
1794	CONKLING-MILLER CO	117 MORRISTOWN RD	07924			X		
7692	FORMER EXXON 30905	39 MINE BROOK RD	07924			X		
8078	BERNARDSVILLE CO (42221)	147 RT 202	07924			X		
10663	PILL HILL PUMP STATION	33 ANN ST & PILL HILL RD	07924			X		
10733	NEIL'S AUTOMOTIVE/BRIDGE GARAGE	2 MT AIRY RD	07924			X		
10761	BERNARDSVILLE FIRE CO	118 MINE BROOK RD	07924			X		
12067	BERNARDSVILLE BD OF ED	25 OLCOTT AVE	07924			X		
12796	NEW JERSEY BELL TELEPHONE COMPANY	147 RT 202	07924			X		
15351	NEAD SERVICE CORP	91 MINE BROOK RD	07924			X		
17670	MISTY ACRES	391 CLAREMONT RD	07924			X		
17902	FIRST UNION NATIONAL BANK	47 MINE BROAK RD	07924			X		
19567	KRJ CORP	135 MORRISTOWN RD	07924			X		
19730	BERNARDS AUTO PARTS	55 MINE BROOK RD	07924			X		
20713	BERNARDSVILLE SUBSTATION	RTE 202 & MT AIRY RD	07924			X		
23241	BERNARDSVILLE FORD INC	40 QUIMBY LN	07924			X		
23487	HIGHVIEW GARAGE	14 HIGHVIEW AVE	07924			X		
24202	VISITING NURSE ASS OF SOMERSET HILLS	12 OLCOTT AVE	07924			X		
30752	D&W LUDLOW ASSOCIATES	167 MORRISTOWN RD	07924			X		
31774	FELLOWSHIP DEACONRY INC	230 OLD ARMY RD	07924-0706			X		
32264	MELILLO RESIDENCE	90 BOULDERWOOD DR	07924			X		
32639	MAPLE VILLAGE PUMPING STATION	17 MAPLE VILLAGE COURT	07924			X		
33275	MEADOWBROOK INVENTIONS INC	260 MINE BROOK RD	07924			X		
155855	5 MENDHAM ROAD	5 MENDHAM RD	07924			X		
161905	553 MINE BROOK ROAD	553 MINE BROOK RD	07931			X		
172054*	6 PHEASANT HILL DRIVE	6 PHEASANT HILL DR	07931			X		
193480	90 WASHINGTON CORNER ROAD	90 WASHINGTON CORNER RD	07924			X		
194159	37 WEST STREET	37 WEST ST	07924			X		
194494	59 LIBERTY ROAD	59 LIBERTY RD	07924			X		
194795	75 MULLENS LANE	75 MULLENS LN	07924			X		
194905	76 MOUNT HARMONY ROAD	76 MOUNT HARMONY RD	07924			X		
195280	22 MAPLE VILLAGE COURT	22 MAPLE VILLAGE CT	07924			X		



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Source: NJDEP Data Miner, July 2018, <https://www13.state.nj.us/DataMiner>

PI Number	PI Name	Address	Zip Code	Active	Pending	Closed	Closed with Conditions	Other
196680	120 POST KUNHARDT ROAD	120 POST KUNHARDT RD	07924			X		
196916	75 DOUGLASS AVENUE	75 DOUGLASS AVE	07924			X		
203468	71 CRESTVIEW DRIVE	71 CRESTVIEW DR	07924			X		
207551	6 SUNSET DRIVE	6 SUNSET DR	07924			X		
207851	131 ANDERSON HILL ROAD	131 ANDERSON HILL RD	07981			X		
208230	15 ANN STREET	15 ANN ST	07924			X		
214356	41 HIGHVIEW AVENUE	41 HIGHVIEW AVE	07924			X		
214642	12 SUNSET DRIVE	12 SUNSET DR	07924			X		
217032	106 CAMPBELL ROAD	106 CAMPBELL RD	07924			X		
222618	115 HIGHVIEW AVENUE	115 HIGHVIEW AVE	07924			X		
225225	607 MINE BROOK ROAD	607 MINE BROOK RD	07924			X		
234132	205 MINE BROOK ROAD	205 MINE BROOK RD	07924			X		
234155	65 OLCOTT AVENUE	65 OLCOTT AVE	07924			X		
234654	36 OLD ARMY ROAD	36 OLD ARMY RD	07924			X		
235316	6 CHILDSWORTH AVENUE	6 CHILDSWORTH AVE	07924-2304			X		
236251	133 CLAREMONT ROAD	133 CLAREMONT RD	07924			X		
237078	69 MOUNT AIRY ROAD	69 MOUNT AIRY RD	07924-2722			X		
240790	65 WASHINGTON AVENUE	65 WASHINGTON AVE	07924			X		
244525	44 OLCOTT AVENUE	44 OLCOTT AVE	07924-2308			X		
246241	97 CLAREMONT ROAD	97 CLAREMONT RD	07924			X		
247096	12 OLD ARMY ROAD	12 OLD ARMY RD	07924-1844			X		
251387	160 LLOYD ROAD	160 LLOYD RD	07924			X		
254588	25 OLD ARMY ROAD	25 OLD ARMY RD	07924-1808			X		
257763	54 OLCOTT AVENUE	54 OLCOTT AVE	07924-2308			X		
258391	14 WOODLAND ROAD	14 WOODLAND RD	07924-2248			X		
259363	22 BODNER STREET	22 BODNER ST	07924-1860			X		
262564	BERNARDSVILLE FIRE CO #1	118 MINE BROOK RD	07924			X		
263989	166 PEACHCROFT DRIVE	166 PEACHCROFT DR	07924			X		
264281	26 CRESTVIEW DRIVE	26 CRESTVIEW DR	07929			X		
264404	11 DAYTON CRESCENT	11 DAYTON CRESENT	07924			X		
264959	15 SUNSET DRIVE	15 SUNSET DR	07924-2714			X		
266277	42 SENEY DRIVE	42 SENEY DR	07924-1817			X		

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PI Number	PI Name	Address	Zip Code	Active	Pending	Closed	Closed with Conditions	Other
279976	189 MINE BROOK ROAD	189 MINE BROOK RD	07924			X		
280760	90 MOUNT HARMONY ROAD	90 MT HARMONY RD	07924			X		
282136	141 PEACHCROFT ROAD	141 PEACHCROFT RD	07924			X		
283572	37 OLD COLONY ROAD	37 OLD COLONY RD	07924			X		
284616	27 PILL HILL ROAD	27 PILL HILL RD	07924			X		
284800	281 MENDHAM ROAD	281 MENDHAM RD	07924			X		
287688	1 CENTER STREET	1 CENTER ST	07924			X		
292120	84 SENEY DRIVE	84 SENEY DR	07924			X		
292125	15 HULL ROAD	15 HULL RD	07924			X		
292692	117 ANDERSON HILL ROAD	117 ANDERSON HILL RD	07924			X		
294373	181 MOUNT HARMONY RD	181 MT HARMONY RD	07924			X		
296047	16 SUNNYBROOK ROAD	16 SUNNYBROOK RD	07924			X		
297002	136 MOUNT HARMONY ROAD	136 MT HARMONY RD	07924			X		
298096	12 DAYTON CRESCENT	12 DAYTON CRESCENT	07924			X		
299256	NJ AUDUBON SOCIETY	51 HARDSCRABBLE RD	07924			X		
302035	104 MINE BROOK ROAD	104 MINE BROOK RD	07924			X		
302857	52 OLCOTT AVENUE	52 OLCOTT AVE	07924			X		
332642	7 SUNSET DRIVE	7 SUNSET DR	07924			X		
421493	44 OLD COLONY ROAD	44 OLD COLONY RD	07924			X		
422081	53A BERNARDS AVENUE	53A BERNARDS AVE	07924			X		
422424	496 MINE BROOK ROAD	496 MINE BROOK RD	07924			X		
422461	56 MINE MOUNT ROAD	56 MINE MOUNT RD	07924			X		
434877	31 PEACHCROFT DRIVE	31 PEACHCROFT DR	07924			X		
435384	98 SENEY DRIVE	98 SENEY DR	07924			X		
435733	9 SUNSET DRIVE	9 SUNSET DR	07924			X		
436042	86 DRYDEN ROAD	86 DRYDEN RD	07924			X		
436712	49 PHEASANT HILL DRIVE	49 PHEASANT HILL DR	07931			X		
440030	29 MAPLE VILLAGE COURT	29 MAPLE VILLAGE CT	07924			X		
443341	38 SOUTHFIELD DRIVE	38 SOUTHFIELD DR	07924			X		
448476	12 SUNNYBROOK ROAD	12 SUNNYBROOK RD	07924			X		
450181	219 MINE BROOK ROAD	219 MINE BROOK RD	07924			X		



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PI Number	PI Name	Address	Zip Code	Active	Pending	Closed	Closed with Conditions	Other
451518	29 ANN STREET	29 ANN ST	07924			X		
453599	5 SOMERSET AVENUE	5 SOMERSET AVE	07924			X		
458024	59-65 MINE BROOK ROAD	59-65 MINE BROOK RD	07924			X		
458029	591 MINE BROOK ROAD	591 MINE BROOK RD	07924			X		
459702	34 OLD FORT ROAD	34 OLD FORT RD	07924			X		
459758	57 OLD ARMY ROAD	57 OLD ARMY RD	07924			X		
460095	7 SOMERSET AVENUE	7 SOMERSET AVE	07924			X		
461705	580 US HIGHWAY 202	580 US HWY 202	07931			X		
464629	DRYER WALTER	6 ORCHARD HILL RD	07924			X		
470399	33 OLD ARMY ROAD	33 OLD ARMY RD	07924			X		
470839	20 MINE BROOK ROAD	20 MINE BROOK RD	07924			X		
471002	24 HIGHVIEW AVENUE	24 HIGHVIEW AVE	07924			X		
471628	330 MENDHAM ROAD	330 MENDHAM RD	07924			X		
477904	47 MINE MOUNT ROAD	47 MIN MOUNT RD	07924			X		
478048	110 POST KUNHARDT ROAD	110 POST KUNHARDT RD	07921			X		
478880	7 SENEY DRIVE	7 SENEY DR	07924			X		
485091	190 CLAREMONT ROAD	190 CLAREMONT RD	07924			X		
492421	LYONS PAUL F	467 MINE BROOK RD	07924			X		
493312	59 PAGE HILL ROAD	59 PAGE HILL RD	07931			X		
493815	135 CLAREMONT ROAD	135 CLAREMONT RD	07924			X		
497709	40 TURNBULL LANE	40 TURNBULL LN	07924			X		
498199	86-4 DOUGLASS AVENUE	86-4 DOUGLASS AVE	07924			X		
498595	303 HARDSCRABBLE ROAD	303 HARDSCRABBLE RD	07924			X		
498864	144 1 ROUND TOP ROAD	144 1 ROUND TOP RD	08924			X		
507163	55 SENEY DRIVE	55 SENEY DR	07924			X		
511215	100 CARRIAGE HOUSE ROAD	100 CARRIAGE HOUSE RD	07924			X		
513285	220 CHESTNUT AVENUE	220 CHESTNUT AVE	07924			X		
514612	90 BALLANTINE ROAD	90 BALLANTINE RD	07924			X		
516077	11 OLCOTT LANE	11 OLCOTT LN	07924			X		
517147	37 OLD FORT ROAD	37 OLD FORT RD	07924			X		
518510	33 OLD COLONY ROAD	33 OLD COLONY RD	07924			X		

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PI Number	PI Name	Address	Zip Code	Active	Pending	Closed	Closed with Conditions	Other
520677	20 MAPLE VILLAGE COURT	20 MAPLE VILLAGE CT	07924			X		
526982	101 ROUND TOP ROAD	101 ROUND TOP RD	07924			X		
527320	71 MOUNT HARMONY ROAD	71 MT HARMONY RD	07924			X		
533025	11 CENTER STREET	11 CENTER ST	07924			X		
534465	72 OLD ARMY ROAD	72 OLD ARMY RD	07924			X		
536309	39 SYCAMORE HILL ROAD	39 SYCAMORE HILL RD	07924			X		
542663	28 POST KENNEL ROAD	28 POST KENNEL RD	07931			X		
546347	105 SENEY DRIVE EXTENSION	105 SENEY DR EXT	07924			X		
546574	37 MAPLE VILLAGE COURT	37 MAPLE VILLAGE CT	07924			X		
546759	81 MOUNT HARMONY ROAD	81 MOUNT HARMONY RD	07924			X		
547320	59 DAYTON CRESCENT	59 DAYTON CRESENT	07924			X		
547388	30 COUNTRY LANE	30 COUNTRY LN	07920			X		
548139	19 PHEASANT HILL DRIVE	19 PHEASANT HILL DR	07931			X		
548987	101 MINE BROOK ROAD	101 MINE BROOK RD	07924			X		
551224	12 ELMER AVENUE	12 ELMER AVE	07924			X		
551347	170 MOUNT HARMONY ROAD	170 MOUNT HARMONY RD	07924			X		
551357	39 MAPLE STREET	39 MAPLE ST	07924			X		
551540	20 PAGE HILL ROAD	20 PAGE HILL RD	07931			X		
553134	119 RIPPLING BROOK WAY	119 RIPPLING BROOK WAY	07924			X		
562817	206 N FINLEY AVE	206 N FINLEY AVE	07924			X		
562873	13 GROVE STREET	13 GRV ST	07924			X		
564284	40 OLD COLONY ROAD	40 OLD COLONY RD	07924			X		
567749	172 174 DOUGLAS AVENUE	172 174 DOUGLAS AVE	07924			X		
569111	18 20 MINE MOUNT ROAD	18 20 MINE MOUNT RD	07924			X		
570230	221 CLAREMONT ROAD	221 CLAREMONT ROAD	07924			X		
571151	3 TIMBER ROCK TRAIL	3 TIMBER ROCK TRAIL	07924			X		
574124	15 AMBAR PLACE	15 AMBAR PL	07924			X		
575623	20 DRYDEN ROAD	20 DRYDEN RD	07924			X		
575954	18 MULLENS LANE	18 MULLENS LANE	07924			X		
576722	3 MENDHAM ROAD	3 MENDHAN ROAD	07924			X		
579129	140 MOUNTAIN TOP ROAD	140 MOUNTAIN TOP RD	07924			X		
582007	24 LIBERTY ROAD	24 LIBERTY RD	07924			X		



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PI Number	PI Name	Address	Zip Code	Active	Pending	Closed	Closed with Conditions	Other
585534	42 OLD WOOD ROAD	42 OLD WOOD RD	07924			X		
586930	65 MOUNT AIRY ROAD	65 MOUNT AIRY ROAD	07924			X		
587153	105 RIPPLING BROOK WAY	105 RIPPLING BROOK WAY	07924			X		
588470	52 MENDHAM ROAD	52 MENDHAM RD	07924			X		
591031	170 TOP ROUND ROAD	170 TOP ROUND RD	07924			X		
593205	10 PFIZER ROAD	10 PFIZER RD	07924			X		
593363	70 CAMPBELL ROAD	70 CAMPBELL RD	07924			X		
599164	45 MAPLE VILLAGE COURT	45 MAPLE VILLAGE CT	07924			X		
604648	8 OLCOTT LANE	8 OLCOTT LN	07924			X		
607282	155 CLAREMONT ROAD	155 CLAREMONT RD	07924			X		
608420	59 HIGHVIEW AVENUE	59 HIGHVIEW AVE	07924			X		
609756	100 OLD ARMY ROAD	100 OLD ARMY RD	07924			X		
612347	8 OLCOTT AVENUE	8 OLCOTT AVE	07924			X		
612365	14 SUNSET DRIVE	14 SUNSET DR	07924			X		
614952	270 MENDHAM ROAD	270 MENDHAM RD	07924			X		
615149	35 CHILDSWORTH AVENUE	35 CHILDSWORTH AVE	07924			X		
616674	110 WASHINGTON CORNER ROAD	110 WASHINGTON CORNER RD	07924			X		
619677	221 DRYDEN ROAD	221 DRYDEN RD	07924			X		
623812	63 CRESTVIEW DRIVE	63 CRESTVIEW DR	07924			X		
623857	43 OLD WOOD ROAD	43 OLD WOOD RD	07924			X		
623913	10 SUNNYBROOK ROAD	10 SUNNYBROOK RD	07924			X		
624898	233 CLAREMONT ROAD	233 CLAREMONT RD	07924			X		
625259	12 MAPLE VILLAGE COURT	12 MAPLE VILLAGE CT	07924			X		
625275	67 CHILDSWORTH AVENUE	67 CHILDSWORTH AVE	07924			X		
625296	1-2 CHAPIN ROAD	1-2 CHAPIN RD	07924			X		
626361	22 MORRISTOWN ROAD	22 MORRISTOWN RD	07924			X		
628744	15 WEST STREET	15 WEST ST	07924			X		
631143	3 LINDABURY AVENUE	3 LINDABURY AVE	07924			X		
631391	41 PILL HILL ROAD	41 PILL HILL RD	07924			X		
642532	120 ROUND TOP ROAD	120 ROUND TOP RD	07924			X		
646684	46 2 POST KENNEL ROAD	46 2 POST KENNEL RD	07924			X		
649854	11 PHEASANT HILL DRIVE	11 PHEASANT HILL DR	07931			X		

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PI Number	PI Name	Address	Zip Code	Active	Pending	Closed	Closed with Conditions	Other
652247	67 RAVINE LAKE ROAD	67 RAVINE LAKE RD	07924			X		
657441	25 JEAN PLACE	25 JEAN PL	07924			X		
660444	MOUNT HARMONY ASSOCIATES LLC	91 MT HARMONY RD	07924			X		
664697	15 SPRUCE PLACE	15 SPRUCE PL	07924			X		
666700	168 MOUNT AIRY ROAD	168 MT AIRY RD	07924			X		
676404	74 BALLANTINE ROAD	74 BALLANTINE RD	07924			X		
687761	85-5 MOUNTAINTOP ROAD	85-5 MOUNTAINTOP RD	07924			X		
687851	682 MINE BROOK ROAD	682 MINE BROOK RD	07931			X		
693935	68 ANDERSON HILL ROAD	68 ANDERSON HILL RD	07924			X		
696711	4 3 ORCHARD HILL ROAD	4 3 ORCHARD HILL RD	07924			X		
702268	93 MINE MOUNT ROAD	93 MINE MOUNT RD	07924			X		
707916	36 SOUTHFIELD ROAD	36 SOUTHFIELD RD	07924			X		
713275	90 LLOYD ROAD	90 LLOYD RD	07924			X		
723828	12 MINE MOUNT ROAD	12 MINE MOUNT RD	07924			X		
726659	24 WOODLAND ROAD	24 WOODLAND RD	07924			X		
730351	22 ESSEX AVENUE	22 ESSEX AVE	07924			X		
732426	23 ANDERSON HILL ROAD	23 ANDERSON HILL RD	07924			X		
734702	211 JOCKY HOLLOW ROAD	211 JOCKY HOLW RD	07924			X		
736571	35 LIBERTY ROAD	35 LIBERTY RD	07924			X		
741891	117 MENDHAM ROAD	117 MENDHAM RD	07924			X		
743192	6 CRESTVIEW DRIVE	6 CRESTVIEW DR	07924			X		
748763	41 OLD COLONY ROAD	41 OLD COLONY RD	07924			X		
755069	21 OLD ARMY ROAD	21 OLD ARMY RD	07924			X		
774715	23 CRESTVIEW DRIVE	23 CRESTVIEW DR	07924			X		
G000002142	FERRANTE QUARRY	MINE BROOK RD	07924			X		
G000008852	BERNARDSVILLE SANITARY LANDFILL	PILL HILL RD	07924			X		
G000011684	11 HARDSCRABBLE ROAD	11 HARDSCRABBLE RD	07924			X		
G000013423	KLAUS HILGERS	14 DAYTON ST	07924			X		
G000022802	26 CHURCH STREET	26 CHURCH ST	07924			X		



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PI Number	PI Name	Address	Zip Code	Active	Pending	Closed	Closed with Conditions	Other
G000023936	303-1 HARDSCRABBLE ROAD	303-1 HARDSCRABBLE RD	07924			X		
G000024201	21 SOUTHFIELD DRIVE	21 SOUTHFIELD DR	07924			X		
G000026836	16 BELL TERRACE	16 BELL TERR	07924			X		
G000027099	41 CHILDSWORTH ROAD	41 CHILDSWORTH RD	07924			X		
G000027888	25 CLAREMONT ROAD	25 CLAREMONT RD	07924			X		
G000029327	74 MENDHAM ROAD	74 MENDHAM RD	07924			X		
G000029892	90 POST KENNEL ROAD	90 POST KENNEL RD	07924			X		
G000031345	91 STEVENS LANE	91 STEVENS LN	07924			X		
G000031876	120 STEVENS LANE	120 STEVENS LN	07924			X		
G000032103	60 LLOYD ROAD	60 LLOYD RD	07924			X		
G000033355	83 LIBERTY ROAD	83 LIBERTY RD	07924			X		
G000043334	77 OLD FORT ROAD	77 OLD FORT RD	07924			X		
G000044550	40 CHILDSWORTH AVE	40 CHILDSWORTH AVE	07924			X		
G000044733	19 MAPLE ST	19 MAPLE ST	07924			X		
G000044879	24 CHILDSWORTH AVE	24 CHILDSWORTH AVE	07924			X		
G000060687	27 MINE BROOK ROAD	27 MINE BROOK RD	07924			X		
G000060762	61 STEVENS LN	61 STEVENS LN	07924			X		
G000062848	34 LINDABURY AVE	34 LINDABURY AVE	07924			X		
G000063151	230 MT HARMONY RD	230 MT HARMONY RD	07924			X		

# APPENDIX C

## CORRESPONDENCE



**BERNARDSVILLE PUBLIC LIBRARY**  
BY KRISTI MACDONALD





State of New Jersey  
Mail Code 501-04  
Department of Environmental Protection  
Natural Heritage Data Request Form  
The New Jersey Natural Heritage Program  
DEP-Office of Natural Lands Management  
P.O. Box 420, Trenton, New Jersey 08625-0420  
(609) 984-1339  
Fax No.: (609) 984-1427



PLEASE PRINT AND SUBMIT COMPLETED FORM WITH ATTACHMENTS TO THE ADDRESS ABOVE  
(Fields shown in bold font must be completed in order for data request to be processed.)

1. **Name:** Thomas Hopper **Agency/Company:** Princeton Hydro, LLC.  
**Address:** 1108 Old York Road, Suite 1, PO Box 720 **City:** Ringoes  
**State:** NJ **Zip:** 08551 **Daytime Phone:** (908) 237-5660 **Ext.:** \_\_\_\_\_  
**Cell Phone:** \_\_\_\_\_ **Email:** thopper@princetonhydro.com
2. **Project Name:** Preparation of an Environmental Resource Inventory for the Borough of Bernardsville  
**Municipality(ies):** Borough of Bernardsville **County(ies):** Somerset County  
**Block(s):** Entire Borough **Lot(s):** Entire Borough  
**N.A.D. 1983 State Plane Coordinates (feet) 6 digits only:** **E (x):** 466,451 **N (y):** 689,645
3. **Project Description:** An Environmental Resource Inventory is being prepared for the Borough of Bernardsville, T&E species will be incorporated into this inventory.
4. **USGS Quad:** ☒ A copy of a USGS quad map(s) that clearly indicates the site boundary is included with this form. Specify name of USGS quad(s): Bernardsville, Gladstone, & Mendham  
(USGS quad maps are required, unless prior arrangements have been made to submit site boundaries in an alternate format. Responses will be delayed if site locations are not delineated in a suitable format.)
5. **Flood Hazard Control Act Use:** **Is this request submitted as part of a Flood Hazard Area Control Act rule (N.J.A.C. 7:13) application?** Yes ☐ No ☒
6. **Acknowledgement & Signature:** Any material supplied by the Office of Natural Lands Management will not be published without crediting the Natural Heritage Database as the source of the material. It is understood that there will be a charge of \$70.00 per hour for the services requested. An invoice will be sent with the request response and payment should be made by check or money order payable to "Office of Natural Lands Management."

Signed  Date 5/10/2018

**Time Frame for Response:**

Data requests are processed in the order in which they are received; please allow 30 days for response. If you would like to send in your data request via email, you may do so by sending it to [Natlands@dep.nj.gov](mailto:Natlands@dep.nj.gov). Due to the number of attachments, we cannot fax results. Unless you specifically request that your response be mailed or the response is unusually large, your response will be emailed to the address you provide.

**FOR OFFICE USE ONLY**

DATE RECEIVED \_\_\_\_\_

Item Code: REG \_\_\_\_\_ ST \_\_\_\_\_ RTC \_\_\_\_\_ NC \_\_\_\_\_ REGeo \_\_\_\_\_ STEO \_\_\_\_\_ RTCEO \_\_\_\_\_ NCEO \_\_\_\_\_

Hrs: \_\_\_\_\_

Project Code: \_\_\_\_\_ Inv. #: \_\_\_\_\_



## State of New Jersey

MAIL CODE 501-04

DEPARTMENT OF ENVIRONMENTAL PROTECTION

DIVISION OF PARKS & FORESTRY

NEW JERSEY FOREST SERVICE

OFFICE OF NATURAL LANDS MANAGEMENT

P.O. BOX 420

TRENTON, NJ 08625-0420

Tel. (609) 984-1339 Fax (609) 984-0427

PHILIP D. MURPHY

*Governor*

SHEILA Y. OLIVER

*Lt. Governor*

CATHERINE R. McCABE

*Acting Commissioner*

May 17, 2018

Thomas Hopper  
Princeton Hydro, LLC  
1108 Old York Road, Suite 1, P.O. Box 720  
Ringoes, NJ 08551

Re: Preparation of an Environmental Resource Inventory for the Borough of Bernardsville  
Bernardsville Borough, Somerset County

Dear Mr. Hopper:

Thank you for your data request regarding rare species information for the above referenced project site.

Searches of the Natural Heritage Database and the Landscape Project (Version 3.3) are based on a representation of the boundaries of your project site in our Geographic Information System (GIS). We make every effort to accurately transfer your project bounds from the topographic map(s) submitted with the Natural Heritage Data Request Form into our Geographic Information System. We do not typically verify that your project bounds are accurate, or check them against other sources.

We have checked the Landscape Project habitat mapping and the Biotics Database for occurrences of any rare wildlife species or wildlife habitat on the referenced site. The Natural Heritage Database was searched for occurrences of rare plant species or ecological communities that may be on the project site. Please refer to Table 1 (attached) to determine if any rare plant species, ecological communities, or rare wildlife species or wildlife habitat are documented on site. A detailed report is provided for each category coded as 'Yes' in Table 1.

We have also checked the Landscape Project habitat mapping and Biotics Database for occurrences of rare wildlife species or wildlife habitat in the immediate vicinity (within ¼ mile) of the referenced site. Additionally, the Natural Heritage Database was checked for occurrences of rare plant species or ecological communities within ¼ mile of the site. Please refer to Table 2 (attached) to determine if any rare plant species, ecological communities, or rare wildlife species or wildlife habitat are documented within the immediate vicinity of the site. Detailed reports are provided for all categories coded as 'Yes' in Table 2. These reports may include species that have also been documented on the project site.

The Natural Heritage Program reviews its data periodically to identify priority sites for natural diversity in the State. Included as priority sites are some of the State's best habitats for rare and endangered species and ecological communities. Please refer to Tables 1 and 2 (attached) to determine if any priority sites are located on or in the immediate vicinity of the site.

A list of rare plant species and ecological communities that have been documented from the county (or counties), referenced above, can be downloaded from <http://www.state.nj.us/dep/parksandforests/natural/heritage/countylist.html>. If suitable habitat is present at the project site, the species in that list have potential to be present.

Status and rank codes used in the tables and lists are defined in EXPLANATION OF CODES USED IN NATURAL HERITAGE REPORTS, which can be downloaded from [http://www.state.nj.us/dep/parksandforests/natural/heritage/nhpcodes\\_2010.pdf](http://www.state.nj.us/dep/parksandforests/natural/heritage/nhpcodes_2010.pdf).

Beginning May 9, 2017, the Natural Heritage Program reports for wildlife species will utilize data from Landscape Project Version 3.3. If you have questions concerning the wildlife records or wildlife species mentioned in this response, we recommend that you visit the interactive web application at the following URL,

NHP File No. 18-4007465-14176



<https://njdep.maps.arcgis.com/apps/webappviewer/index.html?id=0e6a44098c524ed99bf739953cb4d4c7>, or contact the Division of Fish and Wildlife, Endangered and Nongame Species Program at (609) 292-9400.

For additional information regarding any Federally listed plant or animal species, please contact the U.S. Fish & Wildlife Service, New Jersey Field Office at <http://www.fws.gov/northeast/njfieldoffice/endangered/consultation.html>.

PLEASE SEE 'CAUTIONS AND RESTRICTIONS ON NHP DATA', which can be downloaded from <http://www.state.nj.us/dep/parksandforests/natural/heritage/newcaution2008.pdf>.

Thank you for consulting the Natural Heritage Program. The attached invoice details the payment due for processing this data request. Feel free to contact us again regarding any future data requests.

Sincerely,

A handwritten signature in blue ink, appearing to read 'R. Cartica', with a long horizontal flourish extending to the right.

Robert J. Cartica  
Administrator

c: NHP File No. 18-4007465-14176

Mail Code 501-04 Department of Environmental Protection New Jersey Forest Service Office of Natural Lands Management P.O. Box 420 Trenton, New Jersey 08625-0420 Tel. (609) 984-1339      Fax. (609) 984-1427		<h1 style="text-align: right; margin: 0;"><i>Invoice</i></h1>	
		Date	Invoice #
		5/17/2018	14176
Bill to: Princeton Hydro, LLC 1108 Old York Road, Suite 1, P.O. Box 720 Ringoes, NJ 08551		Make check payable to: <b>DEP - Office of Natural Lands Management</b> And forward with a copy of this statement to: <b>Mail Code 501-04</b> <b>Office of Natural Lands Management</b> <b>P.O. Box 420 Trenton, New Jersey 08625-0420</b>	
Quantity (hrs.)	Description	Rate (per hr.)	Amount
1	Natural Heritage Database search for locational information of rare species and ecological communities. Project: 18-4007465-14176	\$ 70.00	\$ 70.00
Thomas Hopper Project Name: Preparation of an Environmental Resource Inventory for the Borough of Bernardsville		<b>Total</b>	\$ 70.00



***Table 1: On Site Data Request Search Results (6 Possible Reports)***

<b><u>Report Name</u></b>	<b><u>Included</u></b>	<b><u>Number of Pages</u></b>
1. Possibly on Project Site Based on Search of Natural Heritage Database: Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database	No	0 pages included
2. Natural Heritage Priority Sites On Site	No	0 pages included
3. Rare Wildlife Species or Wildlife Habitat on the Project Site Based on Search of Landscape Project 3.3 Species Based Patches	Yes	2 page(s) included
4. Vernal Pool Habitat on the Project Site Based on Search of Landscape Project 3.3	Yes	1 page(s) included
5. Rare Wildlife Species or Wildlife Habitat on the Project Site Based on Search of Landscape Project 3.3 Stream Habitat File	No	0 pages included
6. Other Animal Species On the Project Site Based on Additional Species Tracked by Endangered and Nongame Species Program	Yes	1 page(s) included

<p align="center"><b>Rare Wildlife Species or Wildlife Habitat on the Project Site Based on Search of Landscape Project 3.3 Species Based Patches</b></p>
---

Class	Common Name	Scientific Name	Feature Type	Rank	Federal Protection Status	State Protection Status	Grank	Srank
<i>Aves</i>								
	Bald Eagle	Haliaeetus leucocephalus	Foraging	4	NA	State Endangered	G5	S1B,S2N
	Bald Eagle	Haliaeetus leucocephalus	Nest	4	NA	State Endangered	G5	S1B,S2N
	Barred Owl	Strix varia	Non-breeding Sighting	3	NA	State Threatened	G5	S2B,S2N
	Brown Thrasher	Toxostoma rufum	Breeding Sighting	2	NA	Special Concern	G5	S3B,S4N
	Cooper's Hawk	Accipiter cooperii	Nest	2	NA	Special Concern	G5	S3B,S4N
	Great Blue Heron	Ardea herodias	Foraging	2	NA	Special Concern	G5	S3B,S4N
	Red-shouldered Hawk	Buteo lineatus	Nest	4	NA	State Endangered	G5	S1B,S3N
	Veery	Catharus fuscescens	Breeding Sighting	2	NA	Special Concern	G5	S3B,S4N
	Wood Thrush	Hylocichla mustelina	Breeding Sighting	2	NA	Special Concern	G4	S3B,S4N
	Worm-eating Warbler	Helmitheros vermivorum	Breeding Sighting	2	NA	Special Concern	G5	S3B,S4N
<i>Mammalia</i>								
	Bobcat	Lynx rufus	On Road	4	NA	State Endangered	G5	S2



<p align="center"><b>Rare Wildlife Species or Wildlife Habitat on the Project Site Based on Search of Landscape Project 3.3 Species Based Patches</b></p>
---

Class	Common Name	Scientific Name	Feature Type	Rank	Federal Protection Status	State Protection Status	Grank	Srank
<i>Reptilia</i>	Indiana Bat	Myotis sodalis	Active Season Sighting	5	Federally Listed Endangered	State Endangered	G2	S1
	Indiana Bat	Myotis sodalis	Maternity Colony	5	Federally Listed Endangered	State Endangered	G2	S1
	Indiana Bat	Myotis sodalis	Roost Site	5	Federally Listed Endangered	State Endangered	G2	S1
	Northern Myotis	Myotis septentrionalis	Active Season Sighting	5	Federally Listed Threatened	NA	G1G2	S1
	Eastern Box Turtle	Terrapene carolina carolina	Occupied Habitat	2	NA	Special Concern	G5T5	S3
	Wood Turtle	Glyptemys insculpta	Occupied Habitat	3	NA	State Threatened	G3	S2

<p><b>Vernal Pool Habitat on the Project Site Based on Search of Landscape Project 3.3</b></p>
--

<b>Vernal Pool Habitat Type</b>	<b>Vernal Pool Habitat ID</b>
Potential vernal habitat area	1954
Potential vernal habitat area	1958
Potential vernal habitat area	1964
Potential vernal habitat area	1970
Potential vernal habitat area	1975
Potential vernal habitat area	1979
Total number of records:	6



<p style="text-align: center;"><b>Other Animal Species On the Project Site Based on Additional Species Tracked by Endangered and Nongame Species Program</b></p>
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Scientific Name	Common Name	Federal Protection Status	State Protection Status	Grank	Srank
<i>Vertebrate Animals</i>					
Eptesicus fuscus	Big Brown Bat			G5	S3
Lasiurus borealis	Red Bat			G3G4	S3
Myotis lucifugus	Little Brown Bat			G3	S1
Perimyotis subflavus	Tricolored Bat			G2G3	S1
Total number of records:	4				

***Table 2: Vicinity Data Request Search Results (6 possible reports)***

<b><u>Report Name</u></b>	<b><u>Included</u></b>	<b><u>Number of Pages</u></b>
1. Immediate Vicinity of the Project Site Based on Search of Natural Heritage Database: Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database	No	0 pages included
2. Natural Heritage Priority Sites within the Immediate Vicinity	No	0 pages included
3. Rare Wildlife Species or Wildlife Habitat Within the Immediate Vicinity of the Project Site Based on Search of Landscape Project 3.3 Species Based Patches	Yes	2 page(s) included
4. Vernal Pool Habitat In the Immediate Vicinity of Project Site Based on Search of Landscape Project 3.3	Yes	1 page(s) included
5. Rare Wildlife Species or Wildlife Habitat In the Immediate Vicinity of the Project Site Based on Search of Landscape Project 3.3 Stream Habitat File	No	0 pages included
6. Other Animal Species In the Immediate Vicinity of the Project Site Based on Additional Species Tracked by Endangered and Nongame Species Program	Yes	1 page(s) included



<p align="center"><b>Rare Wildlife Species or Wildlife Habitat Within the Immediate Vicinity of the Project Site Based on Search of Landscape Project 3.3 Species Based Patches</b></p>
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Class	Common Name	Scientific Name	Feature Type	Rank	Federal Protection Status	State Protection Status	Grank	Srank
<b><i>Aves</i></b>								
	Bald Eagle	Haliaeetus leucocephalus	Foraging	4	NA	State Endangered	G5	S1B,S2N
	Bald Eagle	Haliaeetus leucocephalus	Nest	4	NA	State Endangered	G5	S1B,S2N
	Barred Owl	Strix varia	Breeding Sighting	3	NA	State Threatened	G5	S2B,S2N
	Barred Owl	Strix varia	Non-breeding Sighting	3	NA	State Threatened	G5	S2B,S2N
	Brown Thrasher	Toxostoma rufum	Breeding Sighting	2	NA	Special Concern	G5	S3B,S4N
	Cooper's Hawk	Accipiter cooperii	Nest	2	NA	Special Concern	G5	S3B,S4N
	Great Blue Heron	Ardea herodias	Foraging	2	NA	Special Concern	G5	S3B,S4N
	Red-shouldered Hawk	Buteo lineatus	Nest	4	NA	State Endangered	G5	S1B,S3N
	Veery	Catharus fuscescens	Breeding Sighting	2	NA	Special Concern	G5	S3B,S4N
	Wood Thrush	Hylocichla mustelina	Breeding Sighting	2	NA	Special Concern	G4	S3B,S4N
	Worm-eating Warbler	Helmitheros vermivorum	Breeding Sighting	2	NA	Special Concern	G5	S3B,S4N
<b><i>Mammalia</i></b>								
	Bobcat	Lynx rufus	On Road	4	NA	State Endangered	G5	S2
	Indiana Bat	Myotis sodalis	Active Season Sighting	5	Federally Listed Endangered	State Endangered	G2	S1

<p align="center"><b>Rare Wildlife Species or Wildlife Habitat Within the Immediate Vicinity of the Project Site Based on Search of Landscape Project 3.3 Species Based Patches</b></p>
---

Class	Common Name	Scientific Name	Feature Type	Rank	Federal Protection Status	State Protection Status	Grank	Srank
<b>Reptilia</b>	Indiana Bat	Myotis sodalis	Maternity Colony	5	Federally Listed Endangered	State Endangered	G2	S1
	Indiana Bat	Myotis sodalis	Roost Site	5	Federally Listed Endangered	State Endangered	G2	S1
	Northern Myotis	Myotis septentrionalis	Active Season Sighting	5	Federally Listed Threatened	NA	G1G2	S1
	Eastern Box Turtle	Terrapene carolina carolina	Occupied Habitat	2	NA	Special Concern	G5T5	S3
	Spotted Turtle	Clemmys guttata	Occupied Habitat	2	NA	Special Concern	G5	S3
	Wood Turtle	Glyptemys insculpta	Occupied Habitat	3	NA	State Threatened	G3	S2



**Vernal Pool Habitat  
In the Immediate Vicinity of  
Project Site Based on Search of  
Landscape Project 3.3**

**Vernal Pool Habitat Type**

**Vernal Pool Habitat ID**

Potential vernal habitat area

1954

Total number of records: 1

<p align="center"><b>Other Animal Species</b>  <b>In the Immediate Vicinity of the Project Site Based on</b>  <b>Additional Species Tracked by</b>  <b>Endangered and Nongame Species Program</b></p>
---

Scientific Name	Common Name	Federal Protection Status	State Protection Status	Grank	Srank
<i>Vertebrate Animals</i>					
Eptesicus fuscus	Big Brown Bat			G5	S3
Lasiurus borealis	Red Bat			G3G4	S3
Myotis lucifugus	Little Brown Bat			G3	S1
Total number of records:	3				



**Policy Committee Recommendation**  
**Terms and Conditions for the Use of Images**  
**Bernardsville Public Library**  
*Adopted August 21, 2012*

**Donations Schedule**

Commercial use:  
Non-exclusive, one-time use, per image .....\$100

Personal, educational or non-profit use:  
Non-exclusive, one-time use, per image.....\$20

**I have read the above and agree to the conditions described:**

Name: Dana Patterson Date: 10/25/18

Signature: Dana Patterson

Organization: Princeton Hydro, requesting on behalf of the Borough of Bernardsville's Environmental Commission.

Address:  
1200 Liberty Place  
Sicklerville, NJ 08012

Telephone Number: 856-818-9251

Email / Web Site: [dpatterson@princetonhydro.com](mailto:dpatterson@princetonhydro.com) // [www.PrincetonHydro.com](http://www.PrincetonHydro.com)

Purpose of Use:  
For inclusion in the Bernardsville 2018 Environmental Resource Inventory Report.

**Material to be used (see Page 3 if additional space is needed):**

1971 Old Library Photo  
St. Bernards Church Photo  
Train Station Photo  
Early 1900s Olcott Avenue - Historic District today  
Dunster Squibb House, Mine Brook Rd  
Bernardsville Borough Hall 2017  
Borough Pond, Nervine Park 2017  
Meadowbrook Farm, Mine Brook Rd early 1900s  
Reynolds-Scherman House, Hardscrabble Rd. 1963  
Jockey Hollow Hut

**Amount Due**

*for use*  
*per [initials]*  
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**Total** \_\_\_\_\_

Authorized by: ALEXANDRA ARNOLD  
[Library Director]  
Signature: Alexandra Arnold Date: 7 Nov 2018

# APPENDIX D

## ADDITIONAL HISTORICAL INFORMATION



**BERNARDSVILLE BOARD OF EDUCATION**

BY KRISTI MACDONALD



## ADDITIONAL HISTORIC INFORMATION

**NOTE:** This data was included in the 2010 ERI, and it is included for reference. As per conversation with Dan Lincoln on 2/1/2019 HPAC, this is the most current information available.

Site #	State Historic Site Inventory #	Historic Name of Structure (if any)	Property Address	Description of Actual Location of Structure	Structure Type, e.g. H = House I = Inn SCH=School ST = Store S = Station C = Church T = Tavern B = Barn O = Other BR = Bridge W = Wall	Date of Construct	Block #	Lot #
1		Anthony Kuser Estate			Gates			
2		Blythewood, Kuser Estate	Mountain Top Road			1899		
3		Keepers Cottage	Post Road					
4		Community of Mine Brook			Houses			
5		Willow Brook	311 Mine Brook Road	Across from Meadowbrook Farm			81	4
6		Kirkpatrick House	Mine Brook Road		H	1765		
7		Upton Pyne						
8		Lindabury Estate; Meadowbrook Farm	260 Mine Brook Road		H	1892	96	2
9			170 Dryden Road		H	1936	2	7
10		Our Lady of Perpetual Help	Seney Drive		C	1898		
11		Crowndale; Stout; Ballantine; Gabrielson Estate	Mendham Road	Demolished June, 2004	H	1870		
12		Christie House; Americ House	Old Jockey Hollow Road		H	1941		



13		Vealtown Tavern; Old Library	2 Morristown Road	N side of Morristown Rd; ca 150 ft. east of Olcott Square	T	circa 1760	66	13
14		St. Bernards	88 Claremont Road		C	1898	68	9
14		St. Bernards Cemetery	80 Washington Avenue		C	1898		
15		Cragwood	Ravine Lake Road		H			
16			271 Mt. Harmony Road		H		12	15
17		Tall Oaks; Tommy Dorsey Estate	Old Army Road		H			
18		United Methodist Church Cemetery	46 Anderson Hill Road		O		42	14
18		United Methodist Church	22 Church Street		C		65	10
19		Railroad Station	Mine Brook Road	SE side of Mine Brook Rd, Route 202, directly across from Claremont Rd	S	1899	144	1
20		Cross Estate	Jockey Hollow Road		H	1903	21	1
21	18-03-28	Kenilwood	Ravine Lake Road	SE side of Ravine Lk Rd; .35 mi SW of Post Kennel Rd	H	1896-1897 1885-1910	13	1.08
22		St. John's	379 Mount Harmony Road		C		14	21
23	18-03-11	Appletrees; Turnbull; Post Estate	Chapin Road	SW side of Chapin Rd; .2 mi NW of intersection of Claremont Rd & Turnbull Lane	H	1893	3	12

<b>24</b>	18-03-24	P. Ballentine House; Somerset Hills Country Club	180 Mine Mount Road	SW side Mine Mount Rd; .2 mi SE of Post Kunhardt Rd	H	1860-1885	30	11
<b>25</b>	18-03-17	Grearson House	Mendham Road	NE side of Mendham Rd; .3 mi NW of Washington Corner Rd	H	18th C	7	19
<b>26</b>	18-03-14	George B. Post Estate; Claremont	380 Claremont Road	End of priv dr.; SW side of Claremont Rd opposite Ballantine Rd	H	1905-1907	16	6.1
<b>27</b>	18-03-13		391 Claremont Road	NE side of Claremont Rd; .2 mi NW of Post Lane	H	1910-1940	6	8
<b>28</b>	18-03-12	Stronghold	Claremont Road	SW side of Claremont Rd; .4 mi W of Post Lane	H	1900	4	4
<b>29</b>	18-03-43		471 Claremont Road	NE side of Claremont Rd; opposite Turnbull Lane	H	1938	6	3.1
<b>30</b>	18-03-49	J. Savage; C.R. Buck House	271 Mt. Harmony Road	NE & SW sides of Mt. Harmony; .6 mi E of Post Kennel Road	H	1835-1860	14	15
<b>31</b>	18-03-51	Freeman; Burn; Hull House	503 Mine Brook Road	NW side Mine Brook Rd (202); .2 mi NE of Douglas Road	H	1800	28	48
<b>32</b>	18-03-54	Old Burkhardt House	Mine Brook Road	SE side Mine Brook Rd (202); .15 mi SW of Meeker Road	H	1881	94	13



33		Dunster House	189 Mine Brook Road	NW side of Mine Brook Rd (202) .6 mi SW of Claremont Rd	H	1880	80	14
34		Bunn House	135 Mine Brook Road	NW side of Mine Brook Rd (202) .35 mi SW of Claremont Rd	H	1860-1865	80	61
35	18-03-66	Anderson Hill House	Anderson Hill Road	N corner of Anderson Hill Rd & Dana Place	H	1885-1910	40	10
36	18-03-74	Ezra Sanders House	161 Jockey Hollow Road	SE side Jockey Hollow Rd; .8 mi NE of Hardscrabble Rd	H	1785	21	5.01
36	18-03-74	Barn	161 Jockey Hollow Road	SE side Jockey Hollow Rd; .8 mi NE of Hardscrabble Rd	B	1785	81	7.01
37	18-03-77	G.I. Seney House	Mendham Road	End of priv dr; SE side of Lloyd Rd; .3 mi NE of Mendham Rd	H	1800		
38	18-03-89	Dayton House	141 Mount Airy Road	W side of Mt. Airy Rd; .15 mi N of Pill Hill Rd	H	1835-1860	23	4?
39		Gable House	20 Childs Road		H		64	17
40	18-03-92	Calvin D. Smith House	26 Ambar Place	NW corner Ambar Pl & Condit Demolished 1990s	H	1895	126	9 & 10
41	18-03-90	Dilley House	607 Mine Brook Road	N side of Mine Brook Rd (202); .1 mi W of Whitenack Rd	H	1860	90	9

42	18-03-93	J.L. Hall House	43 Mount Airy Road, Bernardsville	W side of Mt. Airy Rd; .opposite Ambar Place	H	1860- 1865	110	7
43		Little Brook Farm	Campbell Road, Bernardsville		H	1800		
44	18-03-33	T. Blatzer House	220 Post Kennel Road, Bernardsville	E side Post Kennel Rd; .7 mi S of Douglas Road	H	18th C	27	7 or 17
45	18-03-40	Paragone	Douglas Road	End of priv dr; NE side of Douglas Rd; 2 mi SE of Post Kennel Road	H	1901- 1905	28	59
46		Croot Barn	Claremont Road	Across from Jeraloman's	B			
47		HoneyPot Cottage	21 Mine Mount Road		H		42	1
48			61 Mine Mount Road		H		37	21
49		Hidden Valley Farm	Campbell Road		H			
50		Fox Farm	141 Campbell Road (Far Hills)		H		9	7
51		Runnymede	Dryden Road		H			
52	18-03- 117	Old Stone Hotel	1 Mill Street	NW corner of Anderson Hill Rd; and Mill Street	H	1849	69	38
53	18-03- 114	Olcott Building	25 Olcott Avenue	SE side of Olcott Ave; .1 mi E of Anderson Hill Rd	SCH	1905	64	1
54	18-03- 100	Bernards Inn	27 Mine Brook Road	NE corner of Mine Brook Rd (202) & Quimby Lane	I	1885- 1910	70	1
55	18-93- 108	Boylan House; Parsonage	35 Olcott Square	S side of Morristown Road	O	18th C	125	2
56	18-03- 102	The Station	45 Mine Brook Road	NE corner of Mine Brook Rd (202) & Claremont	I	1885- 1910	71	1



57		Reynold House	51 Hardscrabble Road	N side of Hardscrabble Rd; .2 mi E of Chestnut Rd	H	18th C	21	13
58		Barn	51 Hardscrabble Road	N side of Hardscrabble Rd; .2 mi E of Chestnut Rd	B			
59		Drake House	9 Hardscrabble Road	N side of Hardscrabble Rd; .2 mi E of Chestnut Rd	H			
60	18-03-8	Kane House	Mountain Top Road	End of priv dr; SE side of Mtn Top Rd; .1 mi W of Post Kunhardt Rd	H	circa 1900	15	9
61	18-03-20	Brushwood; Ballantine Estate Wallace House	134 Ballantine Road	End of priv dr; SE side of Ballantine Rd; .1 mi W of Claremont Rd	H	circa 1900	17	40 or 41
62	18-03-06	Stonehurst	Clark Road	NE side of Clark Rd.; .2 mi west of Mountain Top Rd	H	1893	2	46
63	18-03-04	R. McMurty House (1850 Map); W. Balentine House (1873 Map)	Campbell Road	East Side Campbell; opposite Skyline Drive	H	1800- 1835		
64	18-03-3	T. Cole House	Stevens Lane	NE corner of Jackson Rd & Stevens Lane	H	1850	2	10
65	18-03-1	A. Cole House	Jackson Road	SE side Jackson Rd; .25 mi SW of Stevens Lane	H	Late 1700s	9	1
66	18-03-99	T. Baird House	22 Mount Airy Road	E side Mt Airy Rd; Ca. 100 ft N of Prospect St	H	1865	124	2

67	18-03-101	C.S. Quimby House	12 Quimby Lane	W side of Quimby La; Ca. 80 ft N of Mine Brook Road (202)	H	1800-1835	71	12
68	18-03-110	Bernardsville Railroad Depot	17 Morristown Road	S side of Morristown Rd; ca. 300 ft. E of Olcott Square	S	1872	125	5
69	18-03-04	J. Bunn: Sawmill, Gristmill, and Distillery	Mine Brook Road	SE side of Mine Brook Rd, Route 202, .35 mi SW of Claremont Rd	O	1844	97	1
70		Jonathon Whitaker House					38	17
71		Pfizer Estate	Mendham & Pfizer Roads		H	1881		
72		The Maples	Mendham Road	Demolished March, 2004	H			
73		Streep Home	21 Old Fort Road		H	1950s	46	5
74		Jerolaman's	125 Claremont Road		ST			
75		(2 Carriage Houses)	Mountain Top Road		H			
76		J. William Clark Estate						
77		(Site of Ogden Hammond Estate)						
78		Boulderwood			H			
79		(Wachovia Bank)						
80		McEwen Place						
81		Saunders	377 Claremont Road					
82			475 Mendham Road					



83		(Home of Bill Moyers)						
84			44 Childs Road				61	3
85		Cyrus Saunders House or Liddy House	220 Chestnut Avenue		H	1770	26	31
86		Mason/Rochat	100 Mountain Top Road		H	1928		
87		Josiah R. Brierly House	18 Olcott Avenue		H		56	24
88			24 Olcott Avenue		H			
89			26 Olcott Avenue		H		56	22
90		Dr. Ziegler's House	28 Olcott Avenue		H		56	21
91		The Skoko House	36 Olcott Avenue		H		56	13
92		Highview House	44 Highview Avenue		H			
93		Macwilliams House	155 Claremont Road		H		18	32

# APPENDIX E

## OPEN SPACE INVENTORY



PHOTO BY ED ENGLISH



## Open Space & Recreation Plan Update (2016) Parcel Table

Source: Open Space and Recreation Plan Update for Borough of Bernardsville, October 2016

NOTE: Acreages may vary slightly from the Borough's tax records, as they were calculated using the ArcGIS software. All acreages below are rounded to the nearest acre unless otherwise stated; see Appendix D. Parcel Data Tables for greater detail. The full Open Space Inventory can be accessed here: [www.bernardsvilleboro.org/Articles/Read.aspx?ID=%20532](http://www.bernardsvilleboro.org/Articles/Read.aspx?ID=%20532)

Block	Lot	Property Location	Class	Tax Acres	Owner	GIS Acres	Open Space Class	Facility
2	12	21 STEVENS LANE	15C	64.70	COUNTY OF SOMERSET	63.33	County Parks and Open Space (Class 15C)	
2	13	STEVENS LANE	15C	2.85	COUNTY OF SOMERSET	3.54	County Parks and Open Space (Class 15C)	
2	3	STEVENS LANE	15C	27.00	COUNTY OF SOMERSET	25.33	County Parks and Open Space (Class 15C)	
2	4	STEVENS LANE	15C	14.00	COUNTY OF SOMERSET	13.03	County Parks and Open Space (Class 15C)	
9	4.01	11 CAMPBELL RD.	15C	4.71	COUNTY OF SOMERSET	3.17	County Parks and Open Space (Class 15C)	
100	4	CLINTON ST	15C	2.91	BOROUGH OF BERNARDSVILLE	2.89	Municipal Parks and Open Space (Class 15C)	STORAGE BLDG.
114	1.01	1 PINE ST.	15C	0.42	BOROUGH OF BERNARDSVILLE	0.41	Municipal Parks and Open Space (Class 15C)	OPEN SPACE
115	1	47-3 MAPLE ST.	15C	0.34	BOROUGH OF BERNARDSVILLE	0.33	Municipal Parks and Open Space (Class 15C)	VACANT LAND
115	2	47-4 MAPLE ST.	15C	0.34	BOROUGH OF BERNARDSVILLE	0.33	Municipal Parks and Open Space (Class 15C)	VACANT LAND
115	7	LIBERTY RD.	15C	2.06	BOROUGH OF BERNARDSVILLE	2.05	Municipal Parks and Open Space (Class 15C)	PARK
131	11.01	108 MOUNT AIRY RD.	15C	5.91	BOROUGH OF BERNARDSVILLE	6.02	Municipal Parks and Open Space (Class 15C)	VACANT LAND
131	12	120 MOUNT AIRY RD.	15C	10.16	BOROUGH OF BERNARDSVILLE	9.43	Municipal Parks and Open Space (Class 15C)	VACANT LAND
17	30	277 CLAREMONT RD.	15C	30.35	BOROUGH OF BERNARDSVILLE	33.10	Municipal Parks and Open Space (Class 15C)	PARK
35	2	121 SENEY DR.	15C	27.70	BOROUGH OF BERNARDSVILLE	30.46	Municipal Parks and Open Space (Class 15C)	SWIMMING POOL
35	6	115 CHESTNUT AVE.	15C	6.25	BOROUGH OF BERNARDSVILLE	6.97	Municipal Parks and Open Space (Class 15C)	RECREATION
68	4	60 CLAREMONT RD.	15C	2.37	BOROUGH OF BERNARDSVILLE	2.30	Municipal Parks and Open Space (Class 15C)	KUSER PARK
69	29	14 PARK LANE	15C	0.34	BOROUGH OF BERNARDSVILLE	0.36	Municipal Parks and Open Space (Class 15C)	RECREATION BLDG.
69	8	79 CLAREMONT RD.	15C	3.39	BOROUGH OF BERNARDSVILLE	3.26	Municipal Parks and Open Space (Class 15C)	PLAYGROUND
69	9	CLAREMONT RD.	15C		BOROUGH OF BERNARDSVILLE	0.15	Municipal Parks and Open Space (Class 15C)	CLAREMONT FIELD
75	5	40 CLAREMONT RD.	15C	1.70	BOROUGH OF BERNARDSVILLE	0.35	Municipal Parks and Open Space (Class 15C)	KUSER PARK
80	14	189 MINE BROOK RD.	15F	1.51	BOROUGH OF BERNARDSVILLE	1.73	Municipal Parks and Open Space (Class 15C)	VACANT LAND
80	14.01	4 SPRING HOUSE RD.	15F	2.39	BOROUGH OF BERNARDSVILLE	2.35	Municipal Parks and Open Space (Class 15C)	VACANT HOUSE
80	14.07	OFF SPRING HOUSE RD.	15C	0.38	BOROUGH OF BERNARDSVILLE	0.36	Municipal Parks and Open Space (Class 15C)	VACANT LAND
80	15	ROUND TOP RD.	15C	12.18	BOROUGH OF BERNARDSVILLE	13.01	Municipal Parks and Open Space (Class 15C)	VACANT LAND
80	15.07	LAURELWOOD DR.	15C	0.71	BOROUGH OF BERNARDSVILLE	0.69	Municipal Parks and Open Space (Class 15C)	VACANT LAND
80	18	76 ROUND TOP RD.	15C	4.00	BOROUGH OF BERNARDSVILLE	4.40	Municipal Parks and Open Space (Class 15C)	WATER SUPPLY
93	10	622 MINE BROOK RD.	15C	13.29	BOROUGH OF BERNARDSVILLE	12.04	Municipal Parks and Open Space (Class 15C)	VACANT LAND
95	4.22	MEEKER RD.	15C	34.32	BOROUGH OF BERNARDSVILLE	36.94	Municipal Parks and Open Space (Class 15C)	VACANT LAND
97	1	166 MINE BROOK RD.	15C	12.56	BOROUGH OF BERNARDSVILLE	10.68	Municipal Parks and Open Space (Class 15C)	MUNICIPAL BLDG.
21	1	61 JOCKEY HOLLOW RD.	15F	157.52	USA C/O MORRISTOWN NAT. HIST. PARK	140.89	National Parks and Open Space (Class 15F)	NATIONAL PARK
21	12	131 HARDSCRABBLE RD.	15F	25.44	USA C/O MORRISTOWN NAT. HIST. PARK	26.94	National Parks and Open Space (Class 15F)	PARK
21	2	121 JOCKEY HOLLOW RD.	15F	8.38	USA C/O MORRISTOWN NAT. HIST. PARK	7.99	National Parks and Open Space (Class 15F)	NATIONAL PARK
16	6.03	300 CLAREMONT RD.	15F	11.88	UPPER RARITAN WATERSHED ASSOCIATION	11.15	Nonprofit Preserved Land (Class 15F)	William Post Natural Area



## Open Space & Recreation Plan Update (2016) Parcel Table (cont.)

Block	Lot	Property Location	Class	Tax Acres	Owner	GIS Acres	Open Space Class	Facility
21	13	51 HARDSCRABBLE RD.	15F	45.18	AUDUBON SOCIETY OF NEW JERSEY	40.73	Nonprofit Preserved Land (Class 15F)	Scherman Hoffman Wildlife Sanctuary
21	14	21 HARDSCRABBLE RD.	15F	63.73	AUDUBON SOCIETY OF NEW JERSEY	70.49	Nonprofit Preserved Land (Class 15F)	Scherman Hoffman Wildlife Sanctuary
21	14.02	11 HARDSCRABBLE RD.	15F	21.67	AUDUBON SOCIETY OF NEW JERSEY	22.31	Nonprofit Preserved Land (Class 15F)	Scherman Hoffman Wildlife Sanctuary
27	18	MITCHELL ROAD	15F	0.42	NEW JERSEY CONSERVATION FOUNDATION	0.29	Nonprofit Preserved Land (Class 15F)	Shirley Property
31	1	240 CLAREMONT RD.	15F	10.19	UPPER RARITAN WATERSHED ASSOCIATION	10.53	Nonprofit Preserved Land (Class 15F)	William Post Natural Area
35	8	161 CHESTNUT AVE.	15F	59.23	AUDUBON SOCIETY OF NEW JERSEY	58.43	Nonprofit Preserved Land (Class 15F)	Scherman Hoffman Wildlife Sanctuary
7	4.07	200 WASHINGTON CORNER RD	15F	11.61	PASSAIC RIVER COALITION	11.67	Nonprofit Preserved Land (Class 15F)	unnamed
100	2.23	1 OLD QUARRY ROAD	15C	0.74	BOROUGH OF BERNARDSVILLE	0.87	Public Properties (Class 15C; Borough)	VACANT LAND
100	2.49	2 OLD QUARRY ROAD	15C	4.06	BOROUGH OF BERNARDSVILLE	4.20	Public Properties (Class 15C; Borough)	PISTOL RANGE
101	5	150 PILL HILL RD.	15C	4.14	BOROUGH OF BERNARDSVILLE	3.73	Public Properties (Class 15C; Borough)	SEWER DISPOSAL
102	3	MINE AVE.	15C	0.12	BOROUGH OF BERNARDSVILLE	0.11	Public Properties (Class 15C; Borough)	VACANT LAND
111	18	CRESCENT RD.	15C	0.07	BOROUGH OF BERNARDSVILLE	0.09	Public Properties (Class 15C; Borough)	VACANT LAND
111	4	CENTER ST. EXT.	15C	0.36	BOROUGH OF BERNARDSVILLE	0.37	Public Properties (Class 15C; Borough)	RIGHT OF WAY
114	1	70 BERNARDS AVE.	15C	2.87	BOROUGH OF BERNARDSVILLE	2.84	Public Properties (Class 15C; Borough)	COMMON ELEMENTS
123	13	33 ANN ST.	15C	0.44	BOROUGH OF BERNARDSVILLE	0.39	Public Properties (Class 15C; Borough)	PUMP HOUSE
124	1	18 MOUNT AIRY RD.	15C	0.74	BOROUGH OF BERNARDSVILLE	0.79	Public Properties (Class 15C; Borough)	VACANT LAND
125	27.29	202 NORTH FINLEY	15C		BOROUGH OF BERNARDSVILLE	0.54	Public Properties (Class 15C; Borough)	WATER BASIN
125	27.30	12 FOX HOLLOW TRAIL	15C	0.06	BOROUGH OF BERNARDSVILLE	0.06	Public Properties (Class 15C; Borough)	PUMPHOUSE
129	22	14 MORRISON AVENUE	15C	0.19	BOROUGH OF BERNARDSVILLE	0.29	Public Properties (Class 15C; Borough)	PUMP HOUSE
131	12	120 MOUNT AIRY RD.	15C	10.16	BOROUGH OF BERNARDSVILLE	9.43	Public Properties (Class 15C; Borough)	VACANT LAND
135	1	2 CONKLING AVE.	15C	0.06	BOROUGH OF BERNARDSVILLE	0.03	Public Properties (Class 15C; Borough)	VACANT LAND
135	6	PENNINGTON AVE.	15C	0.16	BOROUGH OF BERNARDSVILLE	0.20	Public Properties (Class 15C; Borough)	VACANT LAND
142	11.02	BROOKSIDE AVE.	15C	0.14	BOROUGH OF BERNARDSVILLE	0.15	Public Properties (Class 15C; Borough)	RIGHT OF WAY
17	43	122 MENDHAM RD.	15C	1.77	BOROUGH OF BERNARDSVILLE	1.88	Public Properties (Class 15C; Borough)	ROADS
38	13	WINDWOOD ROAD	15C	0.61	BOROUGH OF BERNARDSVILLE	0.53	Public Properties (Class 15C; Borough)	VACANT LAND
66	22	1 ANDERSON HILL ROAD	15C	2.63	BOROUGH OF BERNARDSVILLE	3.03	Public Properties (Class 15C; Borough)	COMMON ELEMENTS
69	28	30 ANDERSON HILL RD.	15C	0.05	BOROUGH OF BERNARDSVILLE	0.05	Public Properties (Class 15C; Borough)	LAND
70	4	35 QUIMBY LANE	15C	0.23	BOROUGH OF BERNARDSVILLE	0.23	Public Properties (Class 15C; Borough)	PARKING LOT
80	15.38	MINE BROOK RD.	15C	1.57	BOROUGH OF BERNARDSVILLE	1.04	Public Properties (Class 15C; Borough)	VACANT LAND
80	58	4 CHILTON ST.	15C	0.40	BOROUGH OF BERNARDSVILLE	0.37	Public Properties (Class 15C; Borough)	VACANT LAND
98	1	MINE BROOK RD.	15C	1.09	BOROUGH OF BERNARDSVILLE	1.02	Public Properties (Class 15C; Borough)	PARKING AREA
36	5.01	OLCOTT LANE	15C		COUNTY OF SOMERSET	0.01	Public Properties (Class 15C; County)	ROAD
144	1	50 MINE BROOK RD.	15C	1.30	STATE OF NJ/C/O BOR. B'VILLE	31.44	Public Properties (Class 15C; State)	RAILROAD STATION
144	1	50 MINE BROOK RD.	15C	1.30	STATE OF NJ/C/O BOR. B'VILLE	12.56	Public Properties (Class 15C; State)	RAILROAD STATION

## Conservation Easements - Borough of Bernardsville (Open Space Plan, 2016)

Block	Lot	Address
2	38	87 Mountain Top Road
2	45	101 Mountain Top Road
6	9.02	117-3 Ballantine Road
7	2	391 Mendham Road
7	2.01	399 Mendham Road
11	2.01	96 Clark Road
11	2.02	110 Clark Road
13	1	110 Ravine Lake Road
13	1.04	3 Roebling Road
16	7.01	141 Post Kunhardt Road
16	7.02	151 Post Kunhardt Road
17	8.06	150 Mendham Road
17	8.11	5 Pine Hollow Lane
17	8.12	8 Brushwood Drive
17	8.13	10 Brushwood Drive
17	8.14	11 Brushwood Drive
20	17	270 Hardscrabble Road
28	10	330 Mount Harmony Road
28	10.01	304 Mount Harmony Road
28	10.02	290 Mount Harmony Road
28	10.03	268 Mount Harmony Road
28	10.04	250-1 Brook Hollow Lane
28	60.03	65 Charles Road
44	10.01	58 Old Fort Road
61	5	30 Childs Road
80	14	1 Spring House Road
81	1	21 Mount Harmony Road
95	4	21 Mount Harmony Road
101	6	110 Pill Hill Road

# **Environmental Resource Inventory**

**Borough of Bernardsville**

**2019**