BOROUGH OF PEAPACK & GLADSTONE ENVIRONMENTAL RESOURCE INVENTORY UPDATE

DRAFT

Borough of Peapack & Gladstone
April 22, 2024

BOROUGH OF PEAPACK & GLADSTONE, SOMERSET COUNTY

APRIL 22, 2024 - DRAFT

ENVIRONMENTAL RESOURCE INVENTORY UPDATE

PREPARED BY

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The original document will be appropriately signed and sealed in accordance with Chapter 41, Title 13 of the State Board of Professional Planners.

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ACKNOWLEDGMENTS

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TABLE OF CONTENTS

What is an Environmental Resource Inventory?

1 Executive Summary

2 Geology & Topography

12 Soil

30 Land Use / Land Cover

34 Vegetation

39 Wildlife

45 Hydrology

51 Wetlands, Riparian Areas, & Flood Zones

58 Water Quality

64 Climate & Air

81 Climate Change

89 Known Contaminated Sites

95 Appendix

107 References

Cover Photo:
Holland Avenue Tree Planting
Executive Summary Photo:
Ice Storm, Borough of Peapack & Gladstone

Environmental Resource Inventory

What is an Environmental Resource Inventory?

An Environmental Resource Inventory (ERI) provides the foundation for local decision-making. It details information that planners and local officials can use to craft public policy and make land use decisions that align with their community's priorities.

The ERI describes the natural and resources in a given locality. This include, for example, forests, surface and ground waters, and wildlife habitat.

For the Borough of Peapack and Gladstone, the ERI has:

- ◊ Maps which show the location and extent of the existing resources.
- ◊ Data that provides additional detail about these features such as water quality or soils.
- ◊ Report that summarizes each of these resources in the town.

The ERI is a dynamic document which needs to be updated periodically to reflect current data and changing conditions and policies.

What is the importance of an ERI?

Incorporating the ERI into the Master Plan helps the members of the governing body, planning board, and environmental commission provide sound recommendations while reviewing proposed development applications. In this way, resources upon which the community depends are protected and integrated into the planning process.

According to the Association of New Jersey Environmental Commissions and Sustainable Jersey, an Environmental Resource Inventory:

- Provides factual information for municipal land use planning.
- Assists in developing the land use element of the Master Plan.
- Serves as a guide during the site plan review process.
- Helps in the compilation of zoning regulations and municipal ordinances.
- Forms the basis for a land capability analysis and determining the intensity and location of development.
- Identifies sensitive areas and suitable locations for specific types of development.
- Enhances understanding of natural systems, their limitations, and opportunities for use.
- Acts as a long-term planning tool for identifying potential land use impacts and natural resource issues.
- Educates residents about their community and its environment.
- Aids in avoiding future problems and mitigating costs.

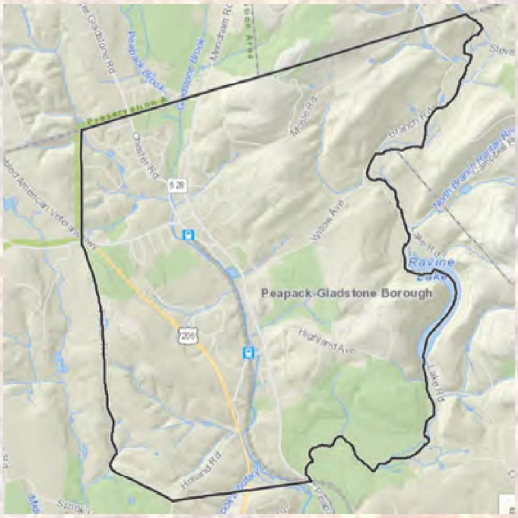
Residents of the Borough can access data and mapping tools obtained for the ERI through NJGEOWEB and the Highlands Council Interactive ERI.

Executive Summary

Rolling hills and winding waters form the backdrop to the Borough of Peapack & Gladstone. Famous for once producing lime quarried from locally available limestone, the Borough is an historic tableau of farms, estates, and scenic areas.

A small municipality, it is rich in wildlife and offers habitat for both federal and state listed endangered species, including the bog turtle and cooper's hawk (a highlight for birders). Fowler Road contains some of the thickest forest cover in the Borough, leading into the valley of the Essex Hunt Club, which offers grasslands and farm habitats.

Bounded by the North Branch of the Raritan River and Ravine Lake, with the Peapack Brook winding through the town, the Borough embraces the charm of the rivers while accepting the responsibility of its stewardship. The Environmental and Shade Tree Commission has completed an investigation of non-native plants, producing an easy-to-use guide for identifying and managing the spread of invasive species in the Borough.



This is the third iteration of the Borough's Environmental Resource Inventory (ERI), the first produced in 2005 and the second in 2013. For this update to the ERI the Borough has relied upon the best available data and included the newly released information available through the New Jersey Highlands Council, Highland Region Interactive Environmental Resource Inventory (https://www.highlandseri.com/). Residents are encouraged to access this website for current information on the natural features in the Borough.

Updating the ERI is a priority for the Environmental and Shade Tree Commission to document the Borough's natural features and incorporate climate change and sustainability into its master plan elements. New to this update is information on resiliency, documentation on trends in temperature and precipitation, and non-native species. This report is a resource for the Borough's boards, elected officials, and residents in their care and management of the beautiful landscape that frames the municipality.

Rolling Hills of the Peapack Valley

Chapter 1.

Geology & Topography

Physiographic Provinces

New Jersey's landscape is divided into four distinctive physiographic provinces.[1] Beginning in the northwest and proceeding to the southeast, these provinces are identified as the Valley and Ridge, Highlands, Piedmont, and Coastal Plain Provinces. (**Figure 1**).

The eastern section of the Borough of Peapack & Gladstone is located in the Piedmont Physiographic Province and the remainder of the municipality falls within the Highlands Region. Physiographic provinces classify landscapes based on terrain texture, rock type, geologic structure, and history. These attributes play an important role in determining the natural resources of an area.

The Highlands Province occupies an area of approximately 980 square miles and comprises approximately one-eighth of the state. It is generally characterized as a mountainous belt, 10 to 25 miles wide. The rugged topography of the Highlands consists of a series of discontinuous rounded ridges separated by deep, narrow valleys.

The Highlands is composed of highly metamorphosed igneous and sedimentary rocks dating from more than a billion years ago. These rocks are relatively resistant to erosion and result in the steep slopes and mountains common to this province.[2]

Figure 1. Physiographic Provinces in the Borough of Peapack & Gladstone
(Source: Highlands Council)[8]

The Piedmont covers 1,600 square miles, which is roughly 20% of the state. Its surface is generally low rolling hills marked with sudden, steep ridges, which extend across the state and includes the Palisades in the east.

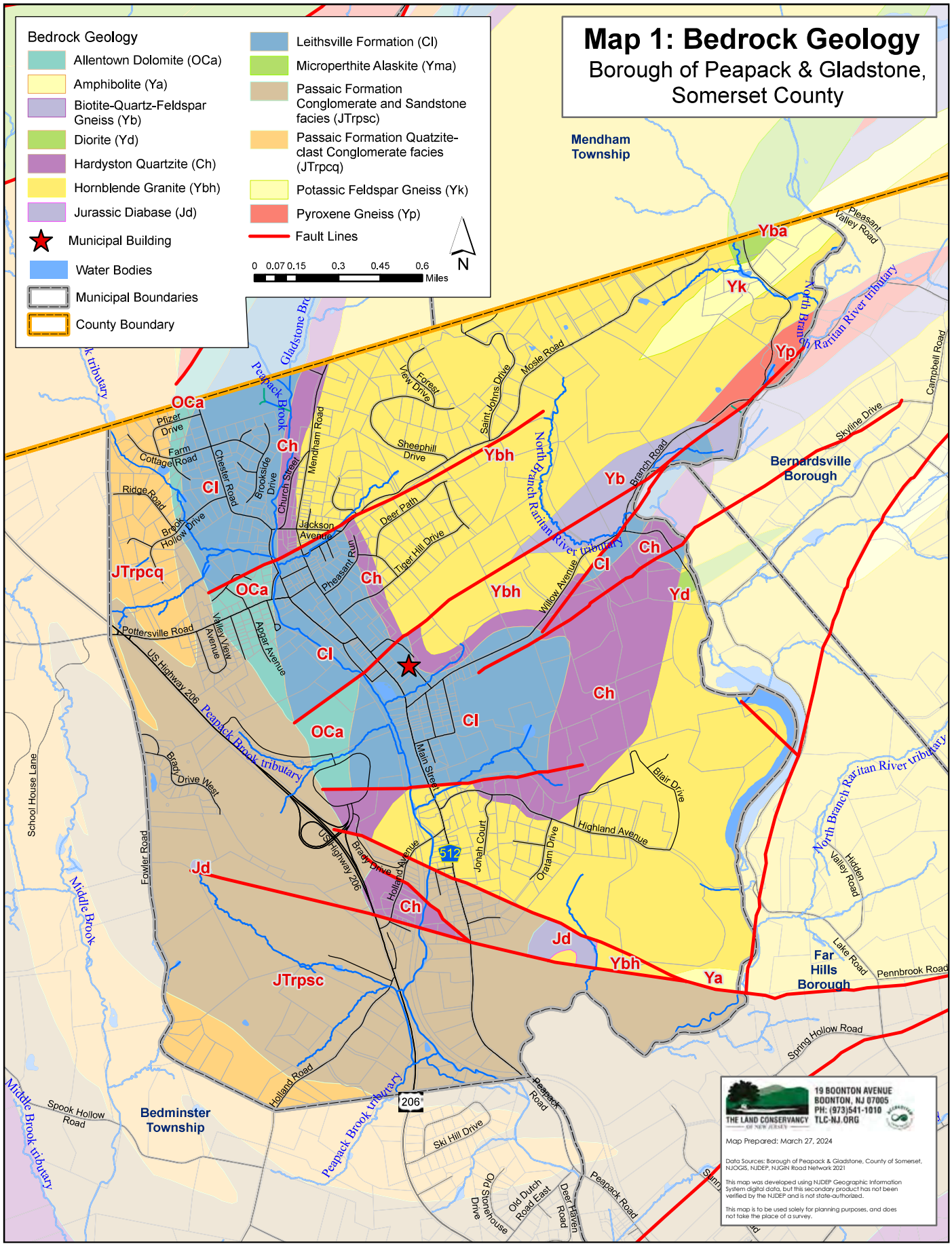
According to the New Jersey Department of Environmental Protection (NJDEP) New Jersey Geological and Water Survey (NJGS), the Piedmont is mostly underlain with sedimentary rocks of Triassic and Jurassic age (240 to 140 million years old) and igneous rocks of Jurassic age.

Within the Borough, 57% (2,116 acres) is located within the Piedmont and 43% (1,581 acres) is located within the Highlands.

Bedrock Geology

According to the NJGS, the properties of bedrock and surficial geology determine the physical extent of aquifers and the chemical quality of water they yield. They also control how groundwater recharges and moves through the aquifers, how contaminants seep into and move through soil and groundwater, and where natural hazards like radon, sinkholes, and seismic instability may occur.[3]

Bedrock geology is the consolidated, underlying rock that extends deep into earth's crust. Surficial geology is the unconsolidated sedimentary materials overlaying bedrock formations that is the parent material for soils.[4,5] Also running, in an east to west direction, are the known fault lines in the Borough of Peapack & Gladstone (**Map 1**).


Map 1: Bedrock Geology
Borough of Peapack & Gladstone, Somerset County
Bedrock Geology
Allentown Dolomite (OCa)
Amphibolite (Ya)
Biotite-Quartz-Feldspar Gneiss (Yb)
Diorite (Yd)
Hardyston Quartzite (Ch)
Hornblende Granite (Ybh)
Jurassic Diabase (Jd)
Municipal Building
Water Bodies
Municipal Boundaries
County Boundary
Leithsville Formation (Cl)
Microperthite Alaskite (Yma)
Passaic Formation Conglomerate and Sandstone facies (JTrpsc)
Passaic Formation Quatzite-clast Conglomerate facies (JTrpcq)
Potassic Feldspar Gneiss (Yk)
Pyroxene Gneiss (Yp)
Fault Lines
0 0.07 0.15 0.3 0.45 0.6 Miles
N
Mendham Township
Bernardsville Borough
Bedminster Township
Far Hills Borough
Yba
Yk
Yp
Yb
Ybh
Yd
Ya
Ch
Cl
OCa
JTrpcq
JTrpsc
Jd
North Branch Raritan River tributary
Peapack Brook tributary
Middle Brook
Middle Brook tributary
Gladstone Brook
Pleasant Valley Road
Campbell Road
Skyline Drive
Branch Road
Mosle Road
Saint Johns Drive
Forest View Drive
Sheephill Drive
Mendham Road
Church Street
Brookside Drive
Chester Road
Farm Cottage Road
Pfizer Drive
Ridge Road
Brook Hollow Drive
Deer Path
Jackson Avenue
Pheasant Run
Tiger Hill Drive
Willow Avenue
Pottersville Road
Valley View Avenue
Appar Avenue
US Highway 206
Main Street
Brady Drive West
Brady Drive
Holland Avenue
Jonah Court
Oratam Drive
Highland Avenue
Blair Drive
Hidden Valley Road
Lake Road
Pennbrook Road
Spring Hollow Road
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Ski Hill Drive
Old Stonehouse Drive
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Map Prepared: March 27, 2024
Data Sources: Borough of Peapack & Gladstone, County of Somerset, NJOGIS, NJDEP, NJGIN Road Network 2021
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Geologic properties establish where sand, gravel, peat, clay, quarry rock, and mineral ores are located. They also determine the suitability of an area for septic systems, the management of stormwater and surface runoff, and the stability of foundations for buildings, bridges, tunnels, and other structures.

The underlying geology of the Borough is predominantly of sedimentary Hornblende Granite, comprising 37% of the Borough's total area (See **Table 1**). In combination with the Passaic Formation (JTrpcq), these two types of bedrock geology comprise nearly two-thirds of the Borough (63%).

Table 1. Bedrock Geology: Borough of Peapack & Gladstone

Abbrev.	Name	Lithology	Acres	Percent
OCa	Allentown Dolomite	dolomite, and less abundant quartzite and shale	93	3%
Ya	Amphibolite	amphibolite, fine- to medium-grained	9	0.2%
Yb	Biotite-Quartz-Feldspar Gneiss	gneiss, fine- to coarse-grained	77	2%
Yd	Diorite	diorite	4	0.1%
Ch	Hardyston Quartzite	conglomeratic sandstone, quartzite, and dolomitic sandstone	332	9%
Ybh	Hornblende Granite	granite, medium- to coarse-grained	1,373	37%
Jd	Jurassic Diabase	diabase, medium- to coarse-grained	18	0.5%
Cl	Leithsville Formation	dolomite, dolomitic sandstone, siltstone, and shale	512	14%
Yba	Microperthite Alaskite	granite, medium- to coarse-grained	9	0.2%
JTrpsc	Passaic Formation Conglomerate and Sandstone facies	conglomeratic sandstone	978	26%
JTrpcq	Passaic Formation Quatzite-clast Conglomerate facies	quartzite conglomerate, sandstone	199	5%
Yk	Potassic Feldspar Gneiss	gneiss, fine- to medium-grained	60	2%
Yp	Pyroxene Gneiss	gneiss, fine- to medium-grained	33	1%
		Total	**3,696**	**100%**

Source: NJGS Bedrock Geology

Surficial Geology

Glacial movement physically shaped the Borough. It was during that time glaciers extended across much of North America, and as time progressed, glaciers moved and shaped the landscape through erosion, deposition, and glacial retreat.[6]

Glaciation and deglaciation also had an influence on the formation and disposition of water bodies. Glacial processes directly impacted the creation of lakes, rivers, and other water-related features. Glaciers carried sediments, including gravel, sand, and silt.

As glaciers melted and recede, the sediments were deposited, forming alluvial fans and outwash plains. This influences the flow and distribution of water in nearby rivers and streams.

Alluvial deposits can be found along the banks of rivers and streams that traverse the Borough, including the Peapack Brook and North Branch Raritan River, along with their tributaries. These deposits are also often found in low-lying areas and floodplains. In modern day, this sedimentation helps retain the Borough's rivers, ponds, and low-lying wetlands.

Surficial deposits are sediments deposited by rivers, glaciers, ocean currents and waves, wind, and movement of soil and rocks on hillslopes (**Map 2**). **Table 2** details the different types of surficial deposits found in the Borough. Weathered gneiss is the predominant surficial geology in the Borough of Peapack & Gladstone (45%). Weathered gneiss and shale represent 73% of the Borough's surficial geology.

Topography

Topography refers to the slope and level of the land. It is the measurement of elevation, and slope is the percentage change in that elevation over a certain distance.

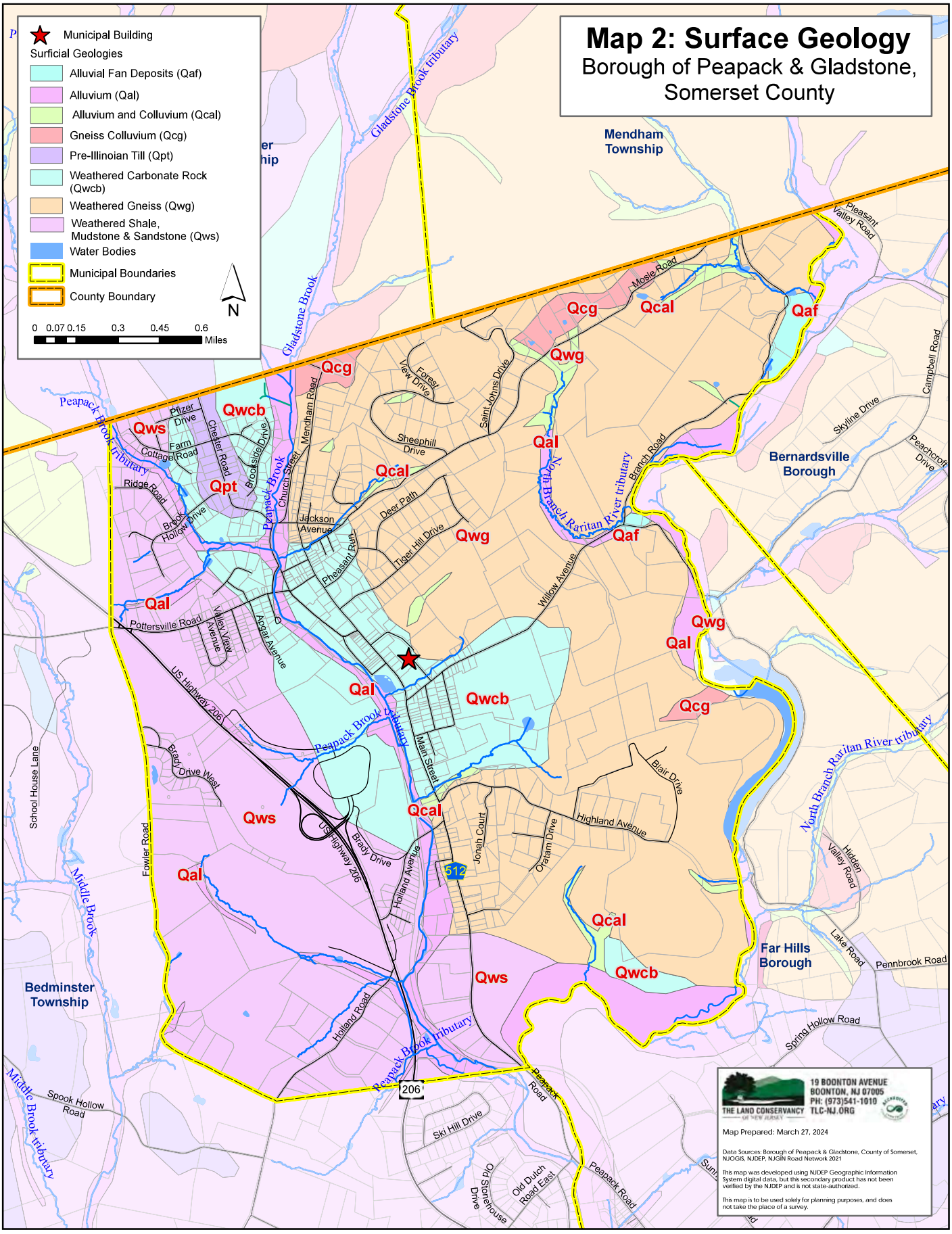
Topography is measured by connecting points of the same elevation. These points are known as contours, and slope is measured by the distance between one point to another point, this distance is divided by the lateral distance between them.

Topography studies the relationship between objects, human environment, and the Earth's surface. It is important to study the topography of a site because it helps to predict whether an area will be suitable for habitation, farming, or preservation based on the information collected. It can also assess the impact of human activity on the natural environment and distribution of natural resources.

The topography of the Borough rolling hills and valleys. The Borough's lowest point, situated in the valley of the Peapack Brook, is at an elevation of 160 feet. The lower areas follow the valleys of Peapack Brook and the North Branch of the Raritan River. The highest point is located at Mount St. John in the northern tip of the Borough, reaching 640 feet (**Figure 2** and **Map 3**).

Table 2. Surficial Geology				
Name	**Description**	**Geologic Age**	**Acres**	**Percent of the Borough**
Alluvial Fan Deposits	Contain minor amounts of organic matter. Form fans at mouths of steep streams. Sand, silt, pebble-to-cobble gravel; reddish brown, yellowish brown to brown. As much as 40 feet thick.	Holocene and late Pleistocene, locally middle Pleistocene	22	1%
Alluvium	Contains variable amounts of organic matter. Deposited in modern floodplains and channels. Sand, gravel, silt, minor clay and peat; reddish brown, yellowish brown, brown, gray. As much as 20 feet thick.	Holocene and late Pleistocene	291	8%
Alluvium and Colluvium	Deposited in headwater areas of valleys. Interbedded alluvium as in unit Qal and colluvium as in units Qcg, Qcb, Qcd, Qcs, Qcc, Qccb, and Qcl. As much as 20 feet thick.	Holocene and late Pleistocene	59	2%
Gneiss Colluvium	Forms aprons at the base of slopes on weathered gneiss. Silty sand to sandy silt with gneiss fragments; yellow, yellowish brown, reddish yellow. As much as 70 feet thick.	Pleistocene	58	2%
Pre-Illinoian Till	Feldspathic gravel clasts and sand generally weathered to clay. Deposited directly from glacial ice during a pre-Illinoian glaciation. Clayey sandy silt to sandy silty clay with few to some pebbles and cobbles and very few boulders; reddish yellow, yellowish brown, reddish brown. As much as 30 feet thick.	Late Pliocene-early Pleistocene	43	1%
Weathered Carbonated Rock	Clayey silty sand to silty clay with fragments of carbonate rock, chert, and shale; red, reddish yellow, yellow. As much as 300 feet thick; thickness varies greatly over short distances.	Pleistocene	520	14%
Weathered Gneiss	Silty clayey sand to sandy clayey silt with gneiss fragments; brown, yellowish brown, red, white. As much as 100 feet thick.	Pleistocene	1,660	45%
Weathered Shale, Mudstone, and Sandstone	Silty sand to silty clay with shale, mudstone, or sandstone fragments; reddish brown, yellow, light gray. As much as 10 feet thick on shale and mudstone, 30 feet thick on sandstone.	Pleistocene	1,024	28%
		Total	**3,676**	**100%**

Source: NJDEP, U.S. Soil Survey
Note: Water (20 acres) is not included in this table.


Map 2: Surface Geology
Borough of Peapack & Gladstone, Somerset County
Municipal Building
Surficial Geologies
Alluvial Fan Deposits (Qaf)
Alluvium (Qal)
Alluvium and Colluvium (Qcal)
Gneiss Colluvium (Qcg)
Pre-Illinoian Till (Qpt)
Weathered Carbonate Rock (Qwcb)
Weathered Gneiss (Qwg)
Weathered Shale, Mudstone & Sandstone (Qws)
Water Bodies
Municipal Boundaries
County Boundary
N
0 0.07 0.15 0.3 0.45 0.6 Miles
Mendham Township
Bernardsville Borough
Bedminster Township
Far Hills Borough
Gladstone Brook tributary
Gladstone Brook
Peapack Brook tributary
Peapack Brook
North Branch Raritan River tributary
Middle Brook
Middle Brook tributary
Qcg
Qcal
Qaf
Qwg
Qwcb
Qws
Qpt
Qal
Mosle Road
Pleasant Valley Road
Campbell Road
Skyline Drive
Peachcroft Drive
Forest View Drive
Saint Johns Drive
Sheephill Drive
Mendham Road
Church Street
Pfizer Drive
Chester Road
Farm Cottage Road
Ridge Road
Brookside Drive
Brook Hollow Drive
Jackson Avenue
Deer Path
Tiger Hill Drive
Pleasant Run
Branch Road
Willow Avenue
Pottersville Road
Valley View Avenue
Appar Avenue
US Highway 206
Brady Drive West
Brady Drive
Main Street
Blair Drive
Highland Avenue
Jonah Court
Oratam Drive
Holland Avenue
Holland Road
Fowler Road
School House Lane
Hidden Valley Road
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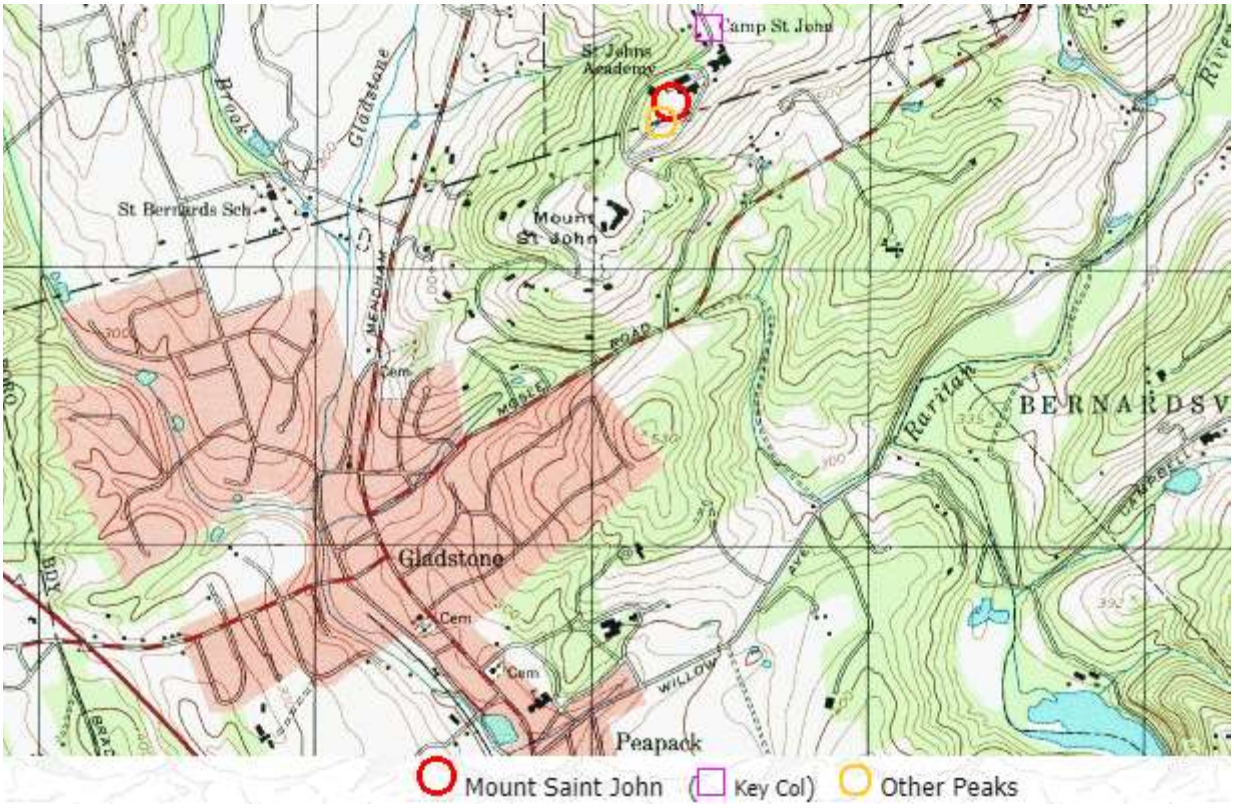


Figure 2. Mount Saint John in the Borough of Peapack & Gladstone
(Source: peakbagger.com)[9]

Steep Slopes

Slopes vary across different parts of the Borough due to its varying topography. Nearly 12% of the Borough has slopes greater than 25% and more than 33% of the Borough has slopes greater than 15% (**Figure 3** and **Map 4**).[7] The Highlands Council defines slopes as follows:

- Severely Constrained Slopes: Slopes of 20% or greater and lands within riparian areas with slopes of 10% and greater. 26% of the Borough is categorized as having severely constrained slopes.

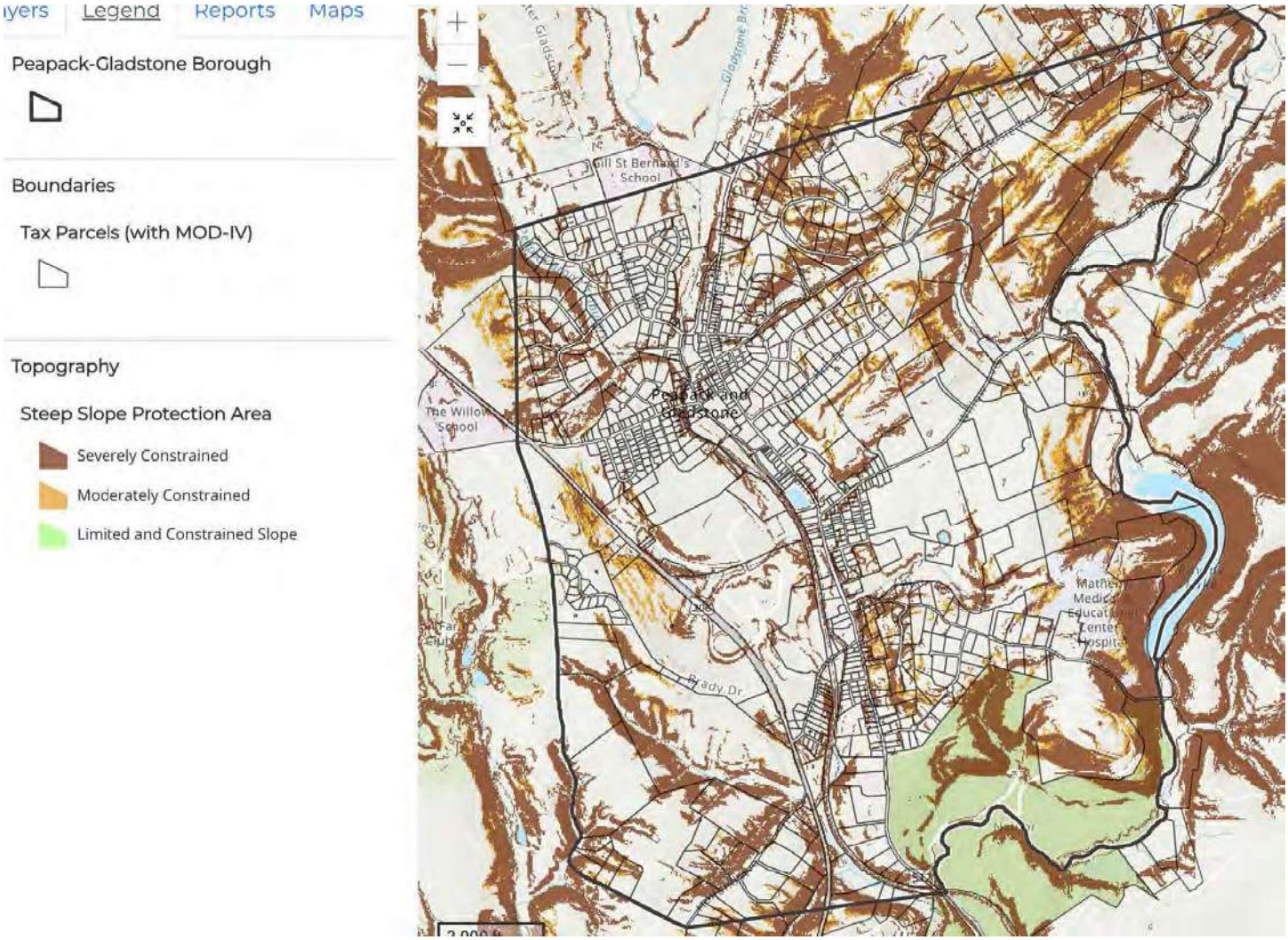
- Moderately Constrained Slopes: All non-riparian areas having a slope of 15% to less than 20% which are forested. Four percent of the Borough is categorized as moderately constrained slopes.

Alteration of the slope may cause slope instability, flooding, erosion, degradation of surface water, and/or drainage problems. Improper grading often alters surface water flow and may cause flooding for the site and nearby property owners. Excessive grading may also alter groundwater level, which can cause the slow death of trees and ground cover, and in turn destroy wildlife habitats.

Carbonate Rock Areas

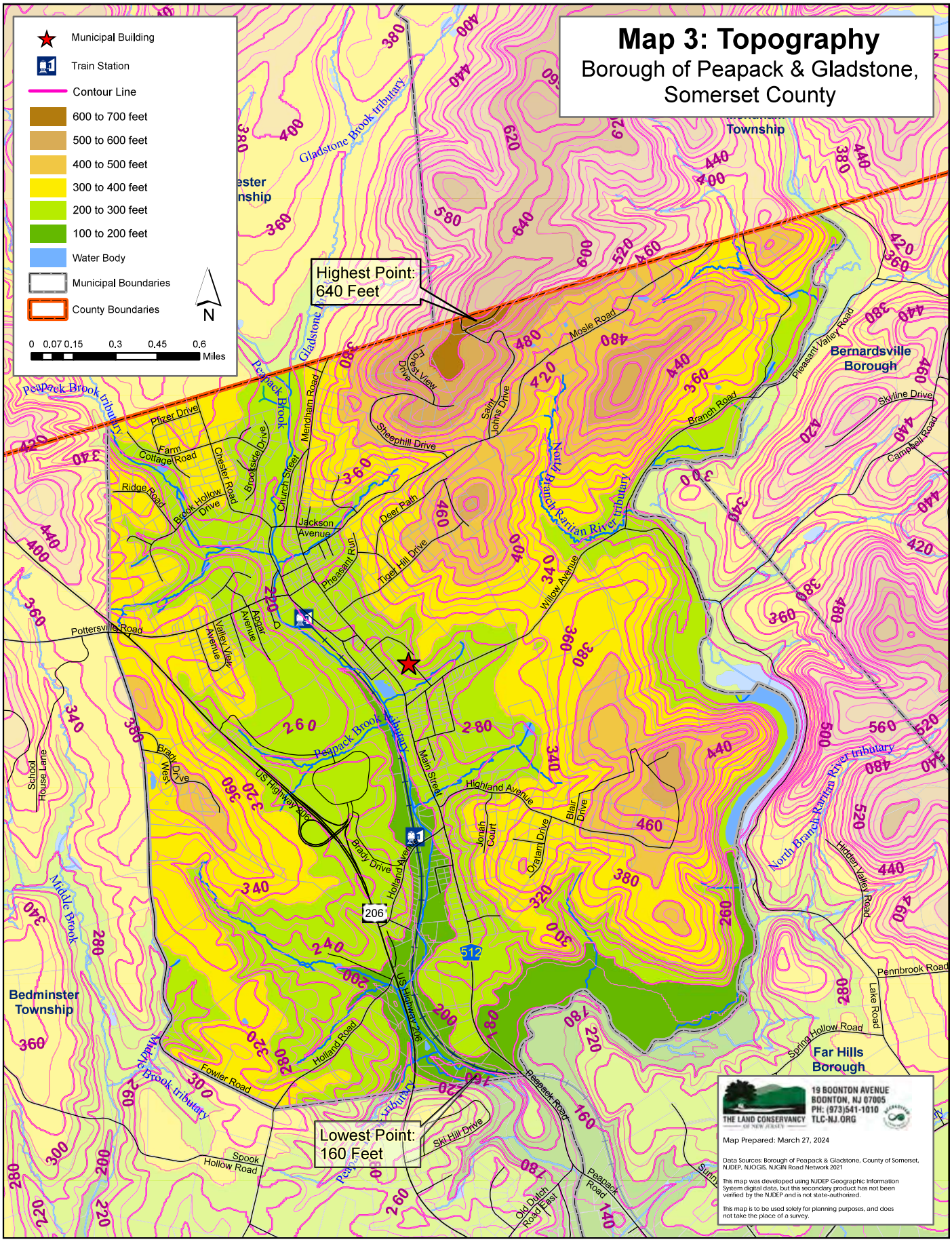
Carbonate rock areas, often situated in valley bottoms, create striking relief and scenic vistas, especially when viewed from higher ridges. These areas contribute significantly to biodiversity, with carbonate rock

Figure 3. Steep Slopes *(Source: Highlands Council)*[10]



primarily composed of calcium and magnesium carbonates. Dolomitic limestone, a common example in the Highlands Region, is susceptible to acidic dissolution, leading to karst formations—surface and subsurface depressions, drainage passages, and irregular rock topography. These conditions make the areas prone to instability, subsidence, and surface collapse. Alterations like impervious coverage or grade changes can exacerbate these issues, causing land subsidence and sinkholes. Furthermore, fractures and solution openings in limestone may pose risks to water supplies, making them vulnerable to contamination from various sources, including solid and liquid wastes, surface water, septic tank effluent, and hazardous substances.

A total of 605 acres, or 16%, of the Borough is underlain by carbonate rock (**Map 5**).


Map 3: Topography
Borough of Peapack & Gladstone, Somerset County
Municipal Building
Train Station
Contour Line
600 to 700 feet
500 to 600 feet
400 to 500 feet
300 to 400 feet
200 to 300 feet
100 to 200 feet
Water Body
Municipal Boundaries
County Boundaries
N
0 0.07 0.15 0.3 0.45 0.6 Miles
Highest Point: 640 Feet
Lowest Point: 160 Feet
Gladstone Brook tributary
Peapack Brook tributary
Peapack Brook
Middle Brook
North Branch Raritan River tributary
Township
Bernardsville Borough
Bedminster Township
Far Hills Borough
Mosle Road
Pleasant Valley Road
Skyline Drive
Campbell Road
Branch Road
Mendham Road
Church Street
Pfizer Drive
Farm Cottage Road
Chester Road
Brookside Drive
Ridge Road
Brook Hollow Drive
Sheephill Drive
Saint Johns Drive
Forest View Drive
Deer Path
Jackson Avenue
Pheasant Run
Tiger Hill Drive
Willow Avenue
Potterville Road
Alger Avenue
Valley View Avenue
Main Street
Highland Avenue
Blair Drive
Jonah Court
Oratam Drive
Brady Drive
Holland Avenue
US Highway 206
206
512
School House Lane
Middle Brook
Fowler Road
Holland Road
Spook Hollow Road
Ski Hill Drive
Peapack Road
Old Dutch Road East
Pennbrook Road
Lake Road
Spring Hollow Road
Hidden Valley Road
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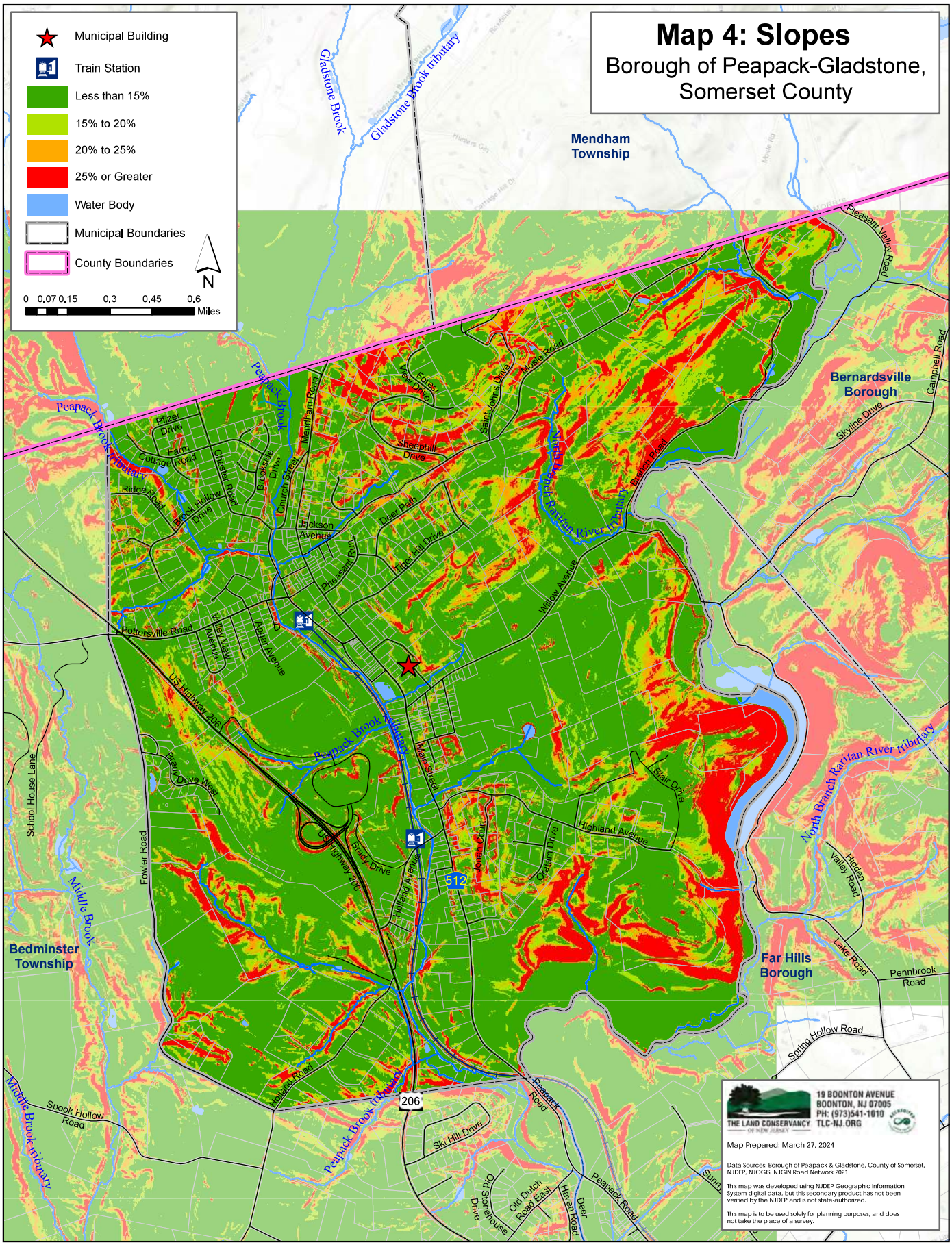
Map 4: Slopes
Borough of Peapack-Gladstone, Somerset County
Municipal Building
Train Station
Less than 15%
15% to 20%
20% to 25%
25% or Greater
Water Body
Municipal Boundaries
County Boundaries
N
0 0.07 0.15 0.3 0.45 0.6
Miles
Mendham Township
Bernardsville Borough
Bedminster Township
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Gladstone Brook
Gladstone Brook tributary
Peapack Brook
Peapack Brook tributary
North Branch Raritan River tributary
Middle Brook
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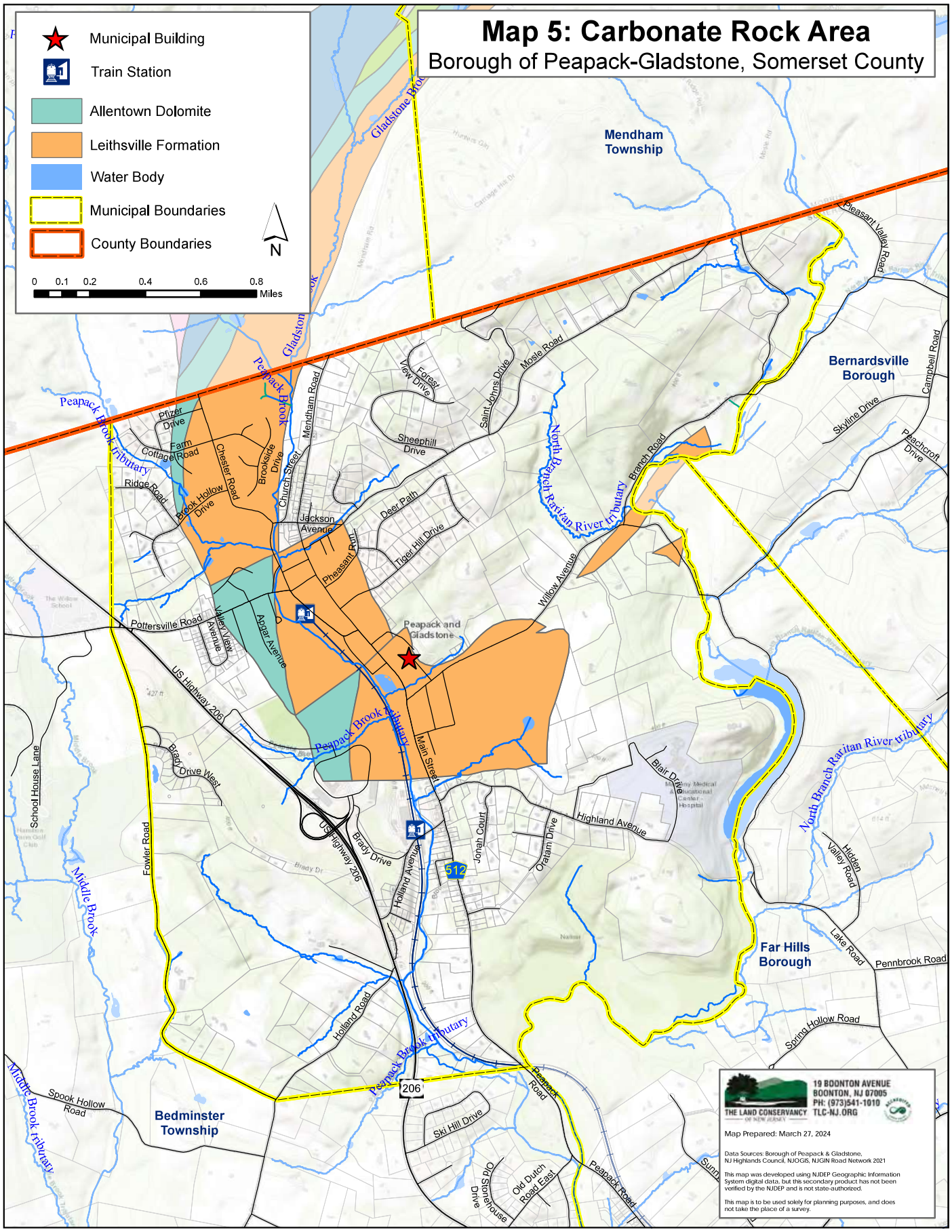
This map was developed using NJDEP Geographic Information System digital data, but this secondary product has not been verified by the NJDEP and is not state-authorized.
This map is to be used solely for planning purposes, and does not take the place of a survey.


Map 5: Carbonate Rock Area
Borough of Peapack-Gladstone, Somerset County
Municipal Building
Train Station
Allentown Dolomite
Leithsville Formation
Water Body
Municipal Boundaries
County Boundaries
N
0 0.1 0.2 0.4 0.6 0.8
Miles
Mendham Township
Bernardsville Borough
Bedminster Township
Far Hills Borough
Peapack and Gladstone
Peapack Brook tributary
North Branch Raritan River tributary
Middle Brook
Middle Brook tributary
Gladstone Brook
Mendham Road
Church Street
Pottersville Road
US Highway 206
Main Street
Brady Drive
Brady Drive West
Holland Avenue
Holland Road
Willow Avenue
Highland Avenue
Blair Drive
Jonah Court
Oratam Drive
Hidden Valley Road
Lake Road
Pennbrook Road
Spring Hollow Road
Peapack Road
Old Dutch Road East
Old Stonehouse Drive
Ski Hill Drive
Spook Hollow Road
Fowler Road
School House Lane
Pfizer Drive
Farm Cottage Road
Chester Road
Brookside Drive
Ridge Road
Brook Hollow Drive
Jackson Avenue
Deer Path
Tiger Hill Drive
Pheasant Run
Valley View Avenue
Angar Avenue
Forest View Drive
Sheephill Drive
Saint Johns Drive
Mosle Road
Pleasant Valley Road
Campbell Road
Skyline Drive
Peachcroft Drive
Branch Road
512
206
19 BOONTON AVENUE
BOONTON, NJ 07005
PH: (973)541-1010
TLC-NJ.ORG
THE LAND CONSERVANCY OF NEW JERSEY
Map Prepared: March 27, 2024
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Dower Farm, Preserved 2010

Chapter 2.

Soil

Soils Overview

Soil is the unconsolidated mineral or organic matter on the surface of the earth that has been subjected to and show the effects of genetic and environmental factors (including climate) of micro- and macro-organisms acting on parent material over a period of time. The Natural Resources Conservation Service (NRCS) Soil Survey identifies and maps over 20,000 different types in the United States.[11] Most are given names from the local area where they were first mapped, and these named soils are referred to as soil series. Soil forming factors include:

Parent Material: Some soils weather directly from the underlying rocks. The residual soils have the same general chemistry as the original rocks.

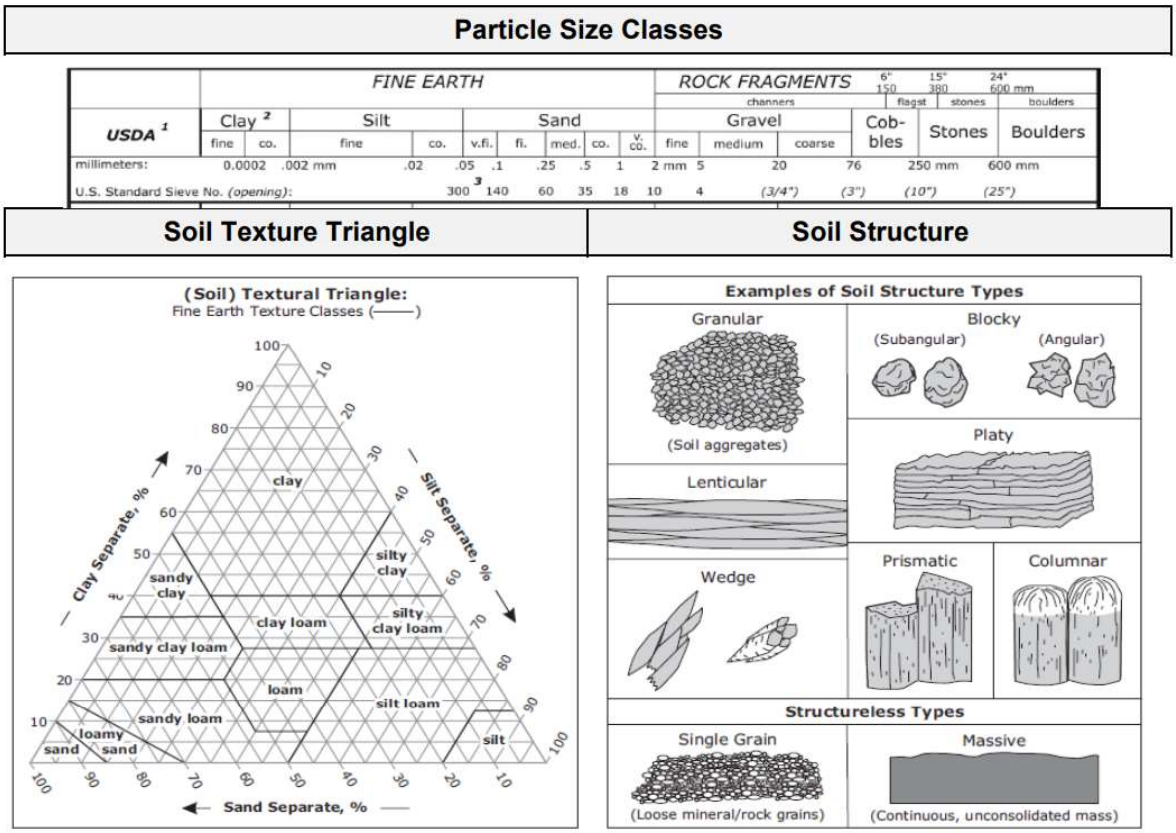
Climate: Temperature and moisture can cause different patterns of weathering and leaching. The intensity, timing, and amount of rain also influences soil formation.

Topography: The slope and aspect (direction the physical slopes face) affect the temperature and moisture content of the soil.

Biological Factors: Plants, animals, micro-organisms, and humans affect soil formation. Native vegetation depends on biology, topography, and climate factors, as well as soil factors (density, chemistry, depth, temperature, and moisture).

Time: Soil formation is continuous, always altering according to climate, landscape position, and biological activity.

Figure 4. Soil Texture and Structure
(Source: USDA)[42]



Soil Classifications

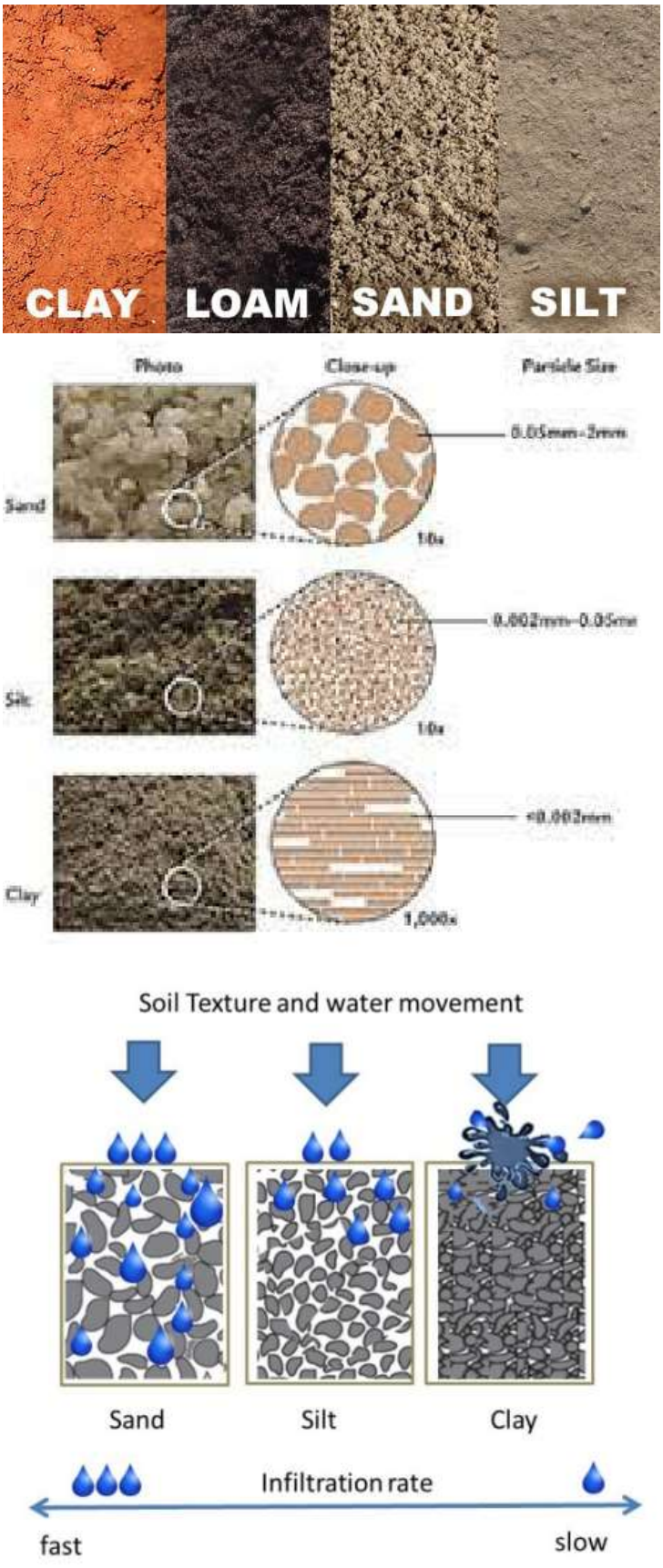
Soils are named and classified on the basis of physical and chemical properties in their layers (horizons).[12] Soil taxonomy uses the color, texture, structure, and other properties of the surface two meters deep to key the soil into a classification system to help the public use soil information The United States Department of Agriculture (USDA) defines 12 major soil texture classifications (loamy, loamy sand, sandy loam, loam, silt loam, silt sandy, clay loam, silty clay, and clay). Soil textures are classified by the fractions of sand, silt, and clay in soil. Classifications are typically named for the primary constituent particle size or the most abundant particle size (**Figure 4**).[13]

The NRCS Soil Survey plots soils by map units.[14] The names of each map unit are based on the characteristics of the dominant soils within that unit. The names identify the soils by their soil series classification(s) and has an associated abbreviation that offers a shorthand version of the naming/classification system. This identifies the soil types by steepness, stoniness, and frequency of flooding:

- **Capital letters at the end of the abbreviation indicate the slope** "A" being less steep and "E" being steeper. An example is the Pattenburg gravelly loam, which includes PdtC and PdtD. These are located around Pottersville Road, U.S. Highway 206, and Holland Road.

- **Small letters following these capital letters indicate stoniness**. "a" "b" or "c" indicate the degree of stoniness: stony, very stony, and extremely stony. An example of

Figure 5. Soil Types (top), Soil Size (middle), and Soil Texture (bottom)
(Source: Noble Research Institute)[43]



this is the Parker-Gladstone complex, PauCc, which indicates extremely stony and is found north of Willow Avenue.

- **Small letter "t" at the end of an abbreviation indicates frequently flooded**. An example of this is the Hatboro-Codorus complex (HcuAt), along the North Branch of the Raritan River.

The Soil Survey also categorizes each map unit as one of four map unit types: consociations, complexes, associations, and undifferentiated groups. The Borough of Peapack & Gladstone's soils fall into two groups: consociation and complexes.

- **Consociations (Cn)** are named for the dominant soil. In a consociation, delineated areas use a single name from the dominant component in the map unit. Dissimilar components are minor in extent. Consociations represent 71% (2,619 acres) of the Borough's total area. An example of this soil type in the Borough is the Gladstone gravelly loam.

- **Complexes (Cx)** consist of two or more dissimilar components that occur in a regularly repeating pattern. The total amount of other dissimilar components is minor in extent. Complexes represent 29% (1,055 acres) of the Borough's total area. An example of this soil type in the Borough is the Parker-Gladstone complex.

Major Soil Series

Soils with similar profiles are a soil series. The most prevalent soil series in the Borough are:[15]

- Gladstone gravelly loam,
- Parker-Gladstone complex,
- Arendtsville gravelly loam, and
- Hatboro-Codorus complex.

Together, they account for 58% (2,121 acres) of the Borough. The acreage of each series is show in **Table 3**, and the series are shown in **Map 6**. Water is not considered a soil series and is excluded.

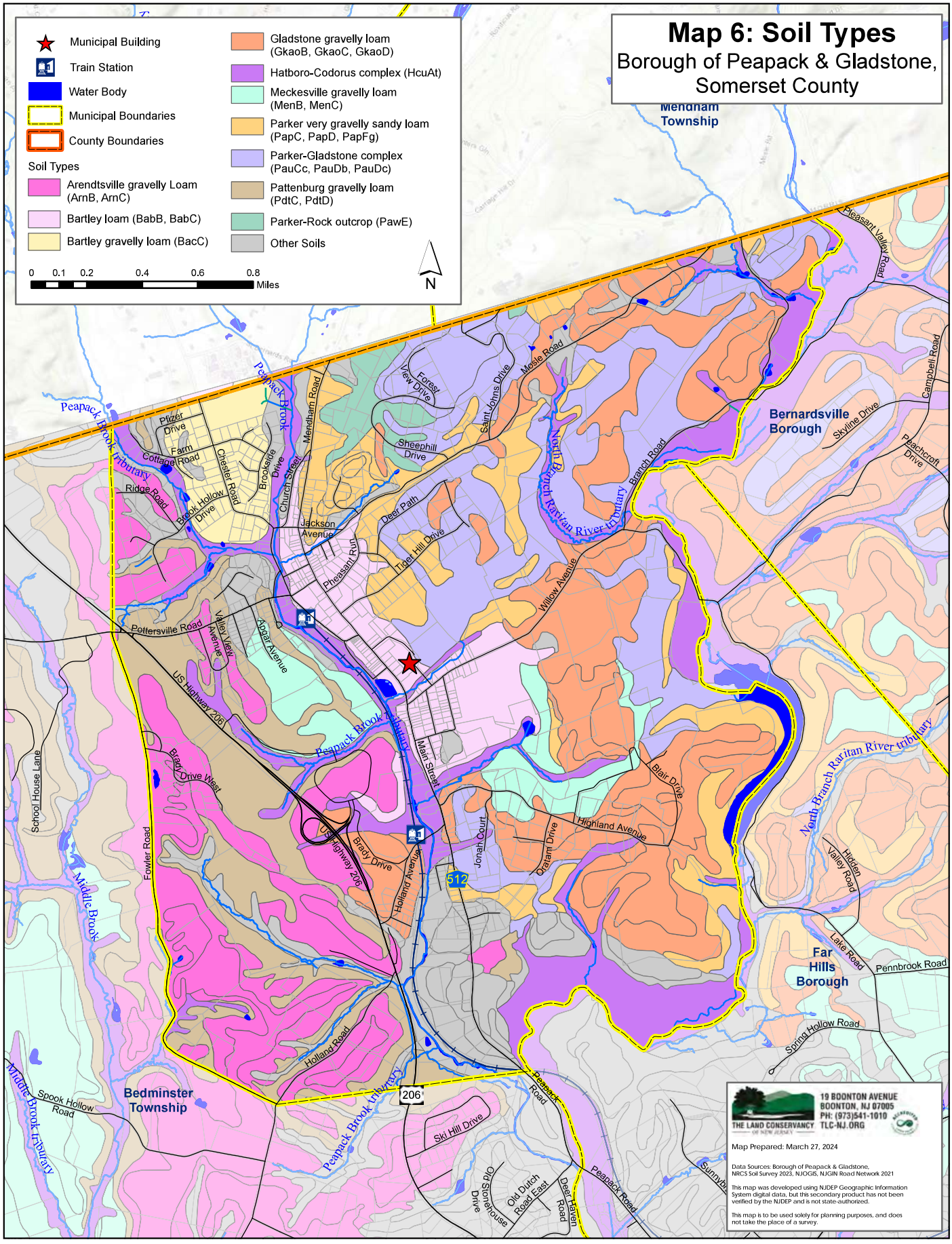
Gladstone gravelly loam

The Gladstone series consists of very deep, well drained soils formed in residuum and colluvium from granitic gneiss.[16] They occur on upland divides and rolling foothills of the Highlands province. Slope ranges

Table 3. The Borough of Peapack and Gladstone Soil Series

Soil Series	*Acres*	*% Borough*	
Major Series			
Gladstone gravelly loam (GkaoB, GkaoC, GkaoD)	685	19%	2,121 acres 58%
Parker-Gladstone complex (PauCc, PauDb, PauDc)	547	15%	
Arendtsville gravelly loam (ArnB, ArnC)	459	12%	
Hatboro-Codorus complex (HcuAt)	430	12%	
Minor Series			
Pattenburg gravelly loam (PdtC, PdtD)	358	10%	1,178 acres 32%
Parker very gravelly sandy loam (PapC, PapD, PapFg)	307	8%	
Bartley loam (BabB, BabC)	217	6%	
Meckesville gravelly loam (MenB, MenC)	138	4%	
Bartley gravelly loam (BacC)	106	3%	
Parker-Rock outcrop (PawE)	52	1%	
Other Series (each totaling 50 acres or less)			
Rowland silt loam (RorAt), Birdsboro silt loam (BhnB, BhnC), Bowmansville silt loam (BoyAt), Klinesville channery loam (KkoD, KkoE, KkoC), Penn channery silt loam (PeoB, PeoC), Califon gravelly loam (CanB), Abbottstown silt loam (AbrB), Califon loam (CakB), Neshaminy silt loam (NehEb, NehC), Neshaminy-Mount Lucas silt loams (NemDb), Norton loam (NotB), Parker gravelly sandy loam (PaoC), Penn silt loam (PenB), Penn-Klinesville channery silt loams (PgmD), Quarries (QY), Raritan silt (RarAr), Reaville deep variant channery silt loam (RerB7), & Reaville silt loam (RehB)	377	10%	377 acres 10%
Total	**3,676**	**100%**	

Source: NRCS Soil Survey (Note: Water (20 acres) is not included in this table.)


Map 6: Soil Types
Borough of Peapack & Gladstone, Somerset County
Municipal Building
Train Station
Water Body
Municipal Boundaries
County Boundaries
Soil Types
Arendtsville gravelly Loam (ArnB, ArnC)
Bartley loam (BabB, BabC)
Bartley gravelly loam (BacC)
Gladstone gravelly loam (GkaoB, GkaoC, GkaoD)
Hatboro-Codorus complex (HcuAt)
Meckesville gravelly loam (MenB, MenC)
Parker very gravelly sandy loam (PapC, PapD, PapFg)
Parker-Gladstone complex (PauCc, PauDb, PauDc)
Pattenburg gravelly loam (PdtC, PdtD)
Parker-Rock outcrop (PawE)
Other Soils
0 0.1 0.2 0.4 0.6 0.8 Miles
N
Mendham Township
Bernardsville Borough
Bedminster Township
Far Hills Borough
Peapack Brook tributary
North Branch Raritan River tributary
Middle Brook
Middle Brook tributary
Pleasant Valley Road
Campbell Road
Skyline Drive
Beachcroft Drive
Mendham Road
Meisle Road
Saint Johns Drive
Forest View Drive
Sheephill Drive
Church Street
Brookside Drive
Chester Road
Farm Cottage Road
Pfizer Drive
Ridge Road
Brook Hollow Drive
Jackson Avenue
Deer Path
Tiger Hill Drive
Pheasant Run
Willow Avenue
Branch Road
Pottersville Road
Valley View Avenue
Agar Avenue
US Highway 206
Brady Drive West
Brady Drive
Main Street
Blair Drive
Highland Avenue
Jonah Court
Graham Drive
Holland Avenue
Holland Road
School House Lane
Fowler Road
Hidden Valley Road
Lake Road
Pennbrook Road
Spring Hollow Road
Spook Hollow Road
Ski Hill Drive
Peapack Road
Old Stonehouse Drive
Old Dutch Road East
Deer Haven Road
Sunnybrook
512
206
THE LAND CONSERVANCY OF NEW JERSEY
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from zero to 65%. The underlying bedrock is granitic gneiss that, in many places, is highly weathered in the upper several inches. In the Borough of Peapack & Gladstone, the Gladstone series includes the soils from the Gladstone gravelly loam (GkaoB, GkaoC, GkaoD). Characteristics include:

- Drainage and permeability: Gladstone soils are well drained. Saturated hydraulic conductivity is moderately high in the subsoil and high in the substratum. Runoff is medium or high.

- Use and vegetation: Most non-stony areas are utilized for crop production. Dominant crops are corn, small grains, soybeans, fruit, hay and pasture. A portion of the gently sloping and sloping areas are developed. Most areas with stony surface are woodland. Tree species are dominantly upland oaks, yellow poplar, ash and hickory.

The Gladstone gravelly loam comprises 19% of the Borough, totaling 685 acres. It is found in the northern, higher elevation section of the Borough.

Parker-Gladstone complex

The Parker-Gladstone complex (PauCc, PauDb, PauDc) consists of soils from the Gladstone, Parker, and Wheaton consociations. They are from the very deep, well drained soils formed in residuum and colluvium from granitic gneiss.[17,18] They occur on upland divides, gentle to very steep slopes of ridges and hills rolling foothills of the Highlands. Slope ranges from zero to 25%. The underlying bedrock is granitic gneiss. Characteristics include:

- Drainage and permeability: Parker-Gladstone complex soils are well drained. Saturated hydraulic conductivity is moderately high in the subsoil and high in the substratum. Runoff ranges from low or high.

- Use and vegetation: Most non-stony areas are utilized for crop or tree production. Areas with stony surface are in woodland. Tree species are dominantly upland oaks, red cedar, dogwood, and hickory.

The Parker-Gladstone complex comprises 15% of the Borough, totaling 547 acres. It is found in the northeastern, higher elevation areas of the Borough.

Arendtsville gravelly loam

Arendtsville gravelly loam (ArnB, ArnC) consists of very deep, well drained soils formed in materials weathered from quartzite, sandstone, aporhyolite, and other rocks.[19] They occur on gentle sloping to steep dissected uplands. Slope ranges from two to 12%. Characteristics include:

- Drainage and permeability: Arendtsville soils are well drained. Permeability is moderate to moderately rapid.

- Use and vegetation: Most of these soils are cleared and are commonly used for orchards. Wooded areas are in hardwoods of mixed oak.

Arendtsville gravelly loam comprises 12% of the Borough, totaling 459 acres. It is found primarily in the west in areas with farm or cleared lands.

The Hatboro-Codorus Complex

The Hatboro-Codorus complex (HcuAt) consists of very deep and poorly drained soils formed in alluvium derived from metamorphic and crystalline rock and are on floodplains.[20, 21] They formed in alluvial materials containing medium to large quantities of mica derived from schist, gneiss, phyllite and other metamorphic rocks. Slope ranges from zero to 3%. Characteristics are:

- Drainage and permeability: Hatboro-Codorus series is moderately well drained and poorly drained. Surface runoff is low. saturated hydraulic conductivity is moderately high.

- Use and Vegetation: Approximately 60% of Hatboro-Codorus soils are pasture, 25% is woodlands and the remaining are a mixture of cropland and mixed hardwoods.

Hatboro-Codorus soils comprise 12% of the Borough, totaling 430 acres. and are located around major waterways such as Peapack Brook, Peapack Brook Tributary, and the tributary to the North Branch of the Raritan River.

Minor Soil Series
(13% of the Borough)

Pattenburg gravelly loam

Pattenburg gravelly loam (PdtC, PdtD) consists of deep and very deep, well drained soils on uplands. They formed in residuum weathered from reddish quartzose conglomerate or fanglomerate.[22] Slope ranges from two to 45%. Characteristics include:

- Drainage and permeability: Pattenburg soils are well drained. Saturated hydraulic conductivity is high. Runoff is very low to medium, depending on slope.

- Use and vegetation: Most of these soil areas are wooded. Locally, gentle slopes are cleared and used for growing corn, hay or pasture. Natural vegetation is forest of red oak, black oak, chestnut oak and white oak, some beech, yellow poplar, black birch and ash.

Pattenburg gravelly loam comprises 10% of the Borough, totaling 358 acres. It is found primarily in the wooded areas in the west of the Borough.

Parker gravelly sandy loam series

The Parker gravelly sandy loam series consists of very deep, somewhat excessively drained soils that formed in residuum derived from granitic gneiss bedrock. They occur on gently sloping to very steep slopes of ridges and hills.[23] Slope ranges from three to 75%. In the Borough of Peapack & Gladstone this series consists of very gravelly sandy loam (PapC, PapD, PapFg) and the gravelly sandy loam (PaoC). Characteristics include:

- Drainage and permeability: Parker gravelly sandy loam series are somewhat excessively drained. Permeability is moderately rapid. Runoff ranges from very low to medium.

- Use and vegetation: Less than half of the Parker soils are cleared of trees and stones for growing crops. Most cleared areas are idle for a number of years and are in various stages of second growth forest dominantly of dogwood and

red cedar. On Parker soils which have not been cleared but have been logged, the vegetation is the oak-hickory forest.

Parker very gravelly sandy loam (PapC, PapD, PapFg) comprises 8% of the Borough, totaling 307 acres. It is found in pockets in the northern and southeastern areas of the Borough.

Bartley loam series

The Bartley loam series consists of very deep, moderately well drained soils that formed in glacial drift or colluvium and underlying residuum derived mainly from limestone and granitic gneiss.[24] These soils have a fragipan in the lower part of the solum. They occur on broad, nearly level to strongly sloping till and in heads of drains. Slope ranges from zero to 15%. In the Borough of Peapack & Gladstone this series consists of Bartley loam (BabB, BabC) and Bartley gravelly loam (BacC). Characteristics include:

- Drainage and permeability: the Bartley loam series is moderately well drained. Saturated hydraulic conductivity is moderately high in the upper solum (above the fragipan) and moderately low or moderately high in the lower solum (fragipan). Runoff is low to high (depending on slope).

- Use and vegetation: Nearly all of these soils are cleared and used for pasture or general farm crops. Wooded areas are in mixed hardwoods consisting predominantly of red and black oak, white oak, hickory and sugar maple.

Bartley loam (BabB, BabC) comprises 6% of the Borough, totaling 217 acres. It is found primarily in middle of the Borough in the more developed areas east of Main Street.

Bartley gravelly loam (BacC) comprises 3% of the Borough totaling 106 acres. It is found in the northwest border of the Borough surrounding Chester Road.

Mecklesville gravelly loam

Meckesville gravelly loam (MenB, MenC) consists of very deep well drained soils formed in colluvium, glacial till, from red acid sandstone, siltstone and shale. They are on the concave sideslopes of upland ridges.[25] Slope ranges from zero to 60%. Characteristics include:

- Drainage and permeability: Meckesville gravelly loam is well drained. Permeability is moderately slow. Runoff ranges from negligible to very high.

- Use and vegetation: Approximately 70% of the loam is woodland and 30% is cropland, pastureland, and idle land. Forested areas are dominantly oak, maple, and ash species

Meckesville gravelly loam comprises 4% of the Borough, totaling 138 acres. It is found on patches of developed land in the middle of the Borough.

Parker-Rock Outcrop

Parker-Rock outcrop (PawE) consists of soils from the Parker, Rock outcrop, and Gladstone consociations. They are from the very deep, well drained soils formed in residuum and colluvium from granitic gneiss.[26] They occur on upland divides, very steep slopes of ridges and hills rolling foothills of the

Highlands. Slope ranges from 40 to 80%.[27] Characteristics include:

- Drainage and permeability: Parker-Rock outcrop soils are somewhat excessively drained. Permeability is moderately rapid. Runoff ranges from very low to rapid.

- Use and vegetation: Most non-stony areas are used for crop or tree production. Most areas with stony surface are woodland. Tree species are dominantly oaks, red cedar, dogwood, and hickory.

Parker-Rock outcrop comprises one percent of the Borough, totaling 52 acres. It is found in the northern edge, east of Mendham Road.

Other Soil Series
(10% of the Borough)

Rowland silt loam (RorAt)

Rowland silt loam (RorAt) consists of very deep, moderately well and somewhat poorly drained soils formed in alluvial sediments weathered from red and brown shale, sandstone, and conglomerate.[28] Slope ranges from zero to 3%. Characteristics include:

- Drainage and permeability: Rowland silt loam is moderately well and somewhat poorly drained. Saturated hydraulic conductivity is moderately high to high above about 40 inches and high in the underlying stratified sand and gravel. Runoff is low.

- Use and vegetation: The loam consists mostly of cleared pasture or cropland. Wooded areas are mixed hardwoods.

Rowland silt loam comprises one percent of the Borough (51 acres).

Birdsboro silt loam

Birdsboro silt loam (BhnB, BhnC) consists of very deep, well drained, and moderately well drained soils. The soils formed in old alluvial deposits derived from red sandstone, shale, and siltstone. They are on terraces and alluvial fans with convex slopes.[29] Slope ranges from zero to 15%. Characteristics include:

- Drainage and permeability: Birdsboro silt loam is well drained and moderately well drained. Saturated hydraulic conductivity is moderately high to high. Runoff is low to rapid.

- Use and vegetation: The loam consists mostly of cleared pasture (65%), 10% wooded areas of mixed hardwoods, and 25% is non-agriculture uses.

Birdsboro silt loam comprises one percent of the Borough, 48 acres.

Bowmansville silt loam (BoyAt)

Bowmansville silt loam (BoyAt) consists of very deep, poorly and somewhat poorly drained soils. They formed in recent alluvial deposits derived from upland soil materials weathered from dolerite or basalt. Bowmansville soils are on nearly level floodplains.[30] Slope ranges from zero to 3%. Characteristics include:

- Drainage and permeability: Bowmansville silt loam is poorly drained and somewhat poorly drained. Saturated hydraulic conductivity is moderately high above stratified sand and gravel

and high in stratified sand and gravel. Runoff is high to very high.

- Use and vegetation: The loam consists mostly of cleared pasture (60%), and mixed hardwoods.

There are 46 acres of this soil type.

Califon loam series

The Califon loam series consists of very deep, moderately well or somewhat poorly drained soils formed either in old till or on driftless landscapes in the Piedmont in colluvium from granitic gneiss on upland flats or concave slope positions.[31] Slope ranges from zero to 15%. In the Borough of Peapack & Gladstone this series consists of Califon gravelly loam (CanBb, CanB) and Califon loam (CakB). Characteristics include:

- Drainage and permeability: Califon loam series is moderately well or somewhat poorly drained. Saturated hydraulic conductivity is moderately low in the fragipan and moderately high in the substratum. Runoff is high to very high.

- Use and vegetation: Only a small part of the Califon soils are now cultivated. They are used mainly for pasture, hay and woodland. Natural vegetation is red maple, pin oak, yellow poplar and elm.

Califon gravelly loam (CanBb, CanB) comprises 28 acres and Califon loam (CakB) totals 4 acres in the Borough.

Klinesville channery loam

Klinesville channery loam (KkoD, KkoE, KkoC) consists of shallow, somewhat excessively drained soils formed in residuum derived from red shale, siltstone, slate, and fine-grained sandstone. They are on dissected uplands. Klinesville soils are gently sloping to very steep upland soils on convex positions.[32] Slope ranges from three to 80%. Characteristics include:

- Drainage and permeability: Klinesville channery loam is somewhat excessively drained. Saturated hydraulic conductivity is high. Runoff is medium to very rapid.

- Use and vegetation: It is mainly forest or pasture. Locally the less sloping areas are used for growing hay and tilled crops. Common trees are chestnut oak, black oak and Virginia pine.

Klinesville channery loam comprises 43 acres in the Borough.

Penn loam series

The Penn loam series consists of moderately deep, well drained soils formed in residuum weathered from noncalcareous reddish shale, siltstone, and fine-grained sandstone.[33] Slope ranges from zero to 60%. In the Borough this series consists of Penn channery silt loam (PeoB, PeoC), Penn silt loam (PenB) and Penn-Klinesville channery silt loams (PgmD). Characteristics include:

- Drainage and permeability: Penn loam series is well drained. Saturated hydraulic conductivity is moderately high to high. Runoff is medium to very rapid.

- Use and vegetation: About 75% of Penn loam is cleared and largely used for rotation cropland.

Woodlands are mixed hardwoods dominated by oaks.

Penn channery silt loam (PeoB, PeoC) totals 38 acres. Penn silt loam (PenB) comprises 19 acres. Penn-Klinesville channery silt loams (PgmD) total 21 acres in the Borough.

Norton loam

Norton loam (NotB) consists of deep well drained soils on uplands. They formed in fine textured red till or colluvium.[34] Slope ranges from zero to 20%. Characteristics include:

- Drainage and permeability: Norton loam is well drained. Permeability is very slow. Runoff is slow on the predominantly gentle slopes. They are slowly permeable. Water may be perched for short periods.

- Use and vegetation: Most of the soil has been cleared and cropped chiefly to small grain, corn, soybeans and hay or is in pasture. Wild vegetation consists mainly of oaks, hickories, beeches and maples.

Norton loam totals 24 acres.

Neshaminy silt loam series

The Neshaminy loam series consists of deep and very deep, well drained soils formed in materials weathered from diabase and other dark colored basic rocks. They are nearly level to very steep slopes on uplands.[35] Slope ranges from zero to 70%. In the Borough this series consists of Neshaminy silt loam (NehEb, NehC) and Neshaminy-Mount Lucas silt loams (NemDb). Characteristics include:

- Drainage and permeability: the Neshaminy silt loam series is well drained. Saturated hydraulic conductivity is moderately high. Runoff is slow to very rapid.

- Use and vegetation: Stony and steep areas are mostly in woodland of mixed hardwoods, dominated by oaks and hickories. Some less steep or non-stony areas are used for cropland, hay, and pasture. Some of the area has been developed for urban or suburban communities.

Neshaminy silt loam (NehEb, NehC) is 13 acres and Neshaminy-Mount Lucas silt loams (NemDb) total 6 acres.

Raritan silt loam

Raritan silt loam (RarAr) consists of very deep, moderately well or somewhat poorly drained soils formed in sediments from red noncalcareous shale, siltstone, and sandstone. Raritan soils are on nearly level to strongly sloping stream terraces, usually above present overflow.[36] Slope ranges from zero to 15%. Characteristics include:

- Drainage and permeability: Raritan silt loam is moderately well and somewhat poorly drained. Saturated hydraulic conductivity is moderately slow. Runoff is medium.

- Use and vegetation: Most of the soil has been cleared for crop land and urban land. Remaining woodlands are mixed hardwoods.

Raritan silt loam comprises 8 acres.

Reaville silt loam series

The Reaville silt loam series consists moderately deep, moderately well and somewhat poorly drained soils, interbedded shale, siltstone, and fine-grained sandstone.[37] Slope ranges from zero to 15%. In the Borough this series consists of Reaville deep variant channery silt loam (RerB) and Reaville silt loam (RehB). Characteristics include:

- Drainage and permeability: Reaville silt loam series is moderately well and somewhat poorly drained. Saturated hydraulic conductivity is moderately low. Runoff is medium to slow.

- Use and vegetation: Most of the soil has been cleared for hay, small grain, and corn are the principal crops, and some areas are in pasture and urban land.

Reaville deep variant channery silt loam (RerB7) is 5 acres and Reaville silt loam (RehB) totals 3 acres.

Abbottstown silt loam

Abbottstown silt loam (AbrB) consists of deep and very deep, somewhat poorly drained soils. They formed in residuum from acid red shale, siltstone and sandstone. Abbottstown soils are on nearly level to sloping concave upland flats, depressions and drainageways.[38] Slope ranges from zero to 15%. Characteristics include:

- Drainage and permeability: Abbottstown silt loam is somewhat poorly drained. Saturated hydraulic conductivity is moderately low to moderately high above the fragipan and moderately low in and below the fragipan. Runoff is medium on nearly level slopes, high on gentle slopes and very high on strongly sloping or moderately steep areas.

- Use and vegetation: Approximately 85% of the Abbottstown soils are used for cropland and pasture. Wooded areas consist of mostly hardwoods, mainly hickory and oak.

Abbottstown silt loam totals 6 acres.

Quarries (QY), within the other soils series, generally consists of disturbed areas that result from mining activities and whose components are not specified. Quarries make up 10 acres.

Soil Characteristics

Hydric Soils

A hydric soil is formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part.[39] Hydric soils are an important element of wetlands and support wetland vegetation. If a soil is classified as hydric, federal/state regulations may restrict land use.

Within the Borough of nine soils have a hydric rating, making up 634 acres or 17% of the Borough. They are generally concentrated along the edges of the Borough's waterways and wetlands:

- Abbottstown silt loam.
- Birdsboro silt loam.
- Bowmansville silt loam.
- Califon loam.
- Hatboro-Codorus complex.
- Neshaminy-Mount Lucas silt loams.
- Raritan silt loam.
- Reaville silt loam.
- Rowland silt loam.

Erodibility

Soils can be categorized by their susceptibility to erosion, the natural process by which wind, moving water, ice, and gravitational forces cause soil and particulate materials to be displaced. While erosion of exposed bedrock occurs over an extended time scale, soil erosion can occur more acutely with more immediate consequences. The consistency of the soil is one factor determining its erodibility potential, with dense, compact, clayey soils being less susceptible and looser loamy soils, with varying levels of clay and sand, being more susceptible.

A measure of this susceptibility is the K-factor. The K-factor looks at the soil texture and composition as well as the permeability to determine a number between 0.02 (less susceptible) and 0.69 (more susceptible) that demonstrates the erosion potential of a soil.

According to the NRCS, Erosion Hazard for Road/Trail Soils measures the soil loss from unsurfaced roads and trails. The soils in the Borough of Peapack & Gladstone (outside of water and urban land) are more subseptable to erosion. For the Borough's two main soil units (Gladstone gravelly loam and Parker-Gladstone complex), K values are at or above 0.50, representing a moderate to high risk of erosion.

Topographic Protection (Wind)

According to the NRCS, the soils in the municipality are subject to erosion by wind.[40] Wind erosion most often affects soil on bare lands, where sheer force of wind detaches particles protruding from the soil surface. Maintaining surface cover will help minimize damage due to wind erosion.

Wind erosion is measured by group and index. Wind erodibility groups consist of soils that have similar properties that affect their susceptibility to wind erosion. Soils in Group 1 are most susceptible to wind erosion, while soils in Group 8 are less susceptible to wind erosion. According to the NRCS, the four major soils units in the Borough are either in Group 5 for wind erodibility (Hatboro-Codorus complex) or in Group 6 (Gladstone gravelly loam, Park-Gladstone complex, Arendtsville gravelly loam).

Limitations for Use

Other characteristics of soil that determine suitability for development, including its capacity to support foundations without corrosion, limits for septic systems, and hydrological characteristics such as tendency towards ponding and flooding, a shallow water table or potential for frost heave, can contraindicate development.

According to the NRCS Soil Survey, differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high-water table makes soil poorly suited to basements or underground installations (**Table 4**).

Limitations for use include the following characteristics:

Depth to restrictive layer is the vertical distance from the soil surface to the upper boundary of the restrictive layer. The restrictive layer is a nearly continuous layer that impedes the movement of water and air through the soil or otherwise provides an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. Depth to restrictive layer may vary throughout a unit, so a representative value is given, indicating the expected value at any site within the unit. Shallow soils can limit plant growth. In the Borough of Peapack & Gladstone, Gladstone gravelly loam has a depth to restrictive layer ranging from 60 to 80 centimeters (cm) and the Parker-Gladstone complex has a depth ranging from 39 to 80 cm.

Drainage refers to the relative wetness of the soil under natural conditions as it pertains to wetness due to a water table. Drainage classes refer to the frequency and duration of wet periods under conditions similar to those under which the soil developed. Drainage classes range from excessively

Table 4. Soil Limitations

	Major Soil Series in the Borough of Peapack & Gladstone			
	Gladstone gravelly loam	**Parker-Gladstone complex**	**Arendtsville gravelly loam**	**Hatboro-Codorus complex**
Depth to Restrictive Feature (cm)	60 - 80	39 - 80	N/A	N/A
Drainage	Well Drained	Somewhat excessively drained	Well drained	Poorly Drained
Depth to Water Table (cm)	>200	>200	>200	8
Available Water Capacity	N/A	N/A	N/A	N/A
Flooding	None	None	None	Frequent
Frost Action Potential	Moderate	Moderate	Moderate	High
Ponding	None	None	None	Frequent
Risk of Corrosion Steel	low	Moderate	Moderate - High	Moderate - High
Risk of Corrosion Concrete	Moderate	Moderate	High	Moderate
Septic Limitations	N/A	N/A	N/A	N/A

Source: NRCS Soil Survey

drained (water is removed very rapidly and the soils are commonly coarse-textured or shallow) to very poorly drained (water is removed from the soil so slowly that free water remains at or very near the ground surface during much of the growing season and unless artificially drained, most crops cannot be grown). In the Borough, the four major soil series are well drained to excessively drained with the exception of the Hatboro-Codorus complex which is poorly drained.

Depth to water table indicates a range of expected depth to a saturated zone in the soil, known as a "water table," that occurs during several months in most years. A saturated zone that lasts for less than a month is not considered a water table. In the Borough, the four major soil series rating is greater than 200 cm except for the Hatboro-Codorus complex which has a rating of 8.

Flooding is the temporary inundation of an area caused by overflowing streams or by runoff from adjacent slopes. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent.

- **None** means that flooding is not probable. The chance of flooding is nearly zero in any year. Flooding occurs less than once in 500 years.

- **Very rare** means that flooding is very unlikely but possible under extremely unusual weather conditions. The chance of flooding is less than one percent.

- **Rare** means that flooding is unlikely but possible under unusual weather conditions. The chance of flooding is one to five percent in any year.

- **Occasional** means that flooding occurs infrequently under normal weather conditions. The chance of flooding is five to 50% in any year.

- **Frequent** means that flooding is likely to occur often under normal weather conditions. The chance of flooding is more than 50% in any year but is less than 50% in all months in any year.

- **Very frequent** means that flooding is likely to occur often under normal weather conditions. The chance of flooding is more than 50%.

Given the well-drained loamy and gravelly soils throughout the Borough, none of the major soil series are prone to flooding except for the Hatboro-Codorus complex which frequently floods.

Potential for frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Silty and highly structured, clayey soils that have a high-water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures. In the Borough of Peapack & Gladstone, the four major

soil series's frost action potential is moderate except for the Hatboro-Codorus complex which has a high frost action potential.

Ponding is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. Frequency is expressed as none, rare, occasional, and frequent.

- **None** means that ponding is not probable.
- **Rare** is unlikely but possible under unusual weather conditions (the chance of ponding is nearly zero to 5% in any year).
- **Occasional** is it occurs, on the average, once or less in two years (the chance of ponding is five to 50% in any year).
- **Frequent** is that it occurs, on the average, more than once in two years (the chance of ponding is more than 50% in any year).

Ponding in the Borough was ranked as none for all major soil series except the Hatboro-Codorus complex which has frequent ponding.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil.

The corrosion of steel in the Borough's soils is rated as moderate to high for the major soil series except for the Gladstone gravelly loam which is rated as low. However, the corrosion of concrete is rated as moderate for all major soils except for the Ardentsville gravelly loam which is has a high risk for corrosion.

Soil Limitations for Building Site Development

The Borough of Peapack & Gladstone has certain soils that are rated by the NRCS Web Soil Survey as having some limits on their ability to support dwellings with or without basements and small commercial buildings. For the purpose of these ratings, dwellings are defined as single-family houses of three stories or less and small commercial buildings are structures that are fewer than three stories high and do not have basements. The ratings for dwellings are based on the soil properties that affect excavation and construction costs.

- For dwellings without basements and small commercial buildings, the foundation is assumed to consist of spread footing of reinforced concrete built on undisturbed soil at a depth of 2 feet or at a depth of maximum frost penetration, whichever is deeper.
- For dwellings with basements, the foundation is assumed to consist of spread footings of reinforced concrete built in undisturbed soil at a depth of about 7 feet.

The properties that affect the load-supporting capacity include depth to a water table, ponding and flooding, subsidence, linear

extensibility (shrink-swell potential), and compressibility. Properties that affect excavation and construction costs are depth to a water table, ponding and flooding, slope, depth to bedrock or cemented pan, hardness of bedrock or cemented pan, and the amount and size of rock fragments. The ratings are as follows:

- 50% (1,835 acres) of the Borough is very limited, which indicates that the soil has one or more features that are unfavorable for dwellings with basements.
- 34% (1,249 acres) of the Borough is somewhat limited, which indicates that the limitations can be overcome or minimized by planning, design, or installation.
- 16% (582 acres) of the Borough is not limited, meaning the soil has conditions that is favorable for basement dwellings.

Limitations - Recreational Use

The NRCS Soil Survey also provides general recommendations with the capacity of the soil to support recreational use. This includes camping, hiking, picnicking and playgrounds (**Table 5**). In the Borough of Peapack & Gladstone, the soils in this category range from somewhat limited to very limited.

Agricultural Soils

Agricultural soils that are considered **Prime Farmland** have the best physical and chemical characteristics to produce food and have high crop yields.[41] Farmlands that do not meet the federal requirements for farmland soils but meet the state requirements are considered **Farmland of Statewide Importance**. These often produce high yields of crops in favorable conditions. **Soils of Local Importance** do not meet federal or state requirements crop yields, but produce high value food and are important to the local economy. According to the Borough's 2024 Comprehensive Farmland Preservation Plan, 754 acres (20%) are considered Prime Farmland Soils, 1,161 acres (31%) are considered Soils of Statewide Importance, and 57 acres (2%) are considered Soils of Local Importance (**Appendix A**).

Table 5. Soil Limitations for Recreational Use in the Borough of Peapack & Gladstone

Major Soil Units	Camp Area	Picnic Area	Playground
Gladstone gravelly loam	Somewhat to Very Limited	Somewhat to Very Limited	Very Limited
Parker-Gladstone complex	Very Limited	Very Limited	Very Limited
Arendtsville gravelly loam	Somewhat limited	Somewhat limited	Somewhat limited
Hatboro-Codorus complex	Very Limited	Somewhat Limited	Very Limited

Source: NRCS Soil Survey

Rockabye Meadow Tree Plantation

Chapter 3.

Land Use Land Cover

The Borough of Peapack & Gladstone is a mixture of suburban and rural development surrounded with wooded watershed lands. According to the 2020 Land Use/Land Cover mapping produced by the NJDEP, the Borough is evenly split between forest and developed lands (40% each), and 20% of the town is agricultural land and fields.[44]

The NJDEP identifies land cover using digital orthophotography and color infrared images. There are five major categories of land cover mapped by the NJDEP:[45]

- **Urban land:** 40% of the Borough. The NJDEP characterizes the landscape as altered by human activities. Structures are usually present. Categories in Peapack & Gladstone include residential, commercial, industrial, transportation, communication and utilities, and recreation. Urban land saw the largest increase in land use percentage from 1995 with a 42% jump. This was an increase of roughly 400 acres, which came from residential developments, utilities (such as the KDC Solar Project), and the conversion of agricultural land at Natirar to property used for recreation.
- **Forest:** 41% of Peapack & Gladstone is forested. There was a 7% decrease since 1995 mainly due to the increase in residences which caused a loss of 100 acres. Forested land is found along ridges, stream corridors, and at

the edges of agricultural fields in the Borough.

- **Agriculture:** 16% of the total land area in the Borough is mapped as agriculture. Between 1995 and 2020 there was a 36% decrease making it the largest loss of land use in that span. The majority of the loss is attributed to urban development, including residences off of Pottersville Road and the KDC Solar Project. These developments caused a loss of just over 300 acres since 1995. There are nearly 600 acres of land currently identified as agricultural in Peapack & Gladstone. This includes Riverbend Farm on Branch Road, Bluebird Farm on Willow Avenue, Essex Hunt Club and Fox Hounds off Holland Road, Greenbriar Farm off Route 206, and the Dower Tree Farm off Todd Road. **Appendix A** further breaks down the soils.

- **Water and wetlands:** 3% of the Borough is mapped as open water and wetlands primarily streams, artificial lakes, and wooded wetlands.

- **Barren land:** Less than one percent of Peapack & Gladstone falls within this category and is identified as characterized by thin soil, sand or rocks and a lack of vegetative cover in a non-urban setting. In the Borough, this includes construction at the Pendry Natirar (hotel at Natirar), as well as along Pine Meadow Lane leading to LKE Catering. Barren land has decreased since 1995 by two acres, from 13 to 11 acres.

Map 7, **Table 6**, and **Figure 6** document the land use in the Borough of Peapack & Gladstone.

Table 6 highlights the change in land cover over the past 25 years.

Figure 6 breaks down the urban land use into specific classifications, with over half of this category identified as residential.

In the **2013 Environmental Resource Inventory** the Borough identified areas of historical and cultural significance that remains relevant today (**Appendix B**).

Table 6. Land Cover between 1995 and 2020, Borough of Peapack & Gladstone

Type	Acres and Percent of the Borough		% Change 1995-2020
	1995	2020	
Agriculture	924 (21%)	592 (16%)	-36%
Barren	13 (<1%)	11 (<1%)	-16%
Forest	1,615 (44%)	1,500 (41%)	-7%
Urban	1,043 (28%	1,480 (40%)	42%
Water	38 (1%)	52 (1%)	38%
Wetlands	63 (2%)	62 (2%)	-2%
Total:	**3,696**	**3,696**	

Source: Land Use Land Cover 1995-2020, NJDEP

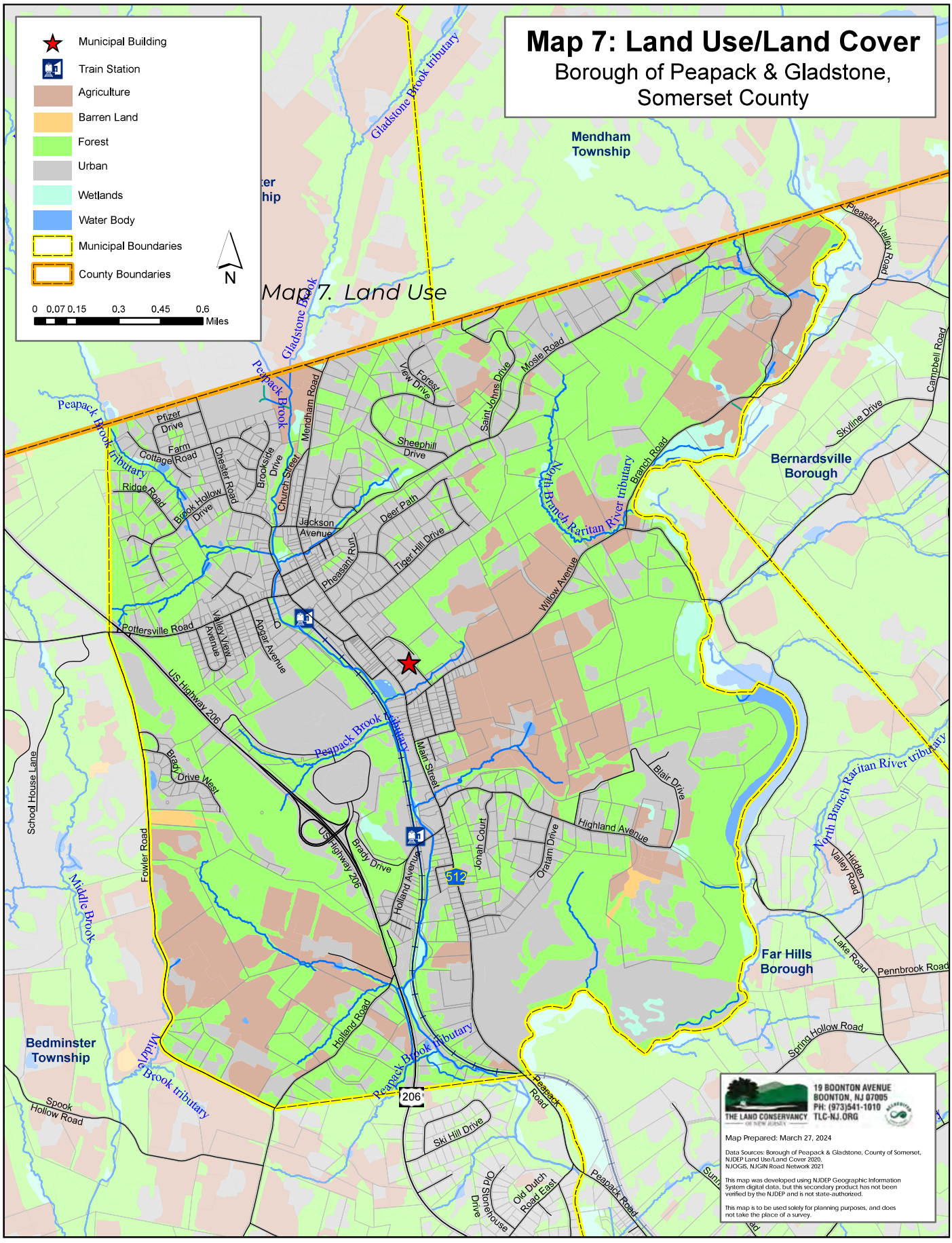
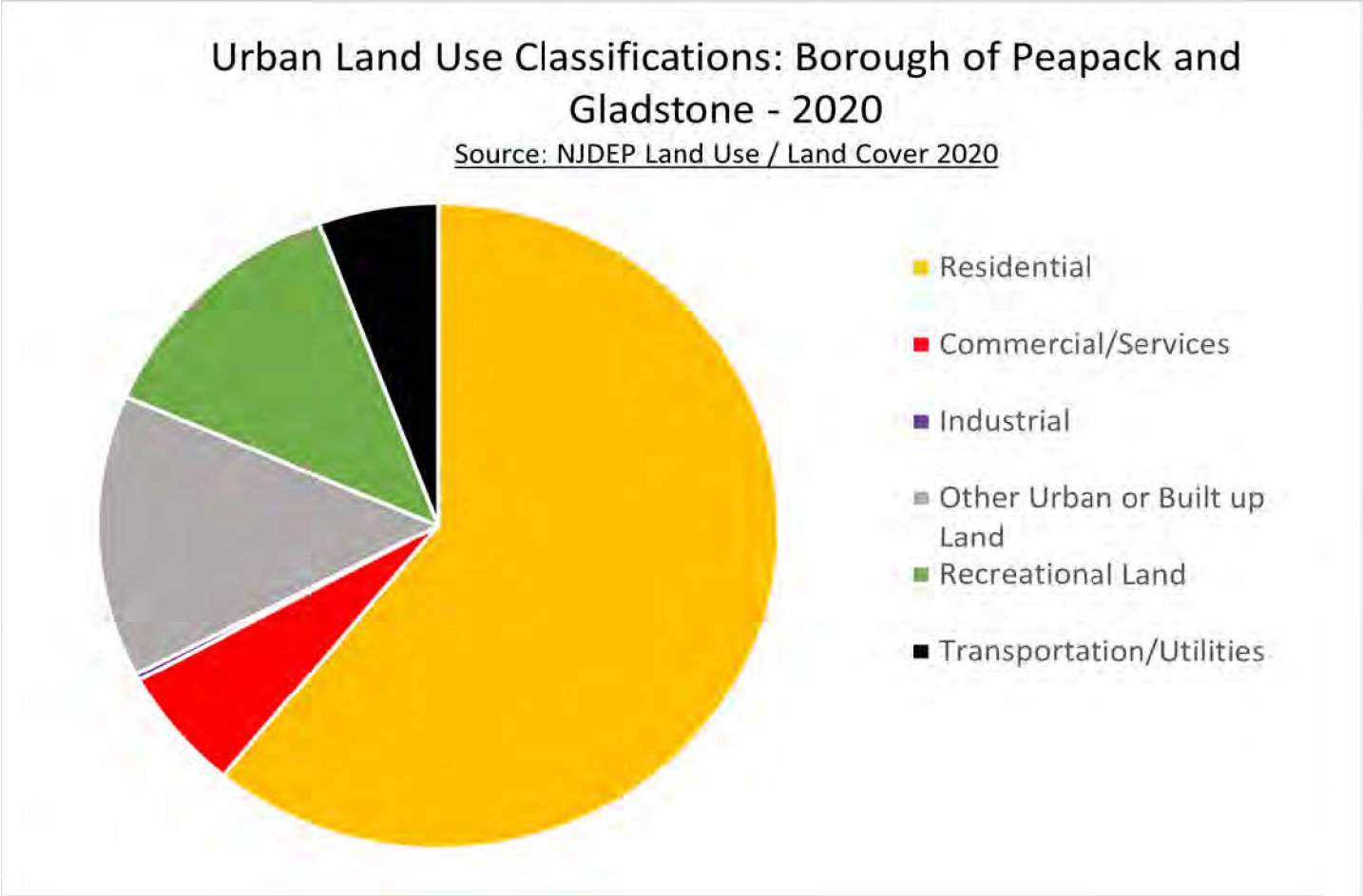

Map 7: Land Use/Land Cover
Borough of Peapack & Gladstone, Somerset County
Municipal Building
Train Station
Agriculture
Barren Land
Forest
Urban
Wetlands
Water Body
Municipal Boundaries
County Boundaries
N
0 0.07 0.15 0.3 0.45 0.6
Miles
Map 7. Land Use
Mendham Township
Bernardsville Borough
Far Hills Borough
Bedminster Township
Gladstone Brook tributary
Gladstone Brook
Peapack Brook
Peapack Brook Tributary
North Branch Raritan River tributary
Middle Brook
Middle Brook tributary
Pleasant Valley Road
Campbell Road
Skyline Drive
Mosle Road
Mendham Road
Forest View Drive
Saint Johns Drive
Sheephill Drive
Pfizer Drive
Farm Cottage Road
Chester Road
Brookside Drive
Church Street
Ridge Road
Brook Hollow Drive
Jackson Avenue
Deer Path
Tiger Hill Drive
Pheasant Run
Branch Road
Willow Avenue
Pottersville Road
Valley View Avenue
Appar Avenue
US Highway 206
Brady Drive West
Brady Drive
Main Street
Holland Avenue
Jonah Court
Oratam Drive
Highland Avenue
Blair Drive
Hidden Valley Road
Lake Road
Pennbrook Road
Spring Hollow Road
Holland Road
Peapack Road
Ski Hill Drive
Old Stonehouse Drive
Old Dutch Road East
Spook Hollow Road
School House Lane
Fowler Road
512
206
19 BOONTON AVENUE
BOONTON, NJ 07005
PH: (973)541-1010
TLC-NJ.ORG
THE LAND CONSERVANCY OF NEW JERSEY
Map Prepared: March 27, 2024
Data Sources: Borough of Peapack & Gladstone, County of Somerset, NJDEP Land Use/Land Cover 2020, NJOGIS, NJGIN Road Network 2021
This map was developed using NJDEP Geographic Information System digital data, but this secondary product has not been verified by the NJDEP and is not state-authorized.
This map is to be used solely for planning purposes, and does not take the place of a survey.

Figure 6. Urban Land Classifications: 2020 *(Source NJDEP)*



Backyard Garden

Chapter 4.

Vegetation

Forest Types

According to the 2020 LU/LC data, 40% of the Borough is forested, with 70% of the forest cover deciduous forest (1,041 acres). Of this, 777 acres have >50% crown closure, and 264 acres have 10-50% crown closure. Only 4% of the total forest cover is coniferous brush/ shrubland (64 acres) and 3% is coniferous forest (5 acres) (**Table 7**). Forested lands in the Borough of Peapack & Gladstone include the following classifications:[46]

Coniferous: This category includes forested land that contains coniferous tree species commonly known as evergreens. They do not lose their leaves (needles) at the end of the growing season but retain them through the year. The stand must be 20 feet high and must be stocked by at least 75% conifers to be labeled as a coniferous stand.

- **Coniferous Brush/Shrubland:** This category contains natural forested areas with coniferous species less than 20 feet high. There are 64 acres in the Borough.

- **Coniferous Forest***: >50% Crown Closure:* This category contains natural coniferous stands with crown closure > 50%. Crown closure is the percentage of forest area occupied by the vertical projections of tree crowns. Crown closure percentages provide a reasonable estimate of stand density. The Borough has 40 acres of forest in this category.

Deciduous: This category includes forested lands that contain deciduous tree species, which lose

Table 7. Forested Cover, Borough of Peapack & Gladstone		
Classification	**Acres**	**% of Forested Area**
Coniferous Brush/Shrubland	64	4%
Coniferous Forest (>50% Crown Closure)	40	3%
Deciduous Brush/Shrubland	23	2%
Deciduous Forest (>50% Crown Closure)	777	52%
Deciduous Forest (10-50% Crown Closure)	264	18%
Mixed Deciduous/Coniferous Brush/Shrubland	160	11%
Mixed Forest (>50% Coniferous With >50% Crown Closure)	36	2%
Mixed Forest (>50% Coniferous With 10-50% Crown Closure)	7	0.5%
Mixed Forest (>50% Deciduous With >50% Crown Closure)	54	4%
Mixed Forest (>50% Deciduous With 10-50% Crown Closure)	23	2%
Old Field (< 25% Brush Covered)	47	3%
Plantation	4	0.2%
Total	**1,500**	**100%**
Source: Land Use Land Cover 1995-2020, NJDEP		

their leaves at the end of the growing season. These trees remain leafless throughout the winter and sprout new leaves the following spring. The average height of the stand is at least 20 feet. A forest stand must have at least 75% canopy coverage from deciduous trees species to be placed in this category.

- **Deciduous Brush/Shrubland:** 23 acres in the Borough, this category contains natural forested areas with deciduous species less than 20 feet in height. An area must have greater than 25% brush cover to be placed in this category. This category can also contain inactive agricultural areas that have grown over with brush.

- **Deciduous Forest**, *>50% Crown Closure*: This is the largest category of tree cover in the Borough, 777 acres (52% of the town). This category contains deciduous stands with crown closure greater than 50%. Crown closure is the percentage of forest area occupied by the vertical projections of tree crowns. Crown closure percentages provide a reasonable estimate of stand density. Most of the deciduous forests in New Jersey are in this category.

- **Deciduous Forest**, *10-50% Crown Closure*: This category contains deciduous forest stands that have crown closure greater than 10% but less than 50%, which includes 264 acres (18%) in the Borough.

Mixed Forest - When neither coniferous nor deciduous trees represent 75% or more of the forested area, it is classified as Mixed Forest. This category is further broken down according to which type is 50% or greater in prevalence and the extent of crown closure.

- **Mixed Deciduous/Coniferous Brush/Shrubland:** Totaling 160 acres in the Borough, these are natural forested areas less than 20 feet high with a mixture of coniferous and deciduous trees.

- **Mixed Forest** *(*>50% Coniferous With >50% Crown Closure*)*: This category includes 36 acres in the Borough and contains stands of mixed coniferous and deciduous trees with the coniferous species > 50% and crown closures > 50%.

- **Mixed Forest** *(*>50% Coniferous With 10-50% Crown Closure): Only 7 acres in the Borough, this category contains stands of mixed coniferous and deciduous trees with the coniferous species > 50% and with crown closures between 10% and 50%.

- **Mixed Forest** *(*>50% Deciduous With >50% Crown Closure): This category includes 54 acres in the Borough and contains stands of mixed deciduous and coniferous trees with the deciduous species > 50% and crown closures > 50%.

- **Mixed Forest** *(>50% Deciduous with 10-50% Crown Closure)*: This category includes 23 acres in the Borough.

Brush/Shrubland – When vegetation is less than 20 feet high, the area is categorized as brush/shrubland.

- **Old Field**: This category includes open areas that have less than 25% brush cover. The predominant cover types are grasses, herbaceous species, tree seedlings, and/or saplings. An area should be placed in this category if the amount of brush cover requires extensive brush removal before plowing. In some cases, it may not be established that the previous use was agriculture. This includes 47 acres in the Borough.

- **Plantation**: This category covers 4 acres in the Borough and contains conifer stands that have been artificially planted. These include stands planted for timber harvesting or aesthetics.

Tree Protection Ordinances

The Borough's Municipal code, Chapter 19: Protection of Trees is dedicated to the preservation of trees. This chapter was adopted by the Ordinance No. 873.[47] This chapter serves to plant, control, protect, regulate and improve the trees in the Borough.

Article V, Section 2-46 covers the role of the Shade Tree Commission to provide for the regulation, planting, care, control, improvement, removal, preservation, and general protection of trees and shrubs so as to protect and preserve the environment.[48]

Invasive Plants in Borough of Peapack & Gladstone

In 2021, the Borough of Peapack & Gladstone Environmental and Shade Tree Commission compiled an **Invasive Species Report** with the aim of identifying and comprehending the threats posed to native plant species. The three most invasive species identified in the Borough include Japanese hops *(Humulus japonicus)*, Ailanthus *(Ailanthus altissima)*, and common mugwort *(Artemisia vulgaris)* (**Appendix C**).

Trees in the Borough have been affected by two invasive insects, the emerald ash borer (EAB) and the spotted lanternfly.[49,50] The EAB afflicts ash trees, burrowing beneath the bark, disrupting its absorption of water, and eventually causing its death. The spotted lanternfly nymphs and adults suck sap from the stems and leaves of trees, interrupting weakening the tree and killing it.

The NJ Department of Agriculture (NJDA) promotes an integrated pest management approach, using aerial spray treatments on residential and recreational areas with the non-chemical insecticide *Bacillus thuringiensis* when natural controls are unable to keep the pest population in check.

Carbon Storage

The role of trees and soil in the global carbon cycle is an increasingly important topic. Forests remove, or sequester, substantial amounts of carbon from the atmosphere and are also known as carbon sinks because they store carbon longer-term. Even without deliberate management for carbon, forests in the United States are currently estimated to offset about 15% of annual U.S. carbon emissions. This is in addition to any local climate benefits they may provide.

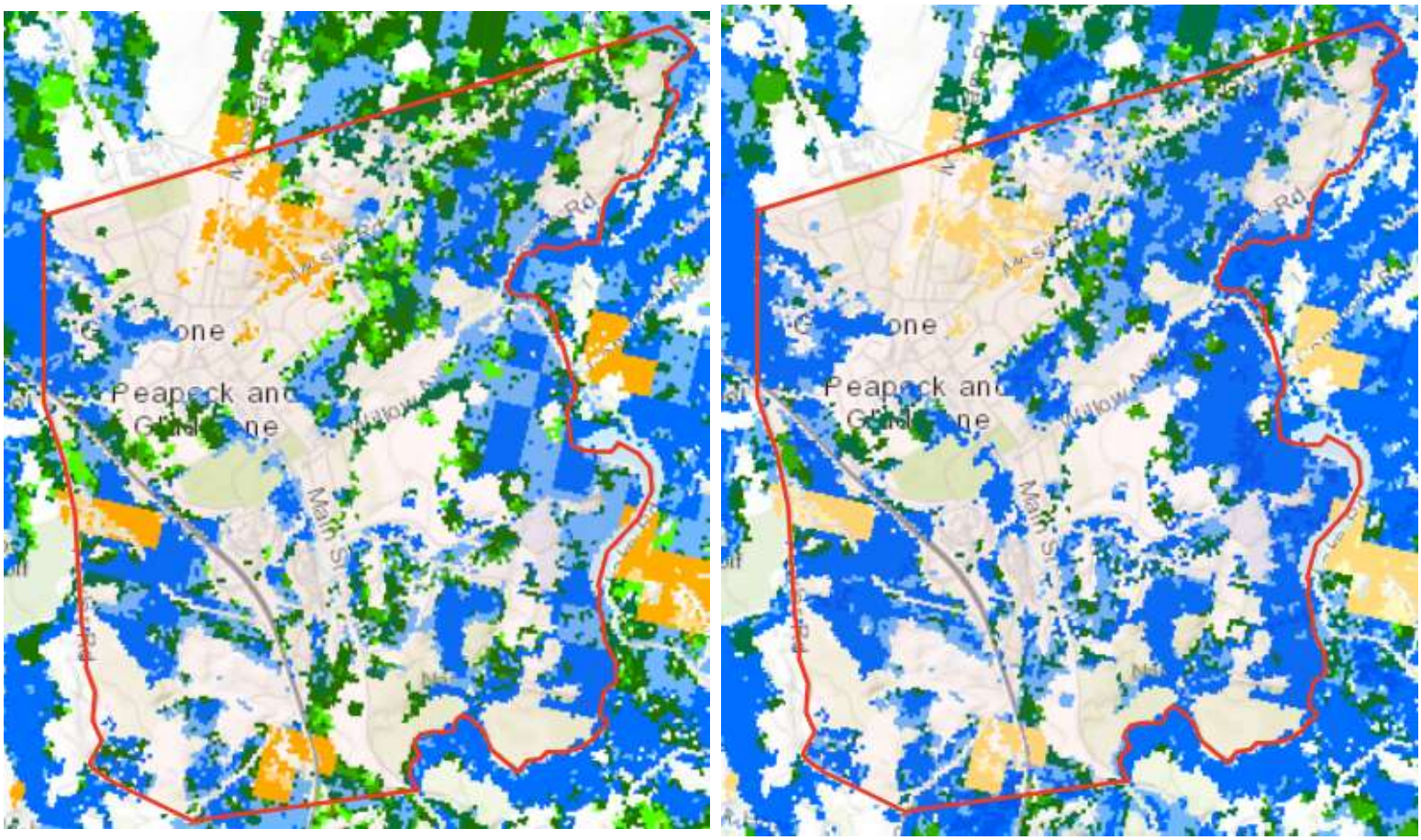
However, the impact of forest carbon sequestration is dependent on the fate of a forest — when wood is harvested and burned, for example, any stored carbon is returned to the atmosphere.

The Nature Conservancy (TNC) has mapped estimated carbon sinks (the amount of carbon currently stored in forests) as of 2010 and projected sequestration between 2010 and 2050 under a no-disturbance scenario.[51] As seen **Figure 7**, the Borough has a potential for storing carbon due to the wooded watershed lands. TNC notes that actual carbon sequestered may be higher or lower depending on management practices or the success of forest preservation.

Figure 7. Forest Ecosystem Projected Stored Carbon, Borough of Peapack & Gladstone *(Source: The Nature Conservancy - Resilient Land Mapping Tool)*

2010 Forest Ecosystem Carbon Estimate

2050 Forest Ecosytem Carbon Estimate



Forest Ecosystem Carbon - 2050 (metric tons/acre)

- <5
- 5.1 - 10
- 10.1 - 20
- 20.1 - 30
- 30.1 - 40
- 40.1 - 50
- 50.1 - 60
- 60.1 - 70
- 70.1 - 80
- 80.1 - 90
- 90.1 - 100
- 100.1 - 110
- 110.1 - 120
- 120.1 - 130
- 130.1 - 140
- 140.1 - 150

Liberty Park, Borough of Peapack & Gladstone website

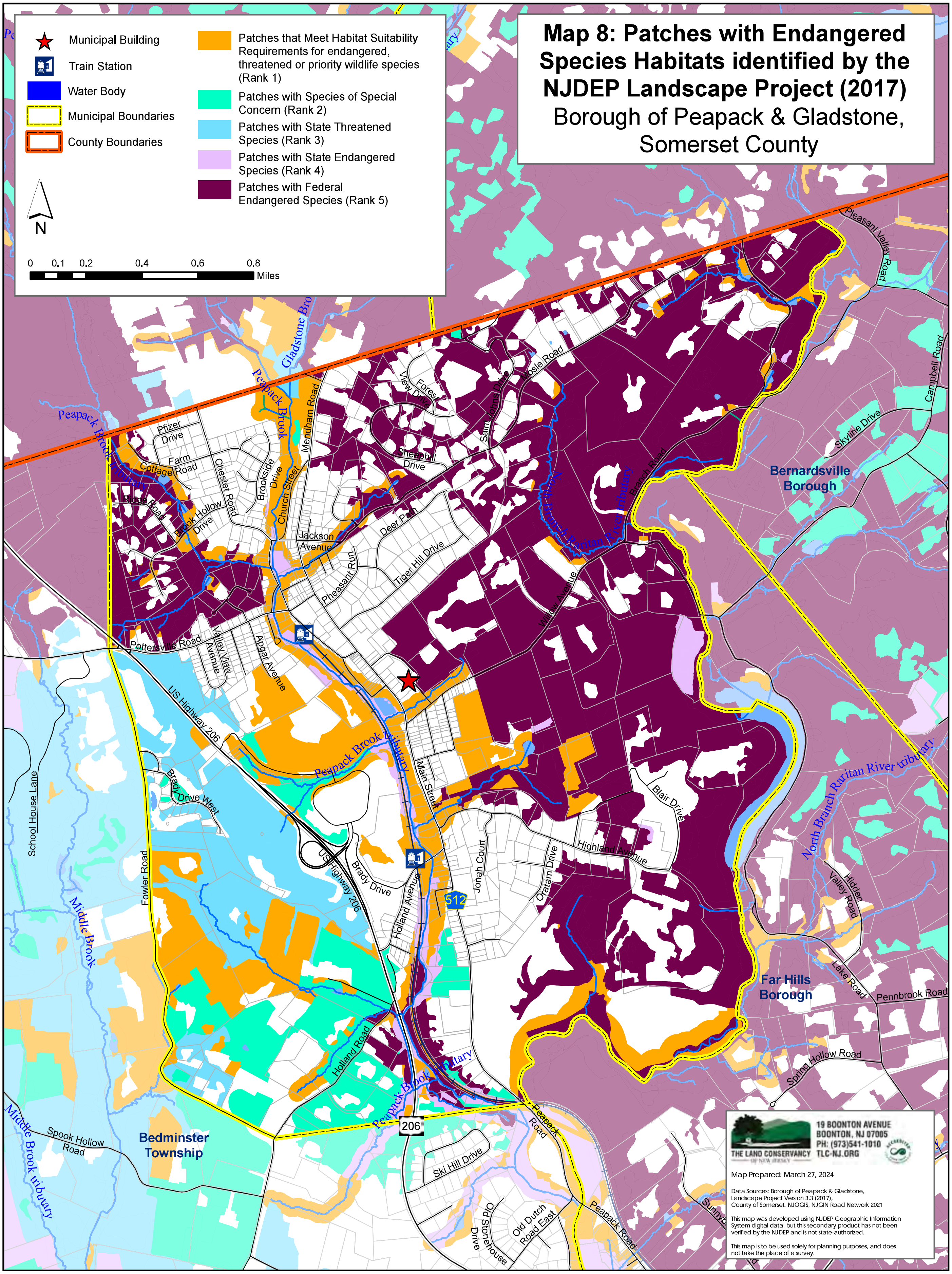
Chapter 5.

Wildlife

Threatened & Endangered Species and Critical Habitat

The Natural Heritage Database and NJDEP Landscape Project provides information on rare wildlife species or wildlife habitat.[52] In the Borough of Peapack & Gladstone, the rural landscape land surrounding waterways and water bodies, particularly the Category One (C1) waterways, provides suitable habitat for threatened and endangered (T&E) species (**Map 8**). The NJDEP Landscape Project ranks patches of habitat using a numeric system (0 through 5) for the purpose of identifying habitat which may be suitable for threatened and endangered species.[53] Habitat identified as Rank 3 through 5 are considered environmentally significant by the NJDEP:

- **Rank 5:** Species-specific patches containing one or more occurrences of wildlife listed as **endangered and threatened** pursuant to the Federal Endangered Species Act of 1973.
- **Rank 4:** Species-specific patches with one or more occurrences of **state endangered** species.
- **Rank 3:** Species-specific patches containing one or more occurrences of **state threatened** species.
- **Rank 2:** Species-specific patches containing one or more occurrences of species considered to be **species of special concern**.
- **Rank 1:** Species-specific patches that meet **habitat-specific suitability requirements** such


Map 8: Patches with Endangered Species Habitats identified by the NJDEP Landscape Project (2017)
Borough of Peapack & Gladstone, Somerset County
Municipal Building
Train Station
Water Body
Municipal Boundaries
County Boundaries
Patches that Meet Habitat Suitability Requirements for endangered, threatened or priority wildlife species (Rank 1)
Patches with Species of Special Concern (Rank 2)
Patches with State Threatened Species (Rank 3)
Patches with State Endangered Species (Rank 4)
Patches with Federal Endangered Species (Rank 5)
N
0 0.1 0.2 0.4 0.6 0.8 Miles
Bernardsville Borough
Far Hills Borough
Bedminster Township
Peapack Brook
Gladstone Brook
Peapack Brook tributary
North Branch Raritan River tributary
Middle Brook
Middle Brook tributary
US Highway 206
Main Street
Pottersville Road
Highland Avenue
Pleasant Valley Road
Campbell Road
Skyline Drive
Lake Road
Pennbrook Road
Spring Hollow Road
Peapack Road
Ski Hill Drive
Spook Hollow Road
School House Lane
Fowler Road
Holland Road
Holland Avenue
Brady Drive
Brady Drive West
Jonah Court
Oratam Drive
Blair Drive
Willow Avenue
Tiger Hill Drive
Deer Path
Pheasant Run
Jackson Avenue
Church Street
Mendham Road
Brookside Drive
Chester Road
Brook Hollow Drive
Ridge Road
Cottage Road
Farm Road
Pfizer Drive
Valley View Avenue
Apgar Avenue
Sheephill Drive
Forest View Drive
Saint Johns Drive
Mosle Road
Hidden Valley Road
Old Stonehouse Drive
Old Dutch Road East
512
206
19 BOONTON AVENUE
BOONTON, NJ 07005
PH: (973)541-1010
TLC-NJ.ORG
THE LAND CONSERVANCY OF NEW JERSEY
Map Prepared: March 27, 2024
Data Sources: Borough of Peapack & Gladstone, Landscape Project Version 3.3 (2017), County of Somerset, NJOGIS, NJGIN Road Network 2021
This map was developed using NJDEP Geographic Information System digital data, but this secondary product has not been verified by the NJDEP and is not state-authorized.
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as minimum size criteria for endangered, threatened, or priority wildlife species, but that do not intersect with any confirmed occurrences of such species.

- **Rank 0:** Species-specific patches that do not contain any species occurrences and do not meet any habitat-specific suitability requirements.

Rank 1 or patches that meet habitat-specific suitability requirements are found primarily along riparian corridors such as Peapack Brook and along the NJ Transit line.

Rank 2, or habitat suitable for species of special concern, is concentrated in the southwest of the Borough around the Essex Hunting Club, Fowler Road, and Holland Road.

Rank 3, or habitat suitable for state threatened species, is south and west of U.S. Highway 206 and north of Holland Road.

Rank 4, or state endangered species habitat, can be found in patches along the Peapack Brook and the North Branch of the Raritan River.

Rank 5, or federally listed endangered species habitat is the most prevalent in the Borough, in the wooded watershed lands extending westward from the North Branch of the Raritan River and Peapack Brook.

The NJDEP Natural Heritage Program notes that several rare species and their habitat have been found within the Borough of Peapack and Gladstone (**Table 8**).

Rare wildlife habitat has been identified as supporting foraging, breeding sightings, and individual sightings.

Almost half (44%) of these species and their habitat fall under Rank 2 with species-specific patches containing one or more occurrences of state threatened species. Rank 2 species include the cooper's hawk, great blue heron, and spotted turtle.

Rank 3 species make up 17% of species-specific patches with one or more occurrences of special concern species, including the barred owl, savannah sparrow, and wood turtle.

Of the remaining habitat, 17% is Rank 4 with species-specific patches containing one or more occurrences of state threatened species being the bald eagle, bobcat, and red-shouldered hawk.

The last 17% is Rank 5 with species-specific patches containing one or more occurrences of federally listed threatened or endangered species including the Indiana bat, Northern myotis and bog turtle.

Vernal Habitat

Vernal habitats, also known as vernal pools, are natural wetland depressions that fill with water during the rainy season in the fall and remain ponded until the warmer weather in early summer causes them to dry out.[54]

Vernal pools provide habitat for a wide variety of amphibians, reptiles, invertebrates, and many species of wetland vegetation, but cannot

Table 8. Rare Species, Borough of Peapack & Gladstone			
Species Rank	**Common Name**	**Scientific Name**	**Acres**
Rank 5 (State and Federally Endangered)	Indiana Bat	*Myotis sodalis*	459
	Northern Myotis	*Myotis septentrionalis*	657
	Bog Turtle	*Glyptemys muhlenbergii*	26
Rank 4 (State Endangered)	Bald Eagle	*Haliaeetus leucocephalus*	58
	Bobcat	*Lynx rufus*	1
	Red-shouldered Hawk	*Buteo lineatus*	N/A
Rank 3 (State Threatened)	Barred Owl	*Strix varia*	303
	Savannah Sparrow	*Passerculus sandwichensis*	>1
	Wood Turtle	*Glyptemys insculpta*	3
Rank 2 (Species of Special Concern)	Black-billed Cuckoo	*Coccyzus erythropthalmus*	1
	Cooper's Hawk	*Accipiter cooperii*	21
	Eastern Meadowlark	*Sturnella magna*	9
	Great Blue Heron	*Ardea herodias*	22
	Veery	*Catharus fuscescens*	81
	Wood Thrush	*Hylocichla mustelina*	1
	Spotted Turtle	*Clemmys guttata*	N/A
	Eastern Box Turtle	*Terrapene carolina carolina*	153
Source: NJDEP Natural Heritage Program		**Total**	**1,772**

support a fish population because of their brief dry period. Certain wildlife species, referred to as **obligate vernal pool breeders**, have evolved with reliance upon these fish-free breeding sites and cannot successfully produce elsewhere.

Wetland areas featuring a confined basin depression exhibiting the hydrologic and biological criteria established above are said to meet certification requirements and may be referred to as certified vernal habitats. The NJDEP's Landscape Project divides its mapping of vernal habitats into two categories:

Potential vernal habitat areas are areas identified as possibly containing a vernal pool that meets the criteria of a vernal habitat pursuant to N.J.A.C. 7:7A-1.4. These sites include sites that have been field inspected and have been found to meet the physical characteristics of a vernal habitat, but for which biological criteria have not yet been measured, as well as sites that have not been checked by NJDEP staff.

Vernal habitat areas are areas that contain pools that have been field-verified by the NJDEP and have been determined to meet both physical

and biological characteristics of a vernal habitat in accordance with N.J.A.C. 7:7A-1.4. The Freshwater Wetlands Protection Act Rules (N.J.A.C. 7:7A) protects vernal habitats as wetland areas requiring a 50-foot buffer, or a 150-foot buffer if the pool supports a State Threatened or Endangered Species.

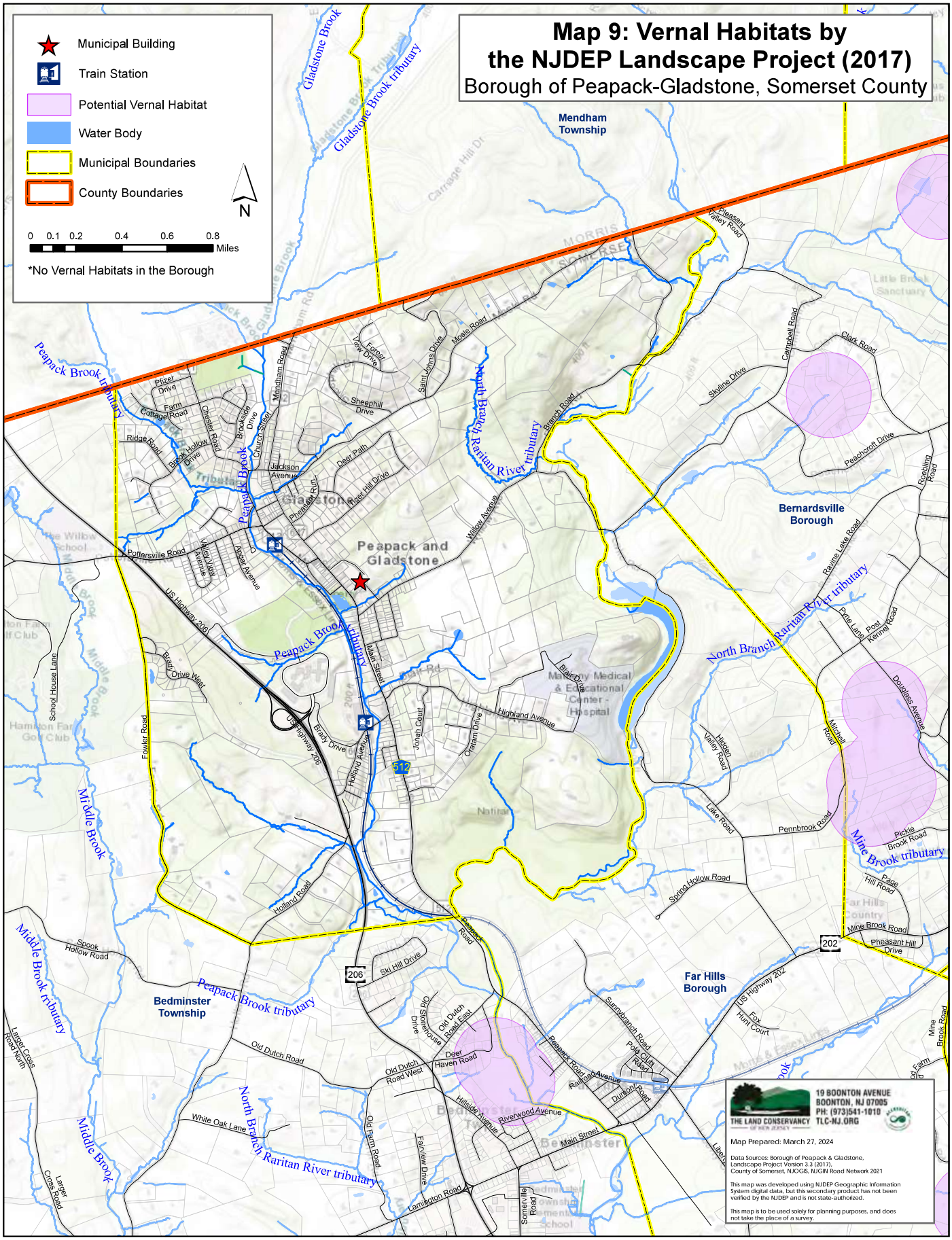
Map 9 shows 300-meter radius circles around the estimated centers of potential vernal habitats. The 300-meter buffer is used to account for the varying sizes of individual pools, the likely presence of adjacent wetland areas and – significantly – the adjacent dispersal habitats typically utilized by many resident amphibian species. There are no vernal habitats located in the Borough of Peapack & Gladstone, however there are several within the neighboring municipalities.

The NJDEP defines a vernal habitat in the Freshwater Wetlands Protection Act Rules (N.J.A.C. 7:7A-1.4) as a wetland that meets all of the following criteria:

- The wetland must consist of or contain a confined basin or depression without a permanently flowing outlet.
- The pool must feature evidence of breeding by at least one obligate vernal habitat species. (these species are identified in N.J.A.C. 7:7A)
- The area must maintain ponded water for at least two continuous months between March and September of a normal rainfall year.
- The area must remain free of fish populations throughout the year, or it must dry up at some time during a normal rainfall year.

Bottom: Cooper's Hawk *(Environmental & Shade Tree Commission)*

Top: Wood Turtle *(Source: NJDEP)*


Map 9: Vernal Habitats by the NJDEP Landscape Project (2017)
Borough of Peapack-Gladstone, Somerset County
Municipal Building
Train Station
Potential Vernal Habitat
Water Body
Municipal Boundaries
County Boundaries
N
0 0.1 0.2 0.4 0.6 0.8 Miles
*No Vernal Habitats in the Borough
Mendham Township
Bernardsville Borough
Bedminster Township
Far Hills Borough
Peapack and Gladstone
Gladstone Brook
Gladstone Brook tributary
Peapack Brook tributary
North Branch Raritan River tributary
Middle Brook
Middle Brook tributary
Mine Brook tributary
Pleasant Valley Road
Meyer Road
Forest View Drive
Saint Johns Drive
Sheephill Drive
Meadham Road
Church Street
Brookside Drive
Chester Road
Brook Hollow Drive
Ridge Road
Farm Cottage Road
Pfizer Drive
Jackson Avenue
Deer Path
River Hill Drive
Pheasant Run
Valley View Avenue
Apaxi Avenue
Potters ville Road
US Highway 206
Brady Drive West
Brady Drive
Old Highway 206
Holland Avenue
Holland Road
Fowler Road
School House Lane
Main Street
Jonah Court
Oratam Drive
Highland Avenue
Blair Drive
Morristown Medical & Educational Center - Hospital
Willow Avenue
Branch Road
Skyline Drive
Campbell Road
Clark Road
Peachcroft Drive
Roebling Road
Ravine Lake Road
Pine Lane
Post Kennel Road
Douglass Avenue
Mitchell Road
Hilcken Valley Road
Lake Road
Pennbrook Road
Pickle Brook Road
Page Hill Road
Spring Hollow Road
Mine Brook Road
Pheasant Hill Drive
202
Ski Hill Drive
206
Spook Hollow Road
Larger Cross Road North
Larger Cross Road
Old Dutch Road
Old Dutch Road West
Old Dutch Road East
Deer Haven Road
Old Stonehouse Drive
White Oak Lane
Old Farm Road
Fairview Drive
Lamington Road
Somerville Road
Hillside Avenue
Riverwood Avenue
Main Street
Peapack Road
Sunnybranch Road
Polo Club Road
Dunlop Road
Lee Avenue
Railroad Avenue
US Highway 202
Fox Hunt Court
512
Natirar
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Ravine Lake Dam, PS&S Report

Chapter 6.

Hydrology

What is Hydrology?

According to the U.S. Geological Survey (USGS), hydrology is

"..the science that encompasses the occurrence, distribution, movement and properties of the waters of the earth and their relationship with the environment within each phase of the hydrologic cycle. The water cycle, or hydrologic cycle, is a continuous process by which water is purified by evaporation and transported from the earth's surface (including the oceans) to the atmosphere and back to the land and oceans."[55]

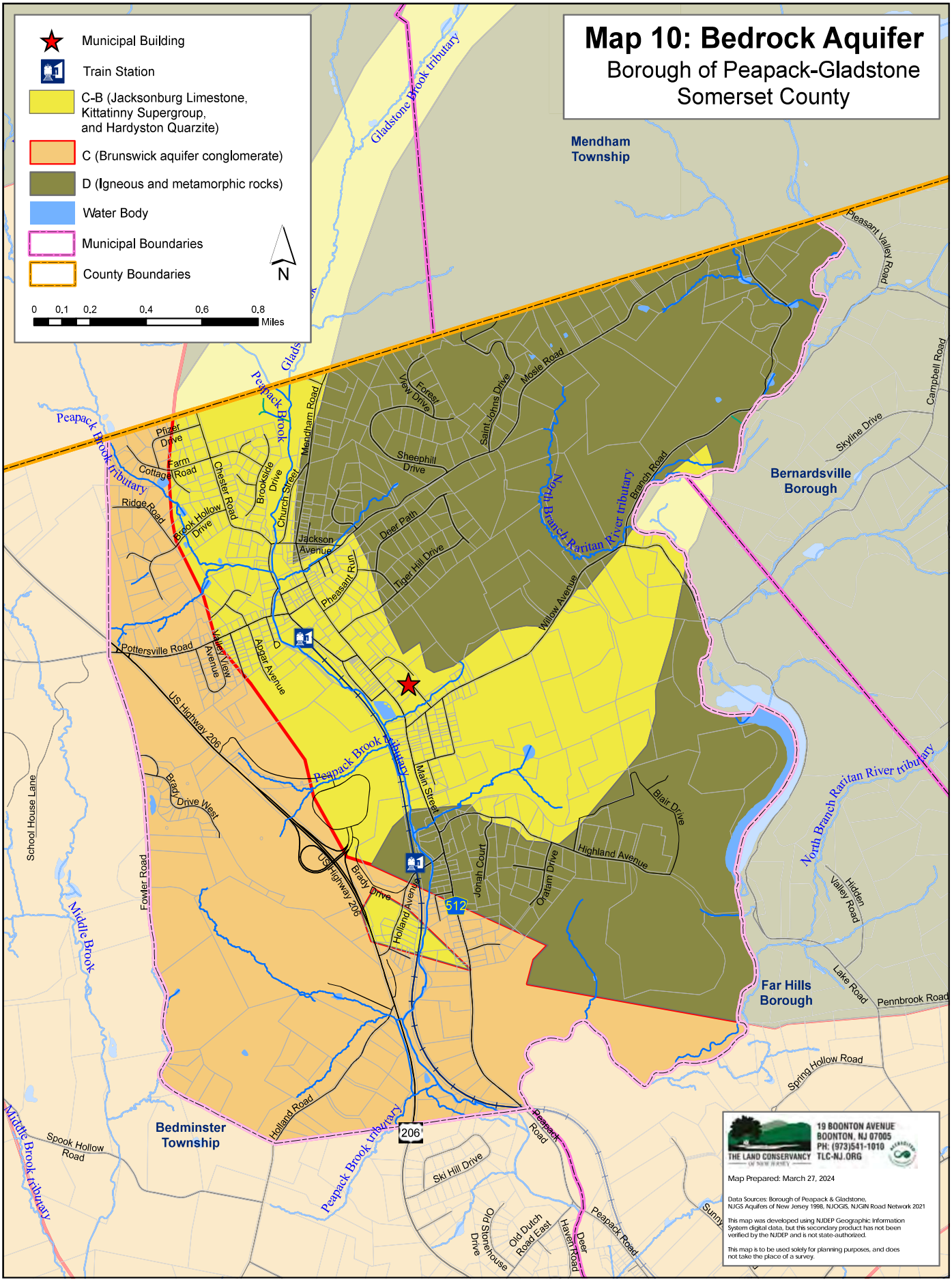
The water cycle and the movement of water forms the basis of the science of hydrology. Over the next three chapters, the ERI will explore recharge, riparian areas, and water quality in the Borough.

Aquifer Recharge

An aquifer is an underground formation of permeable rock or unconsolidated materials that can yield significant quantities of water to wells or springs.[56] The rate of recharge is not the same for all aquifers, and that must be considered when pumping water from a well. Pumping too much water too fast draws down the water in the aquifer and eventually causes a well to yield less water or run dry

Aquifers are typically equated to the type of geologic formation in which they exist. Aquifers in New Jersey are classified as either bedrock or surficial.

Bedrock aquifers consist of rock formations while surficial aquifers are formed from unconsolidated materials such as sand or gravel or


Map 10: Bedrock Aquifer
Borough of Peapack-Gladstone
Somerset County
Municipal Building
Train Station
C-B (Jacksonburg Limestone, Kittatinny Supergroup, and Hardyston Quarzite)
C (Brunswick aquifer conglomerate)
D (Igneous and metamorphic rocks)
Water Body
Municipal Boundaries
County Boundaries
N
0 0.1 0.2 0.4 0.6 0.8 Miles
Mendham Township
Bernardsville Borough
Far Hills Borough
Bedminster Township
Gladstone Brook tributary
Peapack Brook
Peapack Brook tributary
North Branch Raritan River tributary
Middle Brook
Middle Brook tributary
Mendham Road
Mosle Road
Pleasant Valley Road
Campbell Road
Skyline Drive
Branch Road
Forest View Drive
Saint Johns Drive
Sheephill Drive
Deer Path
Tiger Hill Drive
Willow Avenue
Jackson Avenue
Pleasant Run
Church Street
Brookside Drive
Chester Road
Brook Hollow Drive
Ridge Road
Farm Cottage Road
Pfizer Drive
Pottersville Road
Valley View Avenue
Appar Avenue
US Highway 206
Brady Drive West
Brady Drive
Main Street
Holland Avenue
Jonah Court
Oratam Drive
Highland Avenue
Blair Drive
Hidden Valley Road
Lake Road
Pennbrook Road
Spring Hollow Road
Peapack Road
Ski Hill Drive
Old Stonehouse Drive
Old Dutch Road East
Haven Road
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Sunny
Holland Road
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glacial sediment. The Borough of Peapack & Gladstone is located in both the Piedmont and Highlands Physiographic Provinces. Bedrock aquifers in the Piedmont contain water in fractures within the rock while surficial aquifers contain water primarily in the spaces between sand and gravel particles. Bedrock aquifers in the Highlands Province contain water in deep narrow valleys between round ridges.[57]

The Borough of Peapack & Gladstone is underlain by:

- Jacksonburg Limestone, Kittatinny Supergroup, and Hardyston Quarzite (Rank C-B).
- Brunswick aquifer conglomerate (Rank C).
- Igneous and metamorphic rocks (Rank D). (**Map 10**)

Aquifers in New Jersey can be ranked on their ability to yield groundwater to high-capacity wells. These wells include water-supply, irrigation, and industrial-supply wells sited and tested for maximum yield. The five aquifer ranks values are based on a statistical analysis of median yields and measured in gallons per minutes (gpm):

- Aquifer Rank A: >500 gpm
- Aquifer Rank B: 250 to 500 gpm
- Aquifer Rank C: 100 to 250 gpm
- Aquifer Rank D: 25 to 100 gpm
- Aquifer Rank E: <25 gpm

The **Jacksonburg Limestone, Kittatinny Supergroup, and Hardyston Quarzite** (Rank C-B) is located in the center of the Borough with areas stretching north and west. It consists of limestone and quarzite and groundwater is well drained. The water is fresh, slightly to highly alkaline, moderately hard and of the calcium-bicarbonate type. According to NJGS, this region yields between 101 and 500 gallons per minute (gpm).

The **Brunswick aquifer conglomerate** (Rank C) is located on the west and south edges of the Borough. It is composed of sandstone siltstone and shale of the Passaic, Towaco, Teltville, and Boonton formations. Groundwater is stored and transmitted in fractures. Water is normally fresh, slightly alkaline, non-corrosive and hard, while calcium-bicarbonate type waters dominate. The NJGS identifies the Brunswick Aquifer as a fractured-rock aquifer of the Newark Basin, which yields between 100 and 250 gallons per minute.

Igneous and metamorphic rocks (Rank D) are located in the north and southeast of the Borough. It is made up of hard, dense and highly fractured igneous rocks and the hard slate, quartzite, and marble that makes up metamorphic rocks.[58] Groundwater is stored and transmitted in fractures. The water is fresh, slightly to highly alkaline, moderately hard and of the calcium-bicarbonate type. This region yields between 25 and 100 gpm.[59]

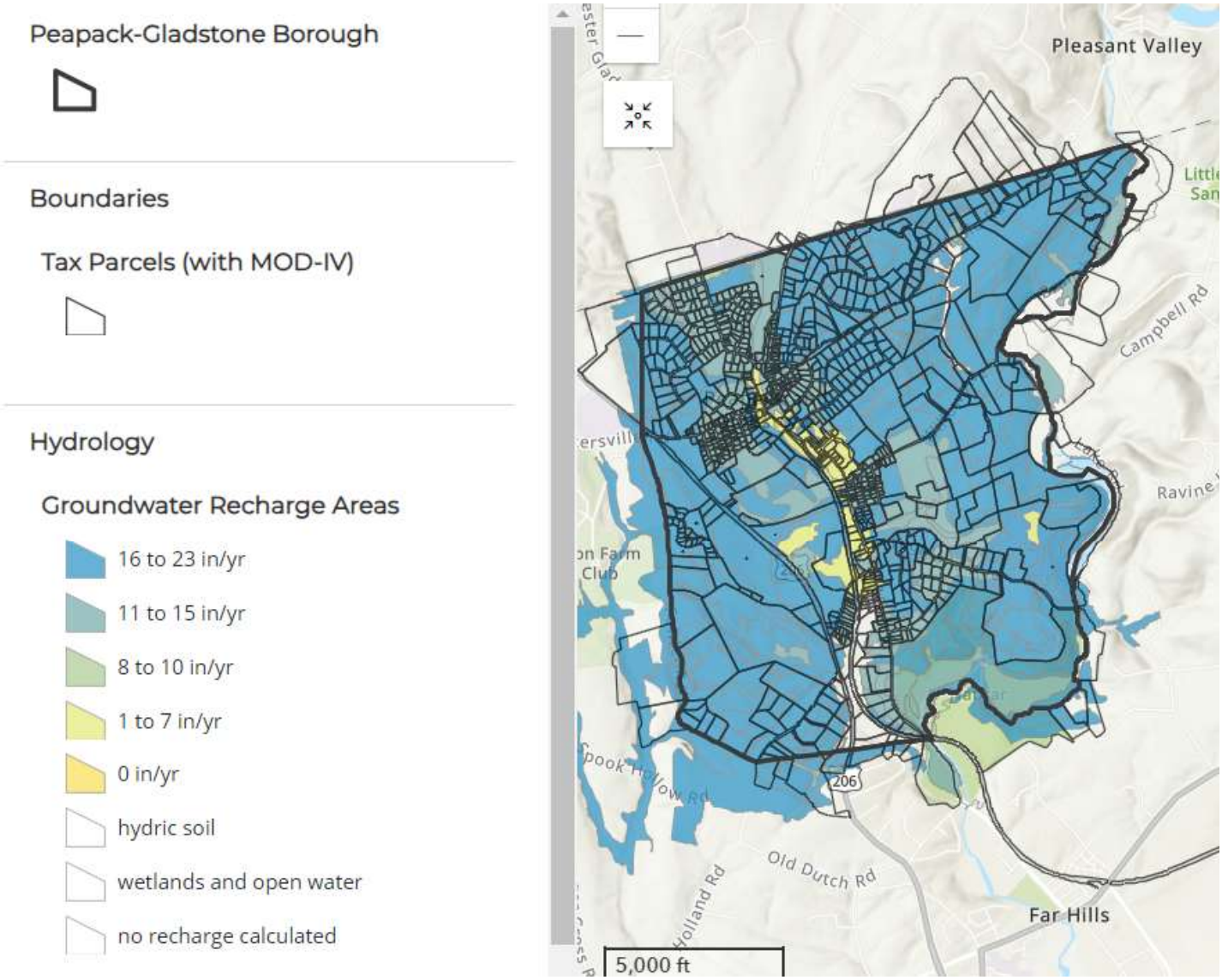
Surficial aquifers in New Jersey are those water-bearing formations which are both greater than 50 feet thick (New Jersey law requires well casing of no less than 50 feet) and are significantly different, hydrogeologically, than the underlying aquifer. Surficial aquifers are most prevalent in northern New Jersey where bedrock consists of consolidated fractured bedrock overlain by thick sequences of unconsolidated glacial sediments.

Figure 8 shows the distribution of rankings for the Borough. **Table 9** summarizes aquifer recharge rankings for the New Jersey and groundwater rankings for Somerset County. Over three quarters of the Borough (79%) is ranked as either C/A, C/B or D/A (**Table 10**). These have a well yield potential ranging from 25-500 gallons per minute (gpm) and a groundwater infiltration rate between 1-23 in/yr.

Public Water Supply and Wellhead Protection

The NJDEP maps Wellhead Protection Areas (WPAs) for public community and non-community wells. The delineations for these wells are two, five, and 12-year tiers. Each tier represents the horizontal extent of groundwater captured by a well pumping at a specific rate over those periods of time. Based on NJDEP data, there are two public community water supply

Figure 8. Aquifer (Groundwater) Recharge, Borough of Peapack & Gladstone *(Source: Highlands Council)*



wells located within the Borough of Peapack and Gladstone. Both are within are in the southeast corner of the Borough near Highlands Avenue **(Figure 9**). New Jersey American Water is the water utility provider for the Borough of Peapack & Gladstone.[60] The Borough falls under Environmental Disposal Corporation and Raritan water systems. According to the **2022 Healthy Community Planning** report, the Borough fell in the lower range (1-5) of maximum contaminant levels and treatment techniques violations as well as action levels exceedances.[61]

Table 9. Statewide Well Yield Rankings and the Borough of Peapack & Gladstone Groundwater Rankings

Aquifer Rank	Median Well Yield (Gallons/Minute)	Groundwater Rank	Avg. Annual Infiltration (In/Yr)
A	>500	A	16-23
B	>250-500	B	11-15
C	>100-250	C	8-10
D	25-100	D	1-7
E	<25	E	0

There are also hydric soils (L/L), wetlands and open water (W/W) and instances where no recharge is calculated (X/X).

Source: NJDEP NJGS

Table 10. Aquifer Potential Recharge Rankings

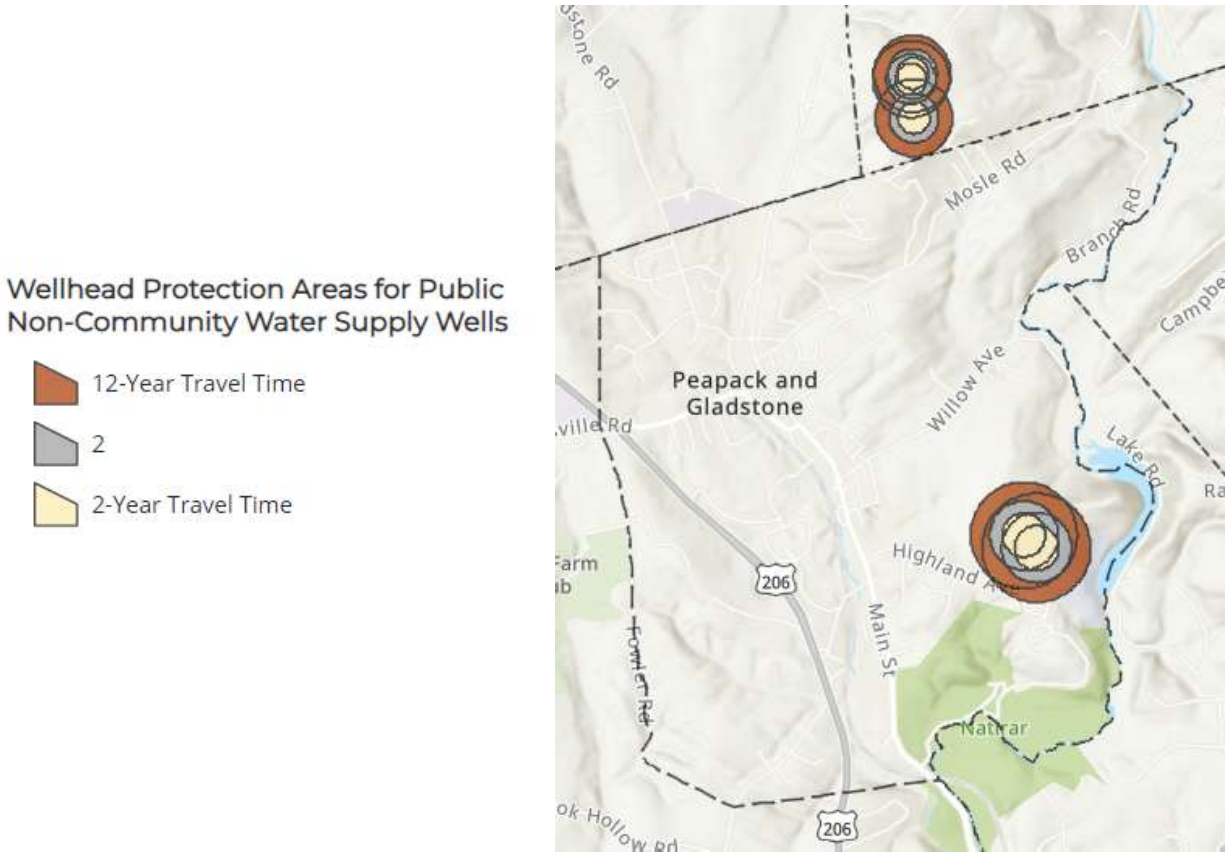
Alpha Rank	Numeric Rank	Acres	Percent
C/A	31	785	21%
C/B	32	1,160	31%
C/C	33	0	0%
C/D	34	84	2%
C/E	35	0	0%
D/A	41	1,008	27%
D/B	42	459	12%
D/C	43	0	0%
D/D	44	33	1%
D/E	45	0	0%
L/L	97	98	3%
W/W	98	69	2%

Source: NJDEP NJGS

The rows highlighted in gray comprise 79% of the Borough of Peapack & Gladstone

The 1986 Federal Safe Drinking Water Act Amendments (Section 1428, P/L. 93-523, 42 USC 300 et. seq) directed all states to develop a Well Head Protection Program (WHPP) Plan for both public community (CWS) and public non-community (NCWS) water supply wells. A component of the WHPP is the delineating of Well Head Protection Areas. This delineation is the first step in defining the sources of water to a public water supply to prevent and clean up groundwater contamination.

Figure 9. Wellhead Protection Areas, Borough of Peapack & Gladstone *(Source: Highlands Council)*



North Branch Raritan River

Chapter 7.

Wetlands, Riparian Areas, & Flood Zones

Wetlands

Wetlands filter chemicals, pollutants, and sediment from water; provide protection from flooding through storage of stormwater; offer critical habitat for wildlife; and are sites for recreation and tourism. The NJDEP (N.J.A.C. 7:7A) defines a **freshwater wetland** as,

"..an area that is inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions, commonly known as hydrophytic vegetation; provided, however, that the Department, in designating a wetland, shall use the three-parameter approach (that is, hydrology, soils, and vegetation) enumerated in the 1989 Federal Manual."

NJDEP has adopted the 1989 manual as the technical basis for identifying and delineating wetlands.[62] The NJDEP regulates virtually all activities in a wetland, including removing vegetation, filling, and placing obstructions. Depending on the environmental value of a wetland, there may also be a transition area, or buffer, around the wetland that will require a waiver issued by the NJDEP for any activity within that zone. A wetland containing endangered species habitat would require a 150-foot wide transition area, whereas a

small wetland in a ditch might not require any transition area at all. Most freshwater wetlands require a 50-foot transition area.

Wetlands in New Jersey are classified into three different values: exceptional resource value, ordinary resource value, or intermediate resource value. The criteria for these classifications are described below.

Exceptional Resource Value Wetland

- Dischargers into FW-1 water and FW-2 trout producing waters and their tributaries;
- Is a present habitat for threatened or endangered species; or
- Is a documented habitat for threatened or endangered species, and remains suitable for breeding, resting, or feeding by the species during the normal period these species would use the habitat.

Ordinary Resource Value Wetland

A freshwater wetland which does not exhibit any of the characteristics of an exceptional resource value wetland, and which is one of the following:

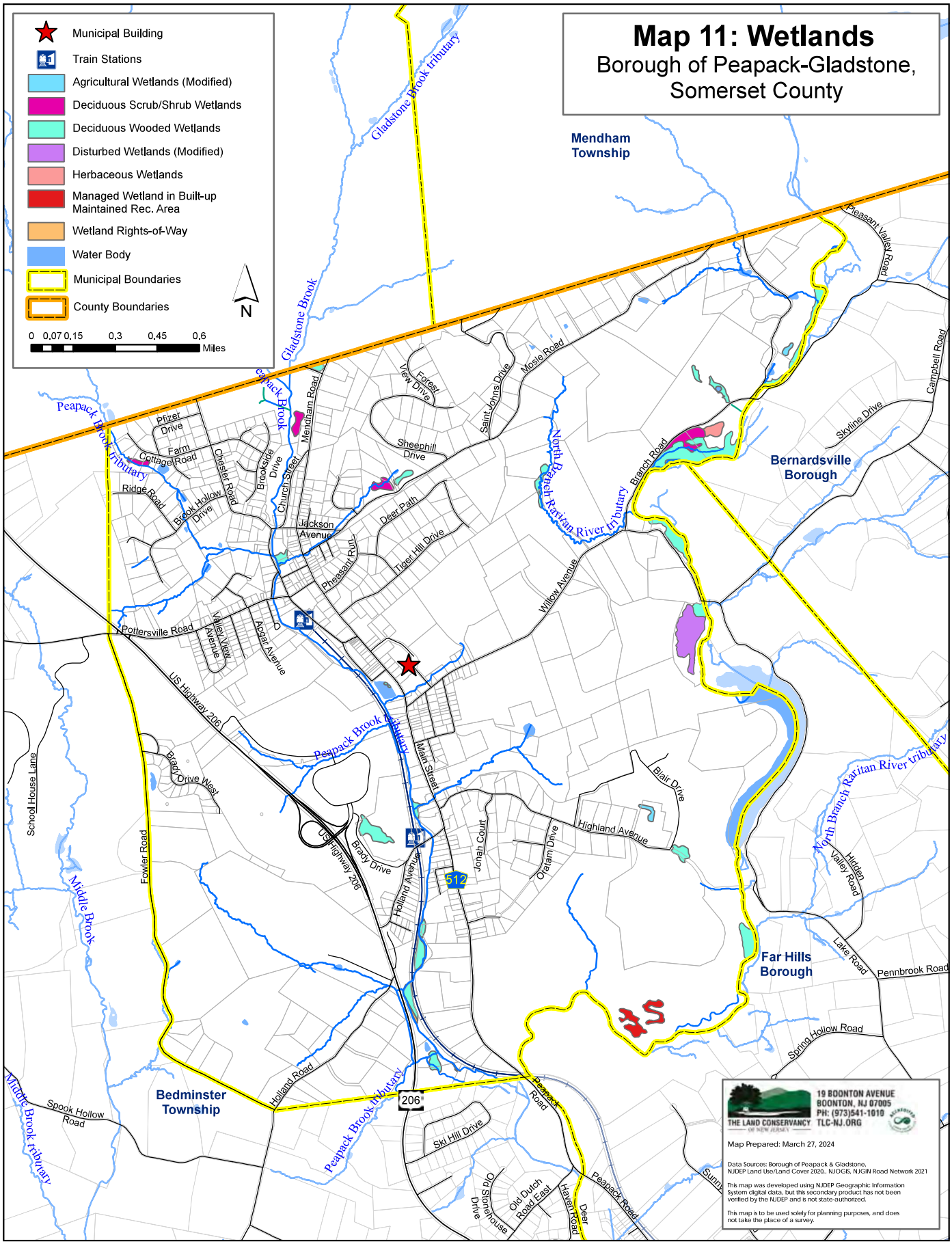
- An isolated wetland (as defined at N.J.A.C. 7:7A-1.4) smaller than 5,000 square feet, with the following uses covering more than 50% of the area within 50 feet of the wetland boundary: lawns, maintained landscaping, impervious surfaces, active railroad right-of-way, and graveled or stoned parking/storage area and roads. In calculating the area covered by a use, NJDEP will only consider a use that was legally existing in that location prior to July 1, 1988, or was permitted under this chapter since that date.
- A drainage ditch.
- A swale.
- A detention facility that was uplands at the time it was created regardless of the wetland resource classification of the wetlands under these rules, or classification of the body of water, as FW-1 or FW-2 trout production, to which it discharges.

Intermediate Resource Value Wetland

- A freshwater wetland of intermediate resource value is any wetland not defined as exceptional or ordinary.

According to the NJDEP 2020 Land Use/Land Cover data, wetlands make up 2% of land cover in the Borough of Peapack & Gladstone (**Map 11**). There are 62 acres of wetlands, 38 acres of which are classified as deciduous wooded wetlands. These areas are largely concentrated along the Borough's waterways, along the Peapack Brook and a tributary of the North Branch of the Raritan River. There are also small patches along the eastern border.

Wetland mapping from NJDEP is approximate, and unmapped wetlands may exist within the Borough of Peapack & Gladstone and would still be subject to NJDEP regulations. Wetlands require a professional delineation before a regulated activity can occur in or around them.


Map 11: Wetlands
Borough of Peapack-Gladstone, Somerset County
Municipal Building
Train Stations
Agricultural Wetlands (Modified)
Deciduous Scrub/Shrub Wetlands
Deciduous Wooded Wetlands
Disturbed Wetlands (Modified)
Herbaceous Wetlands
Managed Wetland in Built-up Maintained Rec. Area
Wetland Rights-of-Way
Water Body
Municipal Boundaries
County Boundaries
N
0 0.07 0.15 0.3 0.45 0.6
Miles
Mendham Township
Bernardsville Borough
Far Hills Borough
Bedminster Township
Gladstone Brook tributary
Gladstone Brook
Peapack Brook
Peapack Brook Tributary
Peapack Brook tributary
North Branch Raritan River tributary
Middle Brook
Middle Brook tributary
Pleasant Valley Road
Campbell Road
Skyline Drive
Branch Road
Mosle Road
Saint Johns Drive
Forest View Drive
Sheephill Drive
Mendham Road
Church Street
Brookside Drive
Chester Road
Pfizer Drive
Farm Cottage Road
Ridge Road
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Deer Path
Tiger Hill Drive
Pheasant Run
Willow Avenue
Pottersville Road
Valley View Avenue
Appar Avenue
US Highway 206
Brady Drive West
Brady Drive
Holland Avenue
Main Street
Jonah Court
Oratam Drive
Highland Avenue
Blair Drive
Hidden Valley Road
Lake Road
Pennbrook Road
Spring Hollow Road
School House Lane
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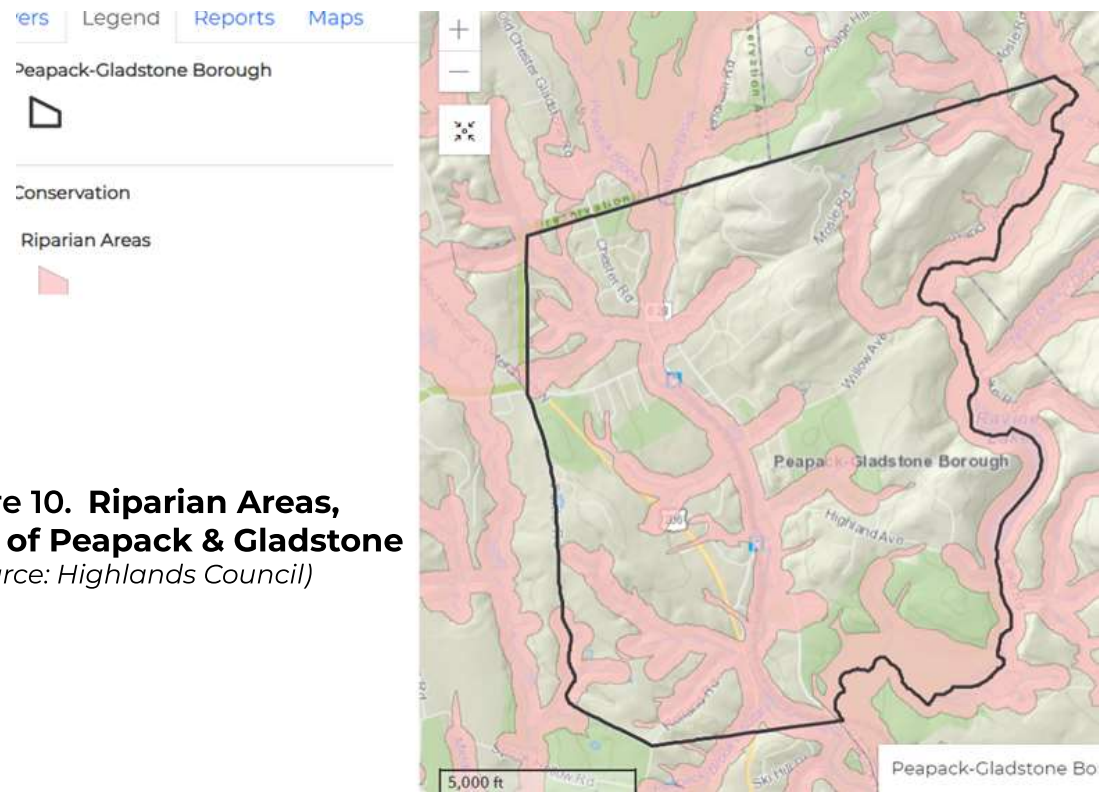


Figure 10. Riparian Areas, Borough of Peapack & Gladstone
(Source: Highlands Council)

Riparian Zones

The lands immediately along waterways serve especially critical roles in the mitigation of downstream flooding and maintenance of healthy stream ecology. Development within these lands can cause environmental damage and expose people to flood risk. Because of their importance, these lands are subject to regulation from multiple different authorities. Riparian zones and flood zones are overlapping regulated areas by the NJDEP and other agencies.

A **riparian zone** comprises the land and vegetation within and adjacent to surface waters regulated by NJDEP. As a baseline, riparian zones include all such lands within 50 feet of any NJDEP regulated waters. Riparian zones are expanded to 150 feet around the following waters:

- Any trout production water and all upstream waters
- Any trout maintenance water and all upstream waters within one mile of a trout maintenance water
- Waters which flow through an area of habitat for threatened or endangered species, and waters within one mile of such habitat

The widest riparian zone buffer, 300 feet, is applied to Category One waters and all upstream waters within the same watershed. These also include tributaries, and buffers are measured from the top of the waterway's banks. Riparian areas in the Borough of Peapack & Gladstone are found around major waterways of the Peapack Brook, tributaries to the Peapack Brook and the North Branch of the Raritan River (**Figure 10**).

Flood Zones

Federal, state, and municipal governments oversee areas prone to flooding through various acts, laws, and ordinances. The intent is to minimize property damage

and negative ecological effects by limiting development and protecting positive environmental influences in areas subject to frequent flooding.

At the federal level, the USGS maps flood prone areas and the Federal Emergency Management Agency (FEMA) evaluates and maps Special Flood Hazard Areas (SFHAs) that can be used in participating communities to determine flood insurance rates.[63] On the state level, the NJDEP delineates Flood Hazard Areas (FHAs) along streams and regulates activities within these areas. In recent years, FEMA and the state have coordinated to integrate NJDEP FHA parameters into FEMA updates. Municipal code may set standards that are stricter than either the state or FEMA.

There are different methods of delineating SFHAs and FHAs, but the two terms are intended to mean the same thing. These areas include all lands which would be underwater in a 100-year flood, meaning a flood level which is expected to only occur every 100 years. These areas have a 1% chance each year of being completely flooded. Estimates for 100-year floods do include a small margin of safety to factor in potential increased flow due to upstream development. SFHAs are delineated and regulated for waterways with a drainage area of 50 acres are greater.

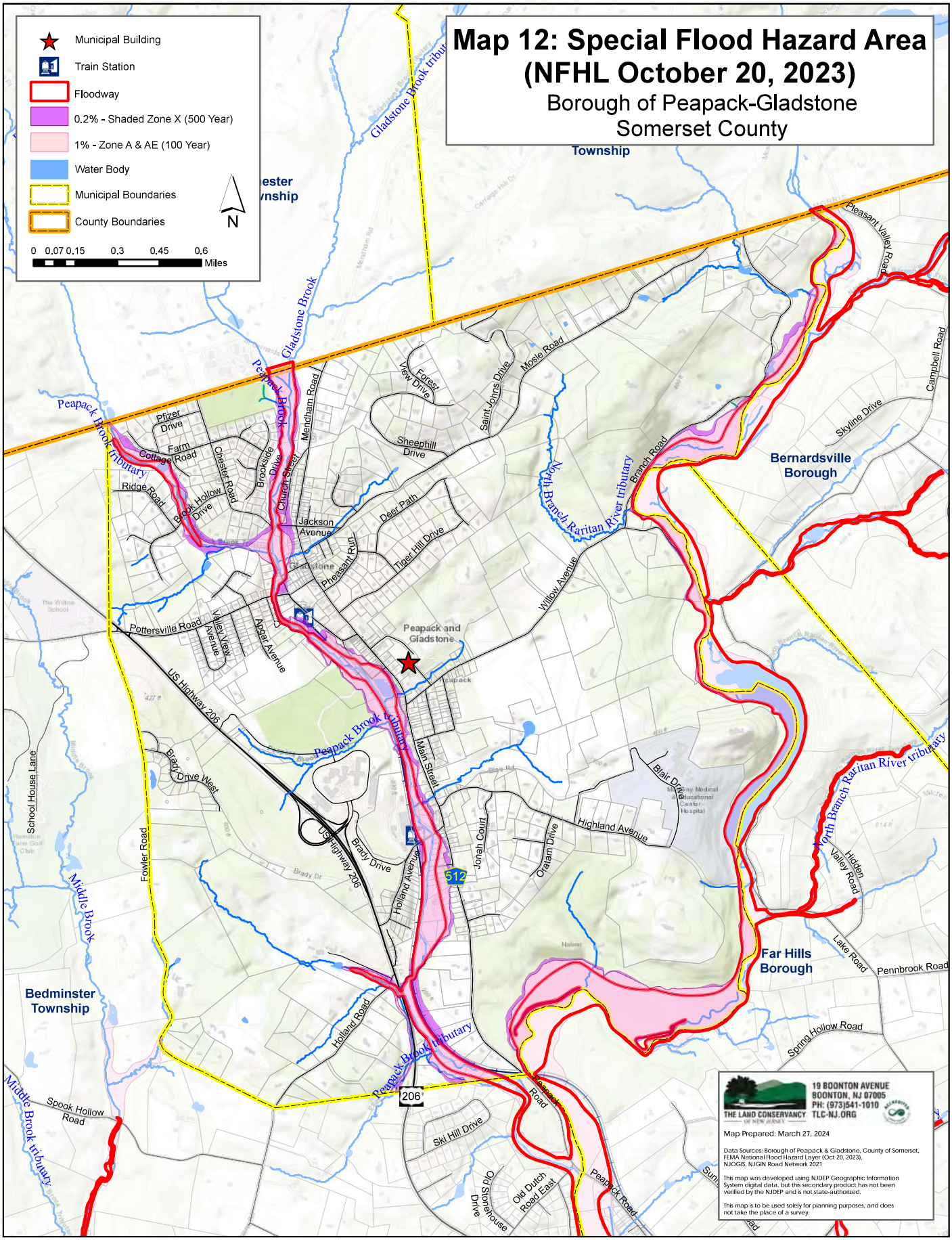
SFHAs as delineated by FEMA are used, along with other flood zones, to create official Flood Insurance Rate Mapping (FIRM) that can be used in participating communities, to determine flood insurance rates. Communities can choose to participate in the National Flood Insurance Program (NFIP), which requires mandatory flood insurance in areas mapped as SFHAs. In addition to the SFHAs, NFIP mapping also delineates 500-year flood zones and various sublevels within the 100-year zone.

As shown on **Map 12**, one percent (45 acres) of the Borough of Peapack & Gladstone is located within the 500-year flood zone (0.2% chance of an annual flood, also known as the Shaded Zone X) and 290 acres (8% of the Borough) are located within the 100-year flood zone (1% chance of an annual flood, also known as Zones A and AE). These areas are located within the floodplain and floodway of Peapack Brook and the North Branch of the Raritan River.

NJDEP Regulations

NJDEP regulates floodprone areas through the NJ Flood Hazard Area Control Act, N.J.A.C. 7:13, amended on October 5, 2021.[64] The act recognizes the importance of not only avoiding building in unsafe places, but also preserving vegetation that is considered essential for maintaining bank stability and water quality. The rules set standards for development in flood hazard areas and land adjacent to surface water to mitigate the adverse impacts of flooding.

The appropriate permit must be obtained in order to engage in any activity in a regulated area. There are also area specific standards, depending on whether or not the area includes a channel, floodway, flood fringe, fishery resource, threatened and endangered species, or acid producing soils. More specific regulations depend on what portion of the flood hazard area a piece of land falls in, and whether it is a riparian zone.


Map 12: Special Flood Hazard Area
(NFHL October 20, 2023)
Borough of Peapack-Gladstone
Somerset County
Municipal Building
Train Station
Floodway
0.2% - Shaded Zone X (500 Year)
1% - Zone A & AE (100 Year)
Water Body
Municipal Boundaries
County Boundaries
N
0 0.07 0.15 0.3 0.45 0.6
Miles
Township
Gladstone Brook
Peapack Brook
Peapack Brook tributary
Pleasant Valley Road
Campbell Road
Skyline Drive
Mosle Road
Saint Johns Drive
Forest View Drive
Sheephill Drive
Mendham Road
Pfizer Drive
Farm Cottage Road
Chester Road
Brookside Drive
Church Street
Ridge Road
Brook Hollow Drive
Jackson Avenue
Deer Path
Tiger Hill Drive
Pheasant Run
North Branch Raritan River tributary
Branch Road
Bernardsville Borough
Willow Avenue
Pottersville Road
Valley View Avenue
Appar Avenue
Peapack and Gladstone
US Highway 206
Peapack Brook tributary
Main Street
Blair Drive
Highland Avenue
Brady Drive West
Brady Drive
Fowler Road
School House Lane
Middle Brook
Jonah Court
Oratam Drive
Holland Avenue
512
North Branch Raritan River tributary
Hidden Valley Road
Lake Road
Pennbrook Road
Far Hills Borough
Bedminster Township
Holland Road
Peapack Brook tributary
Spring Hollow Road
Middle Brook tributary
Spook Hollow Road
206
Peapack Road
Ski Hill Drive
Old Stonehouse Drive
Old Dutch Road East
Peapack Road
19 BOONTON AVENUE
BOONTON, NJ 07005
PH: (973)541-1010
TLC-NJ.ORG
THE LAND CONSERVANCY OF NEW JERSEY
Map Prepared: March 27, 2024
Data Sources: Borough of Peapack & Gladstone, County of Somerset, FEMA National Flood Hazard Layer (Oct 20, 2023), NJOGIS, NJGIN Road Network 2021
This map was developed using NJDEP Geographic Information System digital data, but this secondary product has not been verified by the NJDEP and is not state-authorized.
This map is to be used solely for planning purposes, and does not take the place of a survey.

Inland Flood Protection Rule

On July 17, 2023, a new rule from the NJDEP, known as the Inland Flood Protection Rule, took effect.[65,66] This rule updates the methods of delineating FHAs to account for changes to stormwater flow due to climate change and the impact of upstream development. By expanding the flood hazard areas, these standards increase the amount of land where NJDEP has the authority to regulate development.

Specifically, the rules expand the FHA to include all lands up to two feet higher than current 100-year flood areas in NJDEP maps, and three feet higher than current 100-year flood areas in FEMA maps.[67] The new rule also requires that all new major developments address stormwater runoff using an updated NJDEP data set for peak flow rates of streams and rivers.[68] This new data accounts for recent changes in the region's precipitation patterns since the data was last updated in 1999. In connection with this rule, the NJDEP has created an online Flood Indicator Tool which provides information about potential flood risk on or near a property of interest. It does not show precise DEP standards, calculate actual risk, or demarcate a zone where DEP regulations apply. It is intended only as a reference.

Flood Disclosure

On July 3, 2023, Bill S3110/A4783, also known as the Flood Disclosure Bill, became law.[69] This new legislation, which took effect in the Fall of 2023, adds a new tool for home buyers and renters across the state. The law requires that landlords and home sellers disclose flood risk to prospective tenants or buyers.[70] This includes the property's history of flooding and its location in a FEMA-designated (100-year or 500-year) Flood Hazard Area. Additionally, the law requires landlords to notify tenants of the availability of insurance for renters through the National Flood Insurance Program.

Borough Planning

The Borough of Peapack & Gladstone has taken steps to address the adverse effects of flooding, as summarized by the following list of planning documents and ordinances:

2014 Master Plan Reexamination: Some of the goals in the plans is to safeguard buildings from flooding and other environmental disruptions.[71]

2019 Storm Management Plan: This Plan outlines ways to reduce flood damage, increase stormwater runoff, maintain groundwater recharge, and decrease pollutants in stormwater.[72]

2023 Flood Damage Prevention Ordinance Chapter 27: The ordinance outlines a series of design best management practices for flood control the Borough of Peapack & Gladstone. The stormwater management ordinance is based on NJDEP's Model Municipal Stormwater Control Ordinance, published in March 2020 and NJDEP's Stormwater Management Regulations (N.J.A.C. 7:8) most recently updated in March 2021.[73]

Liberty Park

Chapter 8.

Water Quality

Watersheds

A watershed is a topographic area within which surface water runoff drains into a specific point on a stream or to a water body such as a lake.[74] A watershed-based approach to natural resource management is considered by state and national agencies to be the most appropriate unit for managing complex environmental problems.

The NJDEP has divided the state into Watershed Management Areas (WMAs) composed of multiple watersheds and sub-watersheds. The Borough is located in WMA08, North and South Branch Raritan. At 470 square miles, this watershed is one of New Jersey's largest watersheds, including all or part of 38 municipalities in Hunterdon, Somerset and Morris Counties.[75]

The USGS has mapped and identified watersheds using a hierarchical numbering system. This system identifies watersheds by a hydrological unit code (HUC) that includes up to 14 digits for the smallest watersheds. There are four HUC14 watersheds for the Borough: Middle Brook, Peapack Brook (above and below Gladstone Brook), and the Raritan River North Branch (**Map 13** and **Table 12**).

Surface Water

Surface water is water that collects on the ground or in a stream, river, lake, wetland, or ocean. This includes Peapack Brook and its tributaries, the North Branch Raritan River and its tributaries, and small sections of Middle Brook and Gladstone Brook (**Table 11** and shown in **Map 14**) in the Borough.

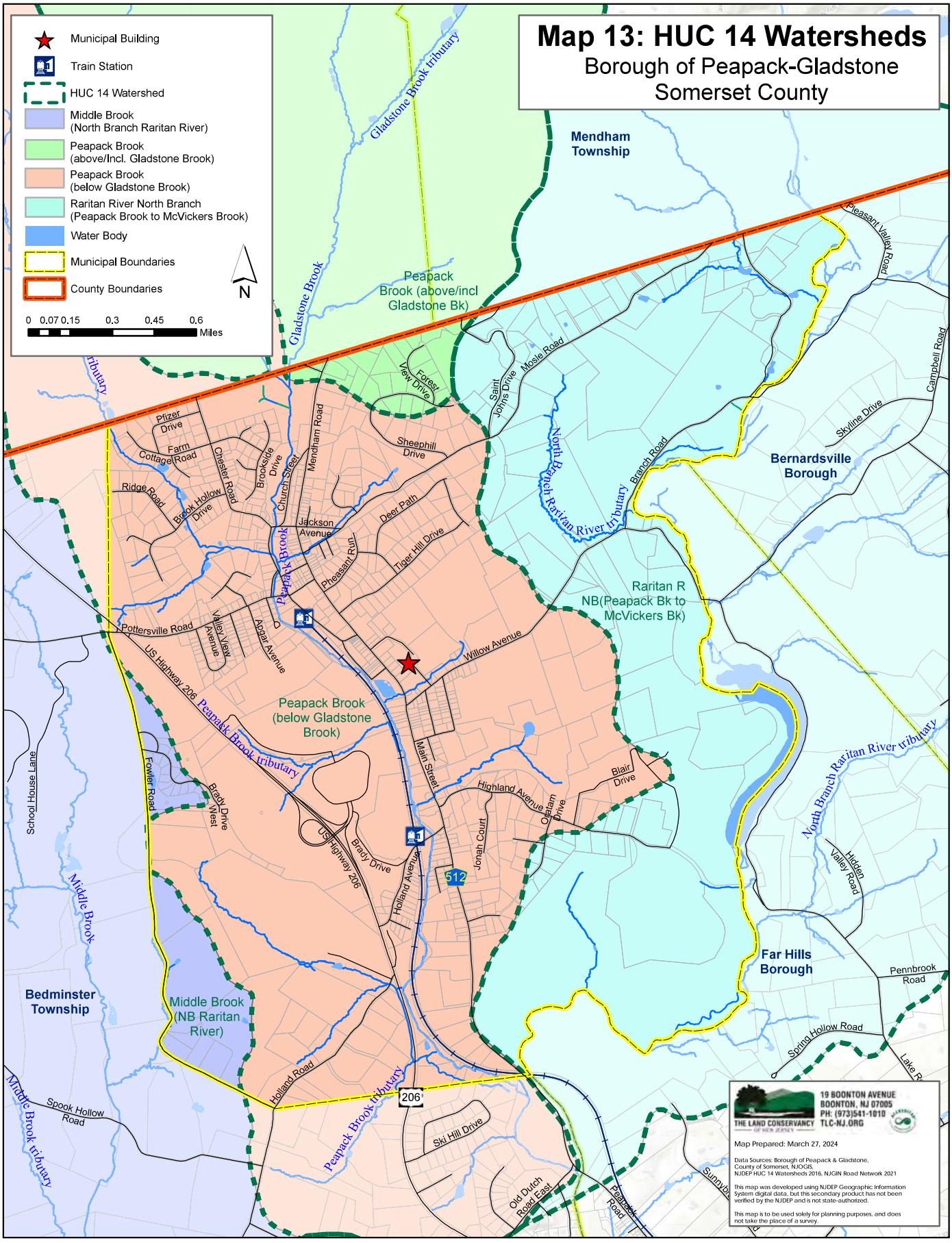

Map 13: HUC 14 Watersheds
Borough of Peapack-Gladstone
Somerset County
Municipal Building
Train Station
HUC 14 Watershed
Middle Brook (North Branch Raritan River)
Peapack Brook (above/Incl. Gladstone Brook)
Peapack Brook (below Gladstone Brook)
Raritan River North Branch (Peapack Brook to McVickers Brook)
Water Body
Municipal Boundaries
County Boundaries
N
0 0.07 0.15 0.3 0.45 0.6
Miles
Mendham Township
Bernardsville Borough
Bedminster Township
Far Hills Borough
Gladstone Brook tributary
Gladstone Brook
Peapack Brook (above/incl Gladstone Bk)
Peapack Brook (below Gladstone Brook)
Middle Brook (NB Raritan River)
Raritan R NB(Peapack Bk to McVickers Bk)
North Branch Raritan River tributary
Peapack Brook tributary
Middle Brook tributary
Pleasant Valley Road
Campbell Road
Skyline Drive
Mosle Road
Saint Johns Drive
Forest View Drive
Sheephill Drive
Pfizer Drive
Farm Cottage Road
Chester Road
Brookside Drive
Mendham Road
Church Street
Ridge Road
Brook Hollow Drive
Jackson Avenue
Deer Path
Tiger Hill Drive
Pheasant Run
Pottersville Road
Valley View Avenue
Apgar Avenue
US Highway 206
Willow Avenue
Main Street
Highland Avenue
Old Farm Drive
Blair Drive
Jonah Court
Holland Avenue
Brady Drive
Brady Drive West
Fowler Road
School House Lane
Holden Valley Road
Pennbrook Road
Spring Hollow Road
Holland Road
Spook Hollow Road
Ski Hill Drive
Old Dutch Road East
Peapack Road
Sunnyside
206
512
19 BOONTON AVENUE
BOONTON, NJ 07005
PH: (973)541-1010
TLC-NJ.ORG
THE LAND CONSERVANCY
Map Prepared: March 27, 2024
Data Sources: Borough of Peapack & Gladstone, County of Somerset, NJOGIS, NJDEP HUC 14 Watersheds 2016, NJGIN Road Network 2021
This map was developed using NJDEP Geographic Information System digital data, but this secondary product has not been verified by the NJDEP and is not state-authorized.
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Table 12. HUC14 Watersheds, Borough of Peapack & Gladstone					
WMA	**WMA Name**	**Watershed Name**	**Sub-Watersheds Name**	**Acres**	**Percent**
08	North and South Branch Raritan	Raritan River (above Lamington)	Middle Brook (North Branch Raritan River)	138	4%
			Peapack Brook (above/ including Gladstone Brook)	76	2%
			Peapack Brook (below Gladstone Brook)	2,148	58%
			Raritan River North Branch (Peapack Brook to McVickers Brook)	1,334	36%
			Total	**3,696**	**100%**
Source: NJDEP HUC14 Watershed Tabular Data					

Table 11. Streams		
Stream	**Miles**	**Percent**
Gladstone Brook	0.07	0.3%
Middle Brook unnamed tributary (UNT)	0.10	1%
North Branch Raritan River	4.51	23%
North Branch Raritan River unnamed tributary (UNT)	3.73	19%
Peapack Brook	3.18	16%
Peapack Brook unnamed tributary (UNT)	7.15	36%
Ravine Lake	0.92	5%
Uncoded Tributary	0.08	0.4%
Total:	**20**	**100%**
Source: NJDEP Surface Water Quality Data		

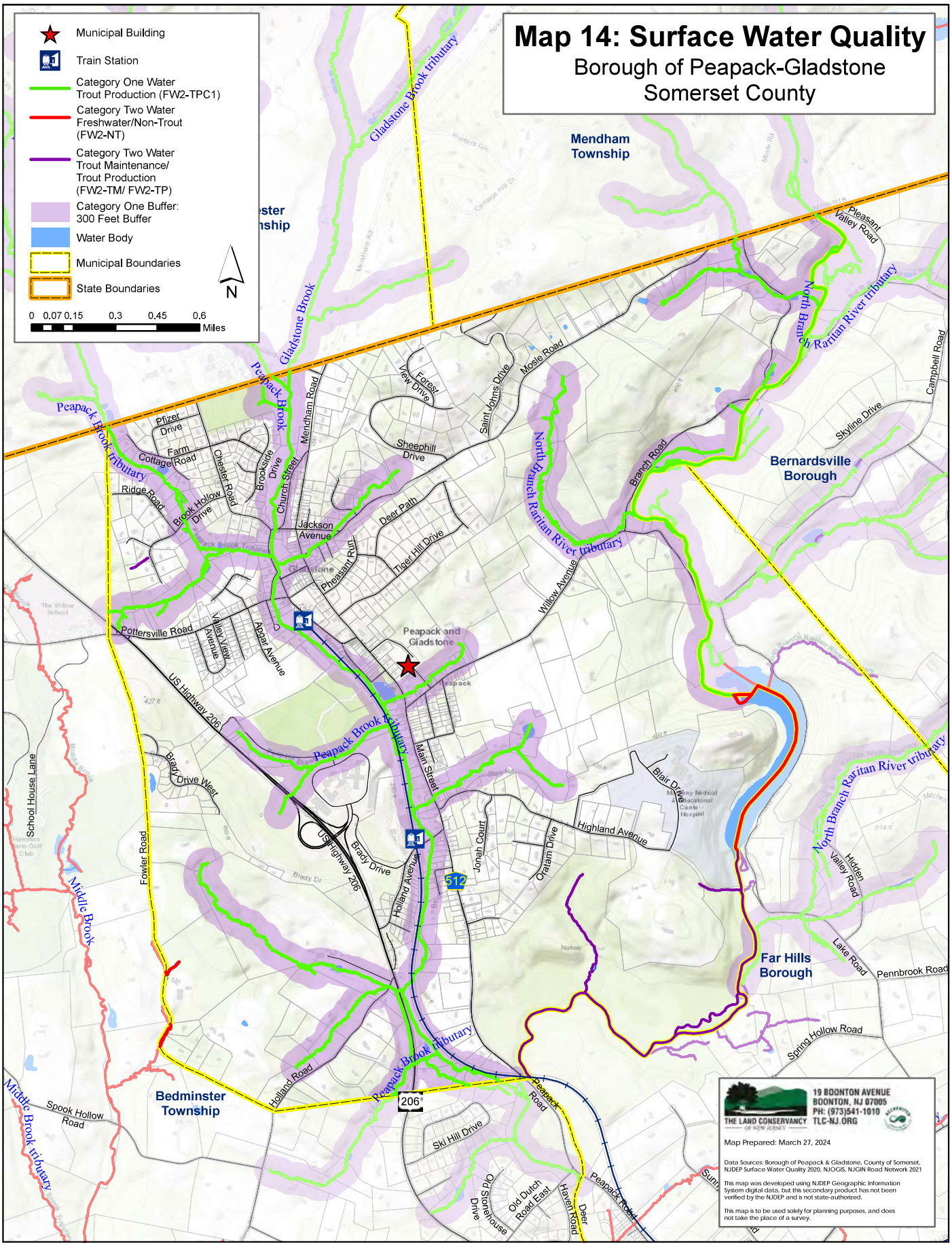
As was noted in the 2013 Environmental Resource Inventory, the NJDEP maps an intermittent stream between School Street and Main Street, but this does not exist on the ground **(Appendix D)**.

Ravine Lake is also located in the Borough. A dammed lake, it is between 38 and 44 acres in size. The dam was constructed between 1898 and 1899.[76]

Water Quality Standards

NJ's Surface Quality Standards (SWQS) (N.J.A.C. 7:9) classify Fresh Water 1 (FW1) as the highest level of classification, which is defined as:

".. those fresh waters, as designated in N.J.A.C. 7:9B-1.15(j), that are to be maintained in their natural state of quality (set aside for posterity) and not subjected to any man-made wastewater discharges or increases in runoff from anthropogenic activities. These waters are set aside for posterity because of their clarity, color, scenic setting, other characteristic of aesthetic value,


Map 14: Surface Water Quality
Borough of Peapack-Gladstone
Somerset County
Municipal Building
Train Station
Category One Water Trout Production (FW2-TPC1)
Category Two Water Freshwater/Non-Trout (FW2-NT)
Category Two Water Trout Maintenance/ Trout Production (FW2-TM/ FW2-TP)
Category One Buffer: 300 Feet Buffer
Water Body
Municipal Boundaries
State Boundaries
N
0 0.07 0.15 0.3 0.45 0.6
Miles
Mendham Township
Bernardsville Borough
Bedminster Township
Far Hills Borough
Gladstone Brook tributary
Gladstone Brook
Peapack Brook
Peapack Brook tributary
North Branch Raritan River tributary
Middle Brook
Middle Brook tributary
Pleasant Valley Road
Mendham Road
Mosle Road
Saint Johns Drive
Forest View Drive
Sheephill Drive
Deer Path
Tiger Hill Drive
Jackson Avenue
Pheasant Run
Church Street
Brookside Drive
Chester Road
Brook Hollow Drive
Ridge Road
Farm Cottage Road
Pfizer Drive
Pottersville Road
Valley View Avenue
Appar Avenue
Willow Avenue
Branch Road
Skyline Drive
Campbell Road
Peapack and Gladstone
US Highway 206
Brady Drive West
Brady Drive
Main Street
Holland Avenue
Jonah Court
Oratam Drive
Highland Avenue
Blair Drive
Hidden Valley Road
Lake Road
Pennbrook Road
Spring Hollow Road
Peapack Road
Holland Road
Ski Hill Drive
Old Stonehouse Drive
Old Dutch Road East
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Map Prepared: March 27, 2024
Data Sources: Borough of Peapack & Gladstone, County of Somerset, NJDEP Surface Water Quality 2020, NJOGIS, NJGIN Road Network 2021
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unique ecological significance, exceptional recreational significance, exceptional water supply significance or exceptional fisheries resource(s)."[77]

The general classification for other freshwater is Fresh Water 2 (FW2). The presence of trout in a stream means that the waters are relatively free of chemicals or biological contaminants. A stream can be classified as:

- Trout Production (TP) waters are designated for use by trout spawning or nursery purposes during their first summer.
- Trout Maintenance (TM) waters support trout throughout the year.
- Non-Trout waters (NT) do not support trout, either because of their physical nature or due to biological or chemical characteristics (SWQS, N.J.A.C.7:9B).

The surface waters are classified as:

Category 1, Trout Production (FW2-TPC1)

- Gladstone Brook
- North Branch Raritan River
- North Branch Raritan River UNT
- Peapack Brook
- Peapack Brook UNT

FW2, Trout Production (FW2-TP)

- North Branch Raritan River UNT

FW2, Trout Maintenance (FW2-TM)

- North Branch Raritan River
- N. Branch Raritan River UNT

FW2 and Non-Trout (FW2-NT):

- Middle Brook (UNT)
- Ravine Lake
- Uncoded Tributary

Category One (C1) Waters

Category One (C1) waterways are identified by the state because of their unique ecological significance. Additionally, within the Highlands Region, C1 waterways are typically capable of supporting reproductive populations of trout and other species that are highly dependent upon exceptional water quality. The C1 classification signifies the highest level of protection for waterways throughout the Highlands and the rest of New Jersey.

In April 2020, NJDEP's Division of Water Monitoring and Standards adopted a new rule that expands C1 waters designation to 600 miles of rivers and waterways in the state.[78] This rule widened the riparian zone around those waterways newly listed as C1 waters. Protections of waterways will benefit water quality across the State.

The Borough of Peapack & Gladstone contains 15.7 miles of one or more C1 waterways.[79] C-1 waterways within the Borough are (**Figure 11**):

- Peapack Brook UNT: 7.1 miles
- Peapack Brook: 3.2 miles
- North Branch Raritan River: 2.7 mi.
- North Branch Raritan River UNT: 2.6 miles
- Gladstone Brook: 0.07 miles

Surface water quality is affected by point sources and non-point sources of pollution as well as erosion and sedimentation.[80] Point sources are any discernible, confined, and discrete fissure, container,

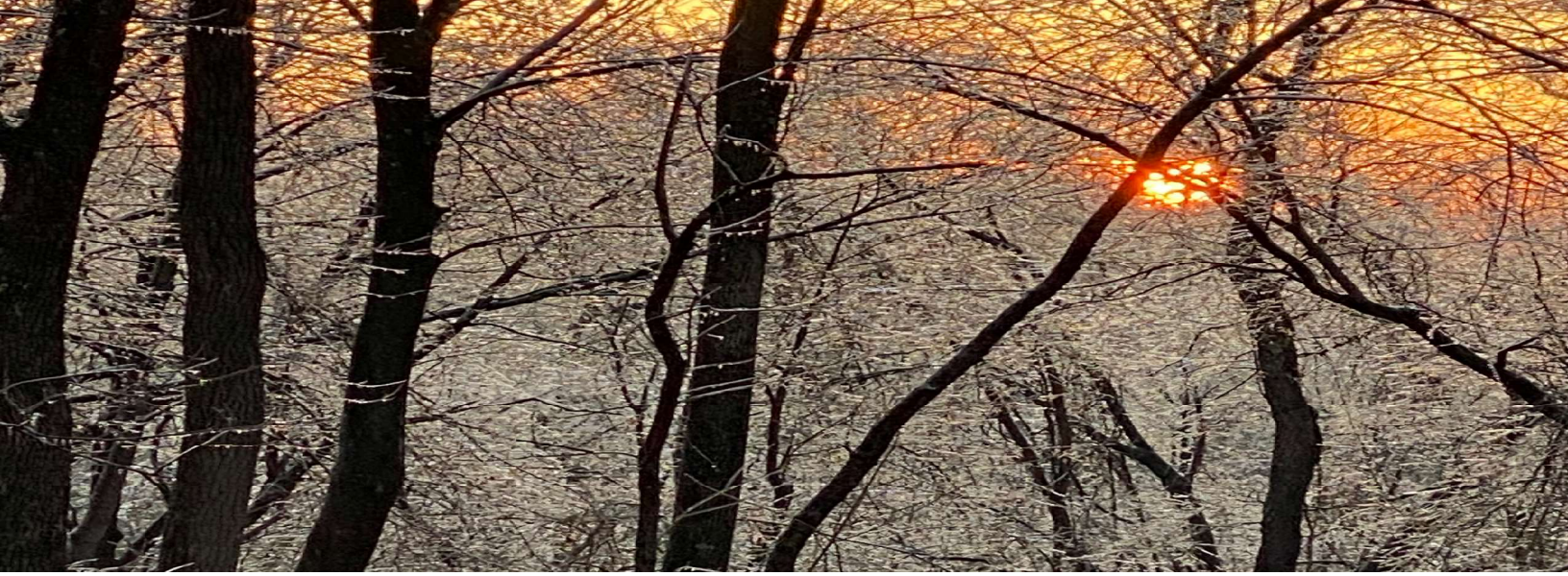
Figure 11. Category 1 Waterways *(Source: Highlands Region Interactive Environmental Resource Inventory)*

or concentrated animal feeding operation from which pollutants are or may be discharged. This includes discharges from sewage treatment plants and factories, stormwater runoff, illegal dumping, and malfunctioning underground storage tanks and septic tanks.

In contrast to point source pollution, non-point source pollution comes from many different sources. As rainfall or snowmelt moves over and through the ground, it picks up and carries natural and human-made pollutants (such as fertilizers, herbicides, and motor oil) and deposits them into surface and groundwater. The effects of pollutants on specific waterways can vary but eventually all are manifested into negative outcomes for drinking water supplies, recreation, fisheries, and wildlife.

One of these effects is eutrophication, which, in freshwater systems, is the addition of substances, either human-made or natural, to a water body affecting the productivity of that body of water. Nitrates and phosphates promote excessive algae growth. These “blooms” can have negative effects on the ecosystem. This can include clouding of the water which limits sunlight penetration and stops the growth of plants deeper in the water. Additionally, the excess nutrient availability (eutrophication) from the decomposition of dead phytoplankton can cause depleted levels of dissolved oxygen (anoxia). These excess nutrients, from unfiltered stormwater and a longer growing season, was partly the reason that the Borough chose not to reestablish the weir that originally flushed Liberty Park Pond.

Water quality can also be negatively impacted by sedimentation, which is the transportation and deposition of eroded materials. A primary cause of sedimentation is development near streams and on steep slopes that reduce vegetative cover and results in exposed soil. The eroded soil can then be transported to surface waters where it could contaminate and increase the turbidity of the water, effectively blocking sunlight to plant species and negatively affecting the health of the aquatic ecosystem.



Ice Storm, Borough of Peapack & Gladstone

Chapter 9.

Climate & Air

Prevailing Air Currents

Atmospheric circulation over North America is dominated by prevailing westerly winds which move air from west to east in a broad, undulating flow. New Jersey's weather is substantially influenced by the north-south movement of these westerly currents, and the variation in their strength throughout the year. This variation results in the state being influenced by wet, dry, hot, and cold air streams changing from day to day.

The Office of the New Jersey State Climatologist (ONJSC) divides New Jersey into five distinct climate zones, each of which experiences distinct variations in the daily weather due to differences in geology, distance from the Atlantic Ocean, and prevailing atmospheric flow patterns.[81] The Borough Peapack & Gladstone falls in the North climate zone, which stretches along the Appalachian Uplands. This zone is typically colder than other zones due to the small mountains that are up to 1,800 feet in elevation.

Temperature & Precipitation

The National Oceanic and Atmospheric Administration (NOAA) divides New Jersey into three climate divisions.[82] The Borough falls in the Division 1 (Northern) of New Jersey, which encompasses the Counties of Bergen, Morris, Somerset, Essex, Hudson, Passaic, Sussex, Union, Warren, and Hunterdon (**Figure 12**).

The ONJSC gathers temperature and precipitation data from monitoring stations throughout the state, with some sites records dating back to the 1890s and many sites with more than 50 years of continuous

data.[83] This data is used to calculate averages at the division and county level. Statistics are also available for individual monitoring stations, with the stations closest to the Borough of Peapack & Gladstone in Pottersville and Bound Brook. ONJSC monitoring stations track a variety of climate factors, namely temperature, precipitation, snowfall, and heating and cooling degree days. Not all stations track the same climate factors.

Data from the OSNJC show an upward trend in average temperature for Division 1 over the last 20 years (**Figure 13**). This is reflected in a decrease in heating degree days (**Figure 14**) and an increase in cooling degree days (**Figure 15**).

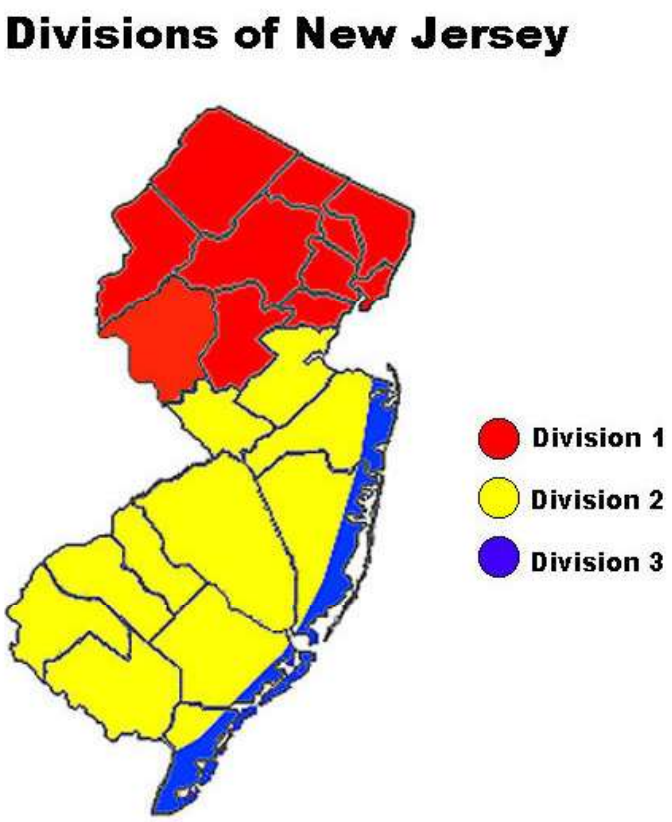


Figure 12. Climate Divisions of New Jersey

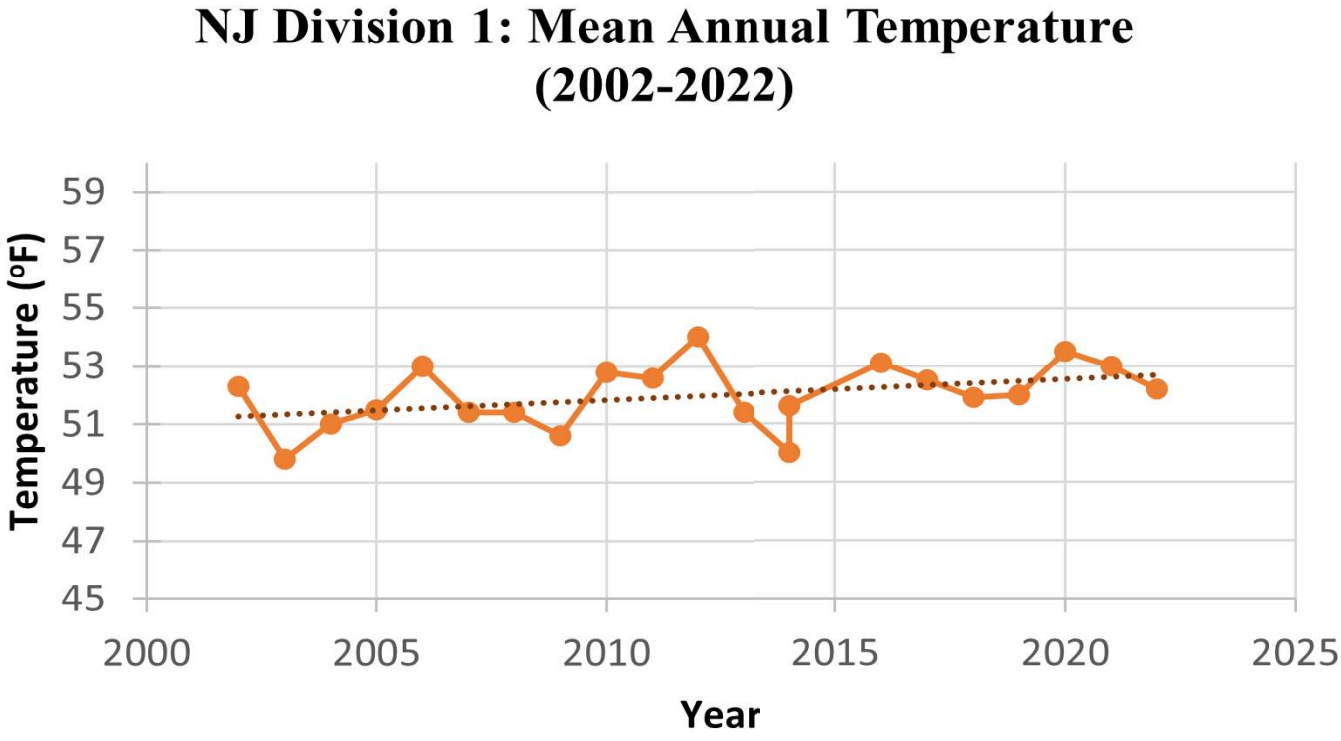


Figure 13. New Jersey Division 1, Average Annual Temperature 2002-2022

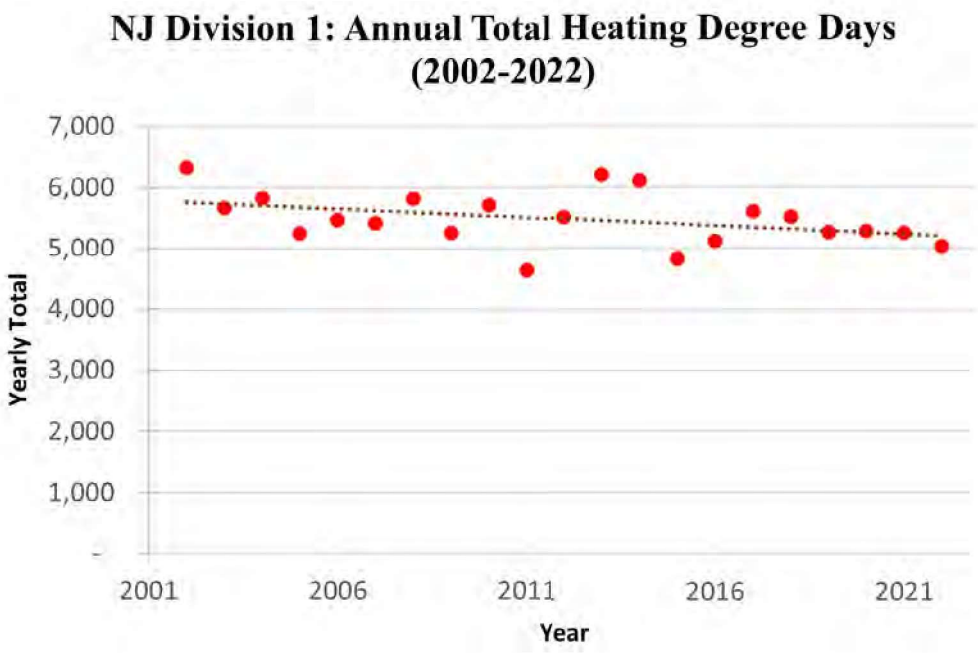


Figure 14. NJ Division 1, Annual Total Heating Degree Days 2002-2022

Figure 16 shows a slight downward trend in precipitation over the last 20 years in Division 1, although precipitation during these years remains higher than the average from the previous century.[84]

In Somerset County, between 1895 and 2023, the average annual temperature has risen from 41°F to 45°F (**Figure 17**). The average temperature is 54.7°F, warmer than the 49.8°F average for Division 1.

Annual precipitation in Somerset County has also risen gradually over the same time period, from 46 inches to 50 (**Figure 18**). Precipitation has also shown more extremes in recent years. In 2011, Hurricane Irene contributed to an all-time record of 73 inches of precipitation in one year. The average annual precipitation

Heating and cooling degree days measure the extent to which outside temperatures required energy use to maintain a comfortable indoor temperature of 65°F in a given year. For example, a 20° day in January has 45 heating degrees. The heating degrees for each day of a year are added up to calculate the number of heating degree days for that year.

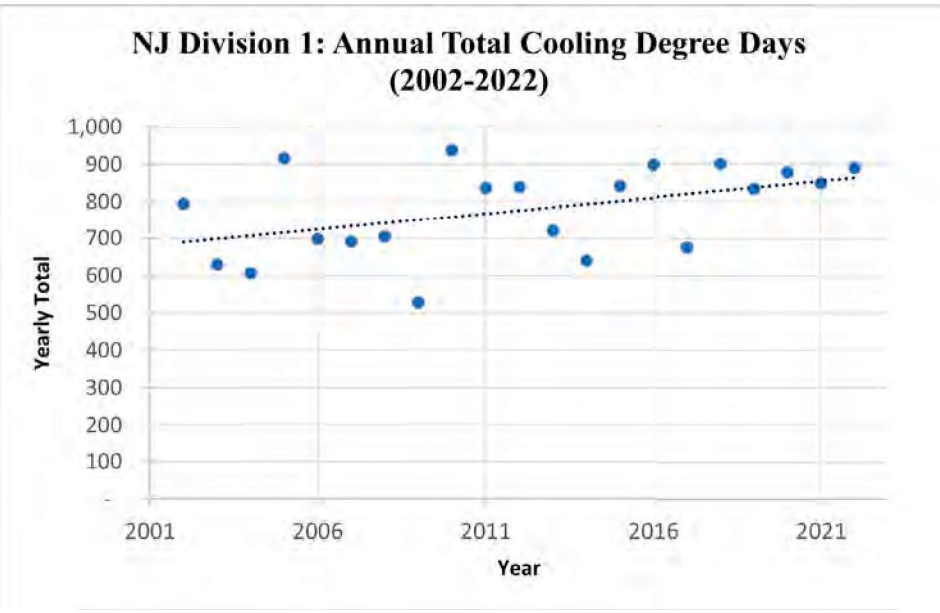


Figure 15. NJ Division 1, Annual Total Cooling Degree Days 2002-2022

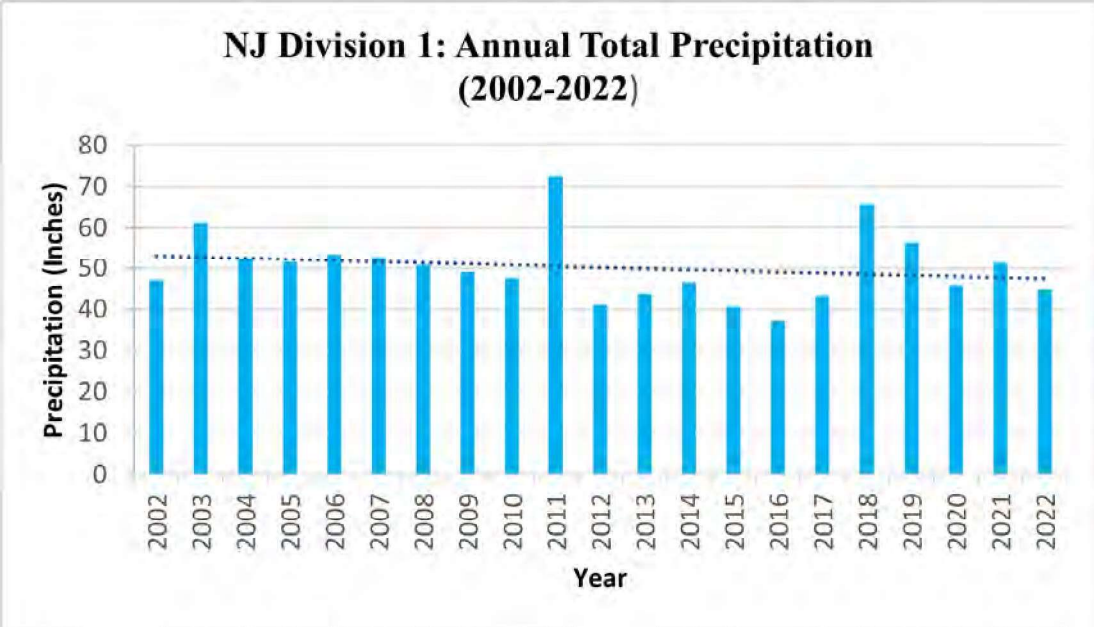


Figure 16. NJDivision 1, Annual Total Precipitation 2002-2022

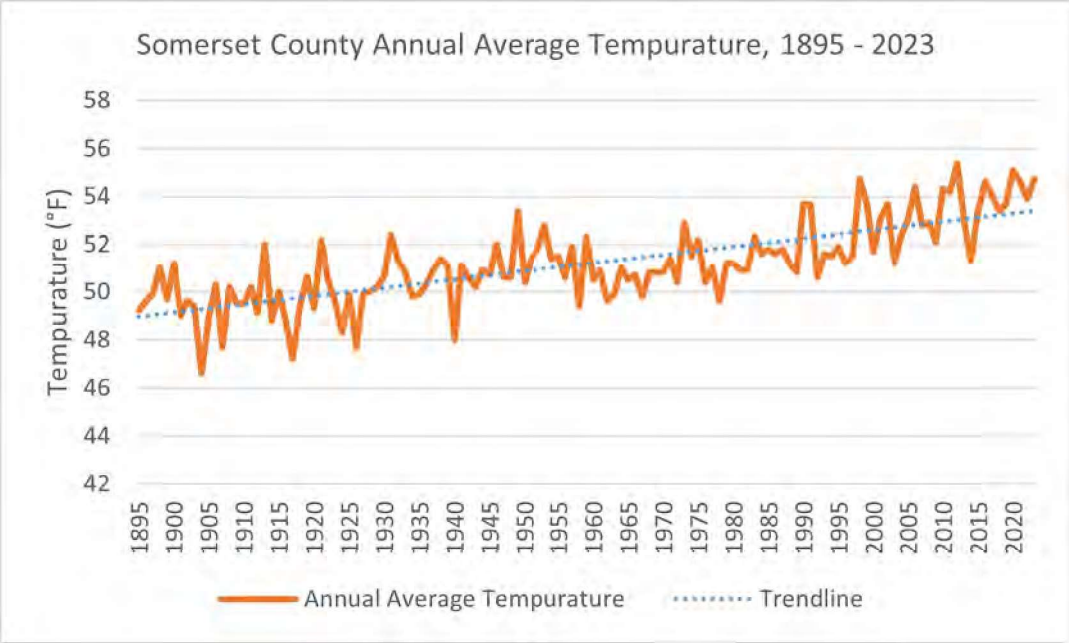


Figure 17. Somerset County Annual Average Temperature, 1895-2023

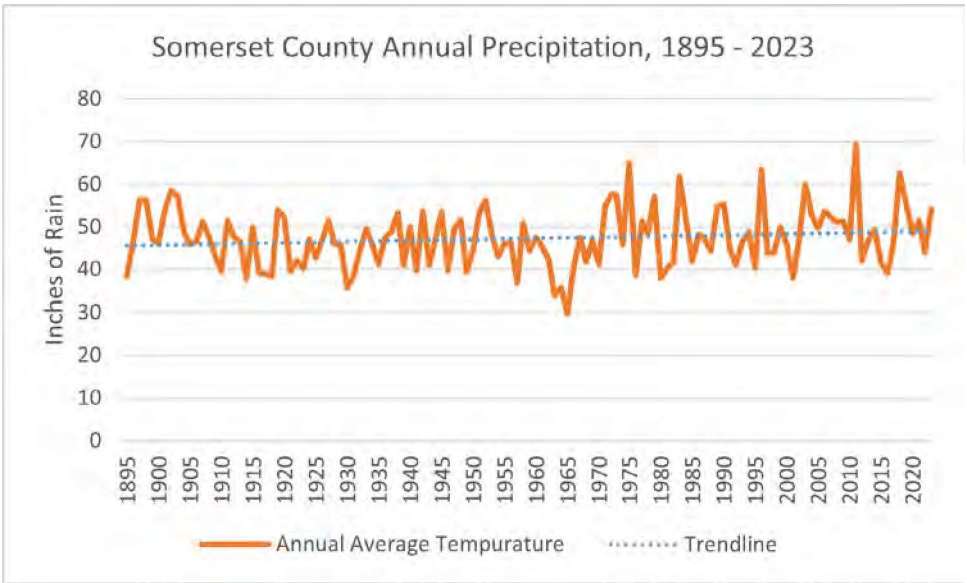


Figure 18. Somerset County Annual Precipitation, 1895-2023

in the County is 53.9 inches, higher than the average of 47.1 inches for northern New Jersey.

Its records, spanning 1954 to the present, show a minimum annual snowfall of 7.8 inches in 1972 and a maximum of 74.8 inches in 1960 (**Figure 19**).

The closest weather station to the Borough of Peapack & Gladstone which records temperature and precipitation is the Flemington station. For that station, all-time records for temperature and precipitation extremes are shown in **Table 13**.[85] Data is available from 1970 to 2023 for temperature and from 1974 to 2023 for precipitation. Monthly records indicate the year in which the highest measurement for a given month was taken. The daily high temperatures in May 2015 were, for example, higher than the daily highs for any other May since record-keeping began in 1970. Years since 2010 are highlighted. The data show that out of 12 months in the year:

- 8 months have experienced their hottest average daily highs since 2010.
- 4 months have experienced their hottest average daily lows since 2010
- 10 months have experienced their

Table 13. Year in Which All-Time Monthly Records Were Recorded, Flemington

Month	Temperature (1970 - 2023)			Highest Total Rainfall (1974 - 2023)
	Highest Average Daily High	Highest Average Daily Low	Highest Monthly Average	
January	2023	1977	2023	1979
February	2017	2015	2017	2008
March	2012	1984	2012	2010
April	2010	1975	2017	2007
May	1991	2005	2015	1989
June	2010	1980	2010	2013
July	1999	2001	1999	1975
August	2022	1982	2022	2011
September	2005	1984	2015	1999
October	2007	1987	2007	2005
November	2001	2009	2015	2018
December	2015	1989	2015	1983

Source: Office of the New Jersey State Climatologist

Note: Highlighting indicates years since 2010

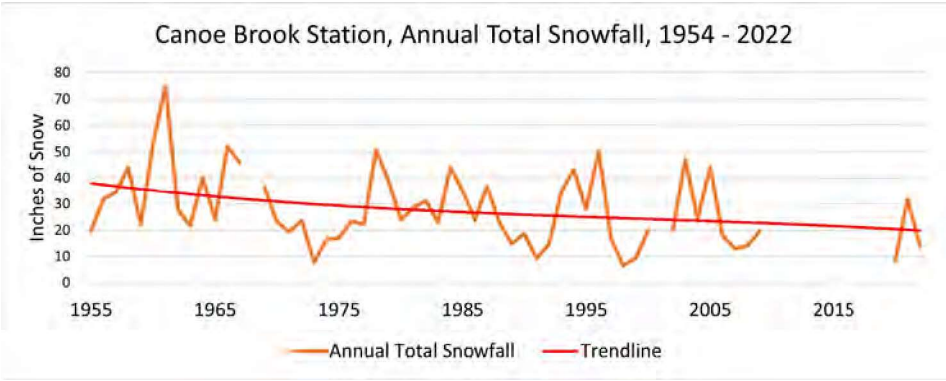


Figure 19. Canoe Brook Station, Annual Total Snowfall, 1954-2022

hottest average temperature since 2010.

- 6 months have experienced their highest amount of precipitation since 2010.
- More records have been set in recent years for average daily lows than average daily highs, meaning that nights are warming faster than days.

Drought

The Borough of Peapack & Gladstone is a generally water-rich environment with frequent and substantial precipitation, and annual rainfall in the region is increasing. While annual precipitation totals have increased, however, the distribution of precipitation has changed. Large storms, such as Hurricane Irene, are occurring more frequently and dropping more rainfall when they come. At the same time, droughts are occurring more frequently.

Table 14 shows the historical droughts recorded in Somerset County's Hazard Mitigation Plan, along with their peak severity according to the U.S. Drought Monitor. Severity of droughts is classified as 1 (Moderate Drought), 2 (Severe Drought), 3 (Extreme Drought), or 4 (Exceptional Drought). Some droughts, such as those having to do with longer-term issues like low reservoir levels and water shortages, are identified by Somerset County's Hazard Mitigation Plan but not noted as occurring in Somerset County by the U.S. Drought Monitor. Missing from these records are the drought conditions experienced in 2022 due to high temperatures over the spring and summer, with a corresponding lack of rain.

Table 14. Historical Droughts Impacting Somerset County, 1923 - 2023

Date of Drought	Severity (1 to 4)
July 1923 to September 1923	3
July 1929 to September 1932	4
December 1939 to January 1940	3
May 1949 to July 1949	N/A
November 1949 to January 1950	3
October 1952	N/A
June 1953 to July 1955	3
August 1961 to September 1966	4 - water shortage
May 1980 to May 1981	4 - water shortage
March 1995 to October 1995	N/A
June 1997 to July 1997	N/A, reservoir levels low
July 1998 to September 1999	3
October 2001 to May 2002	4
June 2005 to October 2005	2
May 2007	1
June 2010 to October 2010	2 - water shortage
April 2015 to September 2015	2 - reservoir levels low; water shortage
April 2016 to March 2017	3

Source: US Drought Monitor, Somerset County Hazard Mitigation Plan

Extreme Phenomena

Tropical Cyclones

NOAA defines tropical cyclones as rotating, organized systems of clouds and thunderstorms that originate over tropical or subtropical waters.[86] Tropical cyclones tend to bypass New Jersey due to its protective location slightly inland of coastal outcrops to the north and south. When they do affect New Jersey, they affect coastal areas, although a few have traveled inland.

Notable recent tropical cyclones are Hurricane Floyd in September 1999, Hurricane Irene in August 2011, Hurricane Sandy in October 2012, Tropical Storm Isaias in 2020, and Hurricane Ida in 2021. In 2011, Hurricane Irene's heavy rains caused damage to roads and bridges as rivers overflowed their banks, while Hurricane Sandy's (2012) high winds resulted in many downed trees across the region. In recent years, Tropical Storm Isaias (2020) and Hurricane Ida (2021) caused power outages and damage in the Borough of Peapack & Gladstone.[87]

Landslides

The New Jersey Geological Survey (NJGS) collects data on landslides in New Jersey. Landslides are defined as geologic hazards in areas with steep to moderate slopes or geologic units prone to failure. Two landslides have been identified in the Borough of Peapack & Gladstone (**Figure 20**). Both occurred along the Route 206 and caused no damage.[88]

Earthquakes

On March 29, 2024 a magnitude 4.8 earthquake struck the Northeast, with its epicenter located at Whitehouse Station, 12 miles from the Borough. This was the strongest earthquake to hit New Jersey since 2011.[89] The NJDEP records all observed earthquakes in New Jersey, with 216 as of April 2023. They occur more frequently along the fault lines

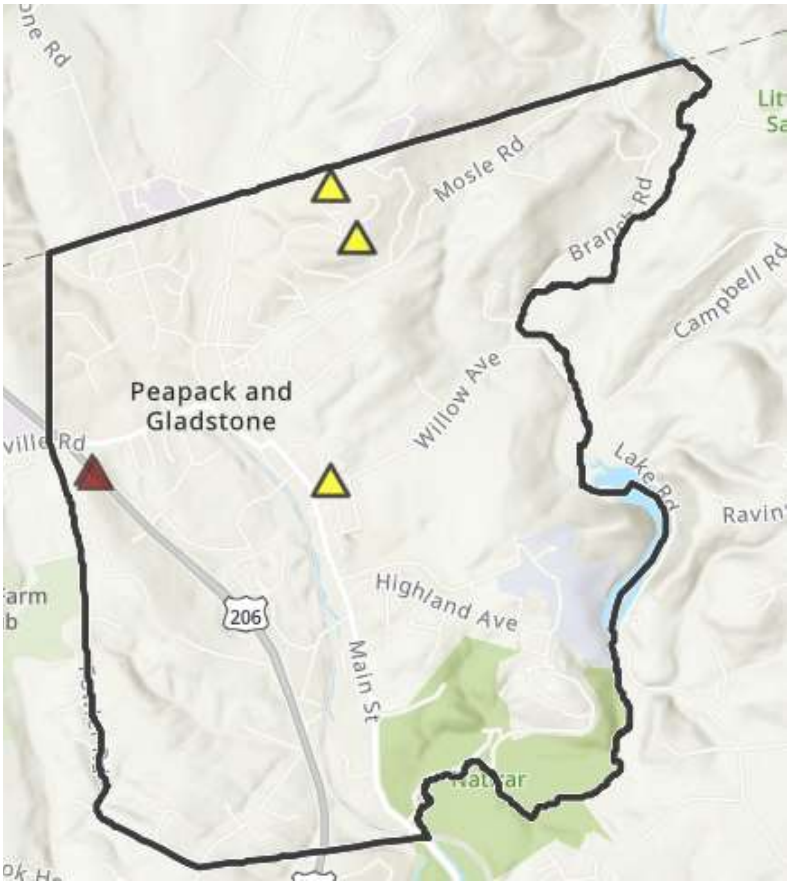


Figure 20. Earthquakes and Landslides, Borough of Peapack & Gladstone *(Source: Highlands Council)*

This data shows that the region is getting hotter and more extreme, with higher annual temperatures, more precipitation, greater precipitation fluctuations, record-high monthly average temperatures and lows, and decreasing snowfall.

in north-central New Jersey than in other parts of the state. New Jersey earthquakes are typically minor in nature, causing no damage. Prior to the April 2024 earthquake, the NJDEP had recorded 3 earthquakes in the Borough of Peapack & Gladstone (**Figure 20**) of which two were considered microquakes with magnitudes of 2.0 or less.[90]

Air Quality

Air quality in New Jersey is carefully monitored by the NJDEP's Division of Air Quality (DAQ) through 30 air monitoring stations across the state, to ensure that air quality levels meet the national standards set by the federal Clean Air Act as well as various state laws and regulations.[91] The local air monitoring stations help the NJDEP assess:

- The population's exposure.
- Impact of major pollution sources.
- Measure background levels.
- Extent of pollutant transport.
- Measure secondary impacts in rural areas.

The levels recorded for many pollutants vary greatly from season to season and even from day to day depending on weather conditions and traffic patterns.

National Clean Air Standards

In 1970, the federal government passed the Clean Air Act, which set air quality standards to be met throughout the country. The Act was amended in 1990, with focus on four areas of pollution.[92]

- Acid rain.
- Urban air pollution.
- Toxic air emissions.
- Stratospheric ozone depletion.

The amendment also introduced a permit program and strengthened enforcement. Under the Act, it is the responsibility of the USEPA to set National Ambient Air Quality Standards (NAAQS) for six common pollutants (ozone, carbon monoxide, sulfur dioxide, nitrogen dioxide, fine particulates, and lead) and the responsibility of each state to develop State Implementation Plans (SIPs) to attain and maintain these standards. In New Jersey, that role is assigned to the DAQ.

Regional/Local Statistics

The State uses the air quality data from its air monitoring network to determine which areas comply with NAAQS as well as overall trends in air pollution levels. The NJDEP produces yearly reports known as the New Jersey Air Quality Reports and provides real-time reporting through its Air Quality Index website.[93] Each monitoring site measures a limited set of pollutants; no one site tracks them all. **Figure 21** illustrates the location of the air monitoring stations in northern New Jersey.

The Air Quality Index (AQI) rates air quality based on the NAAQS, on a scale from zero to 500 (**Figure**

22).[94] AQI pollutants include ozone, particulate matter, carbon monoxide, sulfur dioxide, and nitrogen dioxide. A score of 50 to 100 is considered a moderate level of concern, with an AQI of 100 indexed to the NAAQS for each pollutant.

In 2022, New Jersey exceeded an AQI of 100 on nine days. Seven of these days were considered "Unhealthy for Sensitive Groups" and one was considered "Unhealthy". Of these nine exceedance days, eight were caused by ozone pollution and one by fine particulate matter due to a forest fire in the Pine Barrens in July of 2022.[95]

The number of days with AQI values over 100 in recent years has been: 19 in 2018, 14 in 2019, 6 in 2020, and 15 in 2021. The number of exceedance days in 2020 was the lowest in recent years, due to decreased traffic in response to the Covid-19 Pandemic

Figure 21. NJDEP Northern NJ Air Monitoring Sites

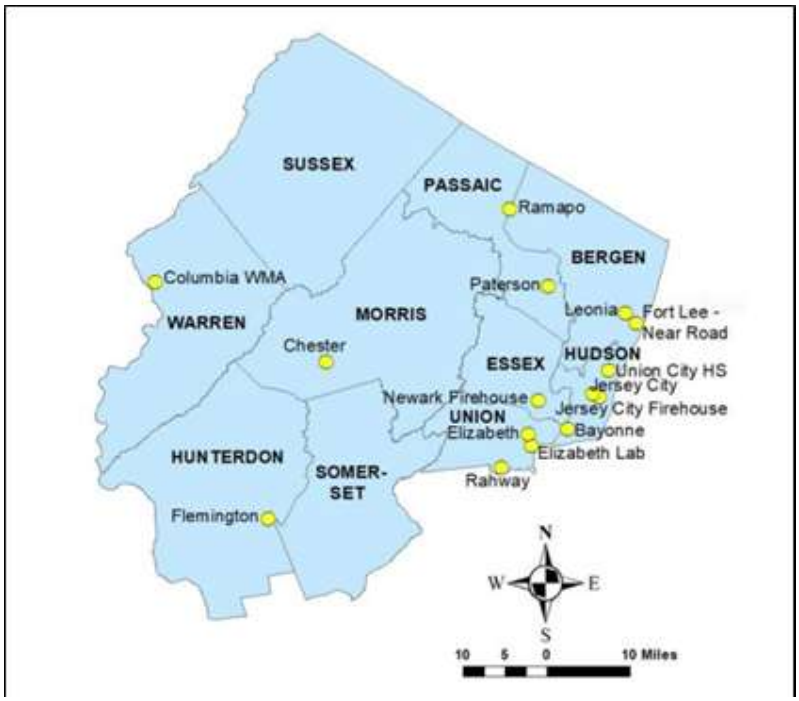


Figure 22. NJDEP Air Quality Index Guide

Air Quality Index Levels and Associated Health Impacts

AQI Level of Health Concern	Numerical Value	Meaning	Color Code
Good	0 to 50	Air quality is considered satisfactory, and air pollution poses little or no risk.	Green
Moderate	51 to 100	Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution.	Yellow
Unhealthy for Sensitive Groups	101 to 150	Members of sensitive groups may experience health effects. The general public is not likely to be affected.	Orange
Unhealthy	151 to 200	Everyone may begin to experience health effects; members of sensitive groups may experience more serious health effects.	Red
Very Unhealthy	201 to 300	Health warnings of emergency conditions. The entire population is more likely to be affected.	Purple
Hazardous	301 to 500	Health alert: everyone may experience more serious health effects.	Maroon

and related closures of businesses, offices, schools, and other destinations. At the New Jersey Clean Air Council's annual public hearing in April 2022, data was presented to show that COVID-19 measures most strongly affected ozone, nitrogen dioxide, and particulate matter.[96] In 2021, however, air pollutant levels returned to pre-pandemic levels.

Criteria Pollutants

The six pollutants for which standards have been set by the EPA - ozone, sulfur dioxide, carbon monoxide, nitrogen dioxide, particulate matter, and lead, are known as criteria pollutants and are the main pollutants regulated by air quality standards in the U.S.

Since 1997, annual concentrations of all criteria pollutants in New Jersey have decreased.[97] Air quality has improved significantly over the last fifty years since the advent of environmental regulation in 1970. New Jersey has attained NAAQS levels of lead, carbon monoxide, sulfur dioxide, and nitrogen dioxide for many years. There are still periodic exceedances of the NAAQS for ozone and fine particulates.

Ozone, O_3

Ozone (O_3) is a gas consisting of three oxygen atoms. It occurs naturally in Earth's upper atmosphere, where it offers protection from harmful ultraviolet rays and has been the subject of successful environmental efforts to maintain its presence.[98] However, when found at ground level, ozone can have serious adverse health effects. Ground-level ozone is formed through a chemical reaction involving nitrogen oxides (NO_x), volatile organic compounds (VOCs), and the presence of heat and sunlight. VOCs are a group of compounds, typically emitted in various industrial processes and leached into air as gases from common household products such as paint and certain plastics. Nitrous oxides are a family of poisonous gases produced by the combustion of fuels and largely associated with on-road emissions from cars and trucks. VOCs and nitrogen oxides are emitted year-round, but ozone only forms in warmer and sunnier conditions, so "ozone season" is defined as the annual period between March and October.

Statewide, New Jersey is classified as a "marginal" ozone non-attainment area for NAAQS. A state is considered to be in non-attainment for ozone in a given year if at any monitoring stations, the three-year average of the fourth-highest daily maximum 8-hour average concentration exceeds 0.070 parts per million (ppm). The Leonia station, at 0.071 ppm, is the only New Jersey station to exceed this standard. The State of New Jersey's standard of 0.12 ppm 1-hour concentration has not been exceeded since 2018. However, the 8-hour average concentration exceeded the NAAQS of 0.070 ppm at some stations on eight days in 2022, causing the AQI on those days to reach the "Unhealthy for Sensitive Groups" range. In 2022, the Monmouth University Station was the primary contributor to AQI on 142 days of the year.

The ozone monitoring station in New Jersey closest to Borough Peapack & Gladstone is the Chester station followed by Columbia Wildlife Management Area (WMA) and Flemington. The Chester station is located in nearby Chester

Table 15. 2022 Ozone Concentrations (ppm)				
Monitoring Site	**1-Hour Average Concentration (NJ Standard: 0.12 ppm)**	**8-Hour Average Concentration (NAAQS Standard: 0.070 ppm**		
	Maximum	**Highest Daily Maximum**	**4th Highest Daily Maximum**	**4th Highest Daily Maximum: 2018-2021 Average**
Chester	0.078	0.065	0.062	0.062
Columbia	0.071	0.061	0.060	0.058
Flemington	0.080	0.068	0.063	0.062
Source: 2021 New Jersey Air Quality Report				

Borough. This station reported 1-hour concentrations up to 0.072 ppm and 8-hour concentrations up to 0.065 ppm (**Table 15**) In 2021, Chester did not exceed the NAAQS on any days. It is likely that the air quality in Borough Peapack & Gladstone falls within this station's concentrations at most times, given its level of development and amount of through-traffic.

The effort to lower ozone concentrations has focused on reducing emissions of VOCs, but further improvements will require reductions in both VOCs and NO_x. New Jersey falls within the US EPA's Ozone Transport Region, where local ozone is particularly impacted by the regional transport of ozone-forming NO_x.[99] Continued interstate cooperation may be required to achieve further reductions in New Jersey's ozone levels.

Sulfur Dioxide, SO_2

Sulfur Dioxide (SO_2) is a heavy, colorless gas with a suffocating odor that easily dissolves in water to form sulfuric acid, or acid rain. SO_2 gases can be formed when fuels containing sulfur are burned, or when gasoline is extracted from crude oil. Most of the sulfur dioxide released into the air comes from the combustion of fossil fuels in power plants and industrial processes, and it is particularly associated with the burning of coal. As the northeastern United States has phased out the use of coal, the regional average concentration of SO_2 has decreased by 90% since 2000 and been well in attainment of the NAAQS standard for over 10 years.

SO_2 can be harmful to people (primarily children, the elderly, and asthmatics) and the environment. It also reacts with other gases and particulates in the air to form sulfates, which have their own harmful effects. Sulfates are the primary cause of reduced visibility in the eastern United States. SO_2 can also react with other substances in the atmosphere to form acid rain, which damages forests, crops, aquatic environments, and buildings.[100]

New Jersey has been in sulfur dioxide NAAQS attainment since 2015. A state is considered in attainment for sulfur dioxide in a given year if at any monitoring

Table 16. 2022 Sulfur Dioxide Concentrations (ppm)				
Monitoring Site	**3-Year Average: 99th Percentile of Daily Max 1-hour Averages**	**Maximum 3-Hour Average**	**Maximum 24-Hour Average**	**Maximum 12-Month Average**
Chester	0.00040	0.0033	0.0018	0.0005
Elizabeth	0.00030	0.0036	0.0024	0.0007
Columbia	0.00040	0.0031	0.0016	0.0002
Source: 2022 New Jersey Air Quality Report				

stations, the three-year average of the 99th-percentile one-hour daily maximum concentration exceeds 75 ppb. The State of New Jersey has more stringent requirements which have also been met in 2022.

Regulations requiring the use of low sulfur fuels in New Jersey have been effective in lowering SO_2 concentrations. No monitoring sites in New Jersey exceeded SO_2 standards in 2022.

The last year an exceedance of the national SO_2 standards was recorded in the state was 2013-2014.[101] The activities of a coal-fired power plant in Portland, Pennsylvania are believed to be the primary reason for this 2013-2014 exceedance, and New Jersey has not been near NAAQS exceedance any year since the power plant's closure in 2014. **Table 16** shows data for the SO_2 monitoring sites closest to Peapack & Gladstone.

Carbon Monoxide, CO

Carbon monoxide (CO) is a colorless, odorless, poisonous gas formed when carbon in fuels is not burned completely. The primary sources of CO emissions in New Jersey are on-road and off-road vehicles, with boilers, incinerators, and forest fires also contributing. 90% of New Jersey's CO comes from internal combustion engines. Outdoor CO levels can reach dangerous levels in cases of a weather inversion, where a layer of air becomes trapped at the earth's surface, allowing pollutants to build up without the usual circulation.

Carbon monoxide reduces the oxygen-carrying capacity of blood and therefore slows the flow of oxygen to critical parts of the body. CO does not occur in outdoor air at the lethal concentrations which can be recorded in indoor air. However, even at the lower concentrations which occur in outdoor air, exposure to CO can result in headaches and nausea. CO can be more damaging for individuals with cardiovascular disease, reducing ability to exercise and causing chest pain.[102]

The CO monitoring stations in New Jersey closest to Peapack & Gladstone Borough are Elizabeth, Jersey City, and Elizabeth Lab. At these stations, all concentrations were well below the national and state standards, though the highest values of any monitoring site in the state were recorded at Jersey City (**Table 17**). Data collection in Newark Firehouse is incomplete due to a temporary shutdown from September to December 2022.

Table 17. 2022 Carbon Monoxide Concentrations (ppm)				
Monitoring Site	**Maximum 1-Hour Average**	**2nd-Highest 1-Hour Average**	**Maximum 8-Hour Average**	**2nd-Highest 8-Hour Average**
Elizabeth	2.1	2.0	1.7	1.5
Jersey City	3.8	3.7	3.4	2.0
Elizabeth Lab	2.2	2.2	1.5	1.4
Source: 2022 New Jersey Air Quality Report				

Nitrogen Dioxide, NO_2

Nitrogen dioxide (NO_2) is a reddish-brown, highly reactive gas that is formed in the air through the oxidation of nitric oxide (NO). When it reacts with other chemicals, it can form ozone, particulate matter, and other pollutant compounds. NO_2 is generally used as an indicator for the group of gases known as nitrogen oxides (NO_x), which are emitted from the combustion of fossil fuels in vehicles, power plants, home heating and cooking, and industrial processes. NO_x is primarily released by motor vehicles, so concentrations in the air tend to peak during and immediately after the morning and evening rush hour.

NO_2 can aggravate or cause respiratory illness, and prolonged exposure can permanently damage the lungs. NO and NO_2 can irritate the eyes, nose, throat and lungs and cause nausea and tiredness. The environmental effects of NO_x can include acidification of freshwater bodies, eutrophication of coastal waters, increases in levels of toxins harmful to fish and other aquatic life. Nitrogen oxides also cause decreased visibility and react in the air to form both ozone and particulate matter.[103]

New Jersey began routinely monitoring NO_2 in 1966. The last year in which annual average NO_2 concentration exceeded standards was 1974, and it has not exceeded the 1-hour NAAQS since their implementation in 2010. Since 1975, NO_2 concentrations in New Jersey have fallen steadily to around 40 ppb. Neither the statewide nor the individual station averages have exceeded the NAAQS of 53 ppb annual average and 100 ppb 1-hour average. In 2022, The Fort Lee Near Road, Elizabeth Lab, and Bayonne stations had the highest 1-hour concentrations, but were never in excess of the 100 ppb NAAQS.

Table 18 shows data from the three NO_2 monitoring stations closest to the Borough. The data show 1-hour concentrations of 79 ppb at Elizabeth Labs, with lower 1-hour concentrations at the other closest stations. Of the ten stations statewide reporting NO_2 concentrations, Elizabeth Lab had the highest maximum daily 1-hour average at 79 ppb. The site with the highest 3-year average (2020-2022) at 61 ppb was Elizabeth Lab. Elizabeth Lab also had the highest calendar-year average and the highest 12-month average of NO_2, measured at 20 ppb and 20 ppb respectively. Data collection in Newark Firehouse is incomplete due to a temporary shutdown from September to December 2022.

Table 18. 2022 Nitrogen Dioxide Concentrations (ppb)					
Monitoring Site	1-Hour Average			12-Month Average	
	Daily Maximum	98th Percentile	3-Year Average: 98th Percentile	Maximum (Running 12 Month Period)	Calendar Year
Chester	43	28	27	3	3
Elizabeth Labs	79	63	61	20	20
Columbia	54	40	40	11	11
Source: 2022 New Jersey Air Quality Report					

Of the ten stations statewide reporting NO_2 concentrations, none recorded NO_2 exceedances for 2022. NO_2 concentrations scored well within the NAAQS, but oxides of nitrogen continue to be of concern because of their role in the formation of other pollutants, particularly ozone and fine particles. Because NO_x generally originates in internal combustion vehicles, it may be of particular concern in parts of Peapack & Gladstone close to major thoroughfares such as Route 206.

Particulate Matter

Particulate air pollution consists of any artificial or natural particles suspended in the air.[104] These particles can affect the environment.

- **Total Suspended Particulates** (TSPs) is the total of all particulates, of whatever size.
- **Inhalable Particulate Matter** are less than 10 micrometers in diameter (PM10) and can be inhaled into and accumulate in the respiratory system.
- **Fine Particulate Matter** are less than 2.5 micrometers (PM2.5), and are believed to pose the greatest health risk, penetrating deep into a person's lungs, heart, and even bloodstream to exacerbate heart and lung diseases and cause heart attacks. PM10 is considered less dangerous but can irritate the eyes, nose, and throat.

In June of 2023, due to the Canadian wildfires, New Jersey was declared Code Red for AQI. Smoke caused the worst air quality in New Jersey in at least 43 years. The NJDEP declared an Air Quality Action Day for Particulate Matter on June 7, 2023.

In 2022, all areas of New Jersey were in attainment of the national standard of 150.0 micrograms [one-millionth of a gram] per cubic meter air ($\mu g/m^3$) for Inhalable Particulates, PM_{10}. The closest of the three PM_{10} monitoring stations to Peapack & Gladstone is the Jersey City Firehouse, where the highest 24-hour concentration recorded was 28 $\mu g/m^3$, well in attainment (**Table 19**).

None of the sites in New Jersey met the annual standard of 12.0 $\mu g/m^3$ for Fine Particulates, $PM_{2.5}$. However, the Brigantine station exceeded the 35.0 $\mu g/m^3$ 24-hour standard on June 20, 2022. This exceedance can be attributed to wildfire smoke from the Mullica River Fire in the Wharton

Table 19. 2022 Particulate Matter Concentrations (µg/m³)				
Monitoring Site	$PM_{2.5}$		PM_{10}	
	Annual Average	Highest 24-Hour Average	Annual Average	2nd-Highest 24-Hour Average
Columbia	8.4	28.1	-	-
Flemington	7.2	21.9	-	-
Jersey City Firehouse	6.8	22.1	13.9	27
Source: 2022 New Jersey Air Quality Report				

State Forest. Data collection in Newark Firehouse is incomplete due to a temporary shutdown from September to December 2022.

Lead

Lead is a hazard to the health of humans and the environment, whether in the air, in paint, in water, or in soils.[105] Though action standards are still defined for lead exposure, there is consensus that no level of lead exposure can be considered safe. Lead has its main impact on the nervous system, particularly in children. Exposure to lead is linked with learning disabilities, mood issues, and lowered IQ. In adults, it can also impact the cardiovascular system and is considered a probable human carcinogen. Lead from the air or water may also accumulate in soils and sediments.

Before the 1970s, lead was a common air pollutant due to its use as an additive in gasoline. However, the phase-out of leaded gasoline has led to a 99% decrease in the average lead air concentration nationwide since 1980. New Jersey no longer has any significant industrial sources of lead, but small airplanes continue to use leaded gasoline and are estimated to release over four tons of lead annually into New Jersey's skies as of 2017. In 2008, the NAAQS level was set at 0.15 µg/m3 for a rolling 3-month average. As of 2022, there are 21 areas nationwide that are in non-attainment. The closest location is in Berks County, Pennsylvania.

Since 2012, there has been one lead monitoring station in New Jersey, at the Newark Firehouse. However, the data from Newark Firehouse is incomplete for 2022 due to a temporary shutdown from September to December 2022.

Air Toxics

Additional air pollutants that may cause adverse health effects but are not criteria pollutants are referred to as **Hazardous Air Pollutants (HAPs**) or air toxics.[106] Almost 200 air toxics have been identified on the list of HAPs maintained by the EPA.[107] The source of air toxics varies by pollutant, but in New Jersey, the majority of all air toxics are produced by internal combustion engines, with non-point sources accounting for most of the rest and heavy industry accounting for only a small portion. Non-point sources include emissions from buildings, pesticide use, consumer products, and various small-scale industrial processes.[108]

The EPA and other agencies have developed health benchmarks for all HAPs, representing the concentration generally considered safe to breathe on a daily basis. NJDEP calculates a Risk Ratio by dividing annual average concentrations of each HAP by its health benchmark. Risk ratios greater than one indicate that a given pollutant may be of concern, substantially increasing the risk for cancer or other negative health effects.

Table 20. 2022 Air Toxics Above Their Health Benchmark

Pollutant	Health Benchmark ($\mu g/m^3$)	Annual Mean Risk Ratios	
		Chester	Elizabeth
Acetaldehyde	0.45	2.1	3.1
Acrolein	0.02	41.8	43.4
Benzene	0.13	2.3	5.4
1,3-Butadiene	0.033	0.4	1.7
Carbon Tetrachloride	0.17	2.8	2.6
Chloroform	0.043	2.2	3.1
Chloromethane	0.56	1.8	2.5
1,2-Dichloroethane	0.0017	1.5	1.5
Formaldehyde	0.077	24.3	30.5

Source: 2022 New Jersey Air Quality Report

The stations closest to the Borough of Peapack & Gladstone are at Chester and Elizabeth. Chester's station is considered a baseline because of its rural location. Peapack & Gladstone is most likely closes to those observed at Chester. Health benchmarks were exceeded for eight different air toxics in Chester, and Elizabeth for nine (**Table 20**).

The NJDEP also monitors certain toxic metals and elements, most of which fall well below their health benchmark at all stations. The Elizabeth station recorded cadmium levels above the health benchmark, and both Elizabeth and Chester recorded chromium levels above the health benchmark.

Radon

Radon is an invisible and odorless radioactive gas resulting from the breakdown of naturally-occurring uranium in soil and rock.[109] As opposed to all other air pollutants covered above, radon is primarily a concern for indoor air quality. It builds up in homes as it seeps out of bedrock and through any crack or opening in a home's foundation. Radon releases radioactive energy, causing lung damage and lung cancer. In the United States, radon is the second main cause of lung cancer and kills at least 15,000 people per year.

NJDEP estimates of radon risk based on real occurrences of radon contamination place Borough of Peapack & Gladstone in a high risk category.[110] This means that within the municipality, at least 25 homes were tested, with 25% or more having radon readings greater than or equal to 4.0 pCi/L (picocuries per liter). EPA recommends action in homes with a radon level of 4 pCi/L or more, but also notes that there are no safe levels of radon, and action may be appropriate above 2 pCi/L.[111]

Noise and Odors

Noise

The Noise Control Act of 1971 authorizes NJDEP to regulate noise from stationary industrial commercial properties and railroads in New Jersey[112]. Other sources of excess noise are regulated as a public health nuisance enforced by a local public health agency, or as a disorderly persons offence enforced by police. Noises are defined as a public health nuisance when they are “unreasonably or unnecessarily loud”.[113] State regulations are applicable to noises above 50 decibels from the hours of 10:00 pm to 7:00 am and 65 decibels during the day, though individual municipalities are permitted to adopt more stringent ordinances.

Peapack & Gladstone has a local noise ordinance, which regulates sound originating from sources within the Borough. It states that sounds from inside a building, structure or vehicle should not be audible at a distance of 100 feet.[114]

Odors

The NJDEP classifies odor as air pollution when it is severe enough to unreasonably interfere with the enjoyment of life or property.[115] In many cases, odor pollution is an indicator of chemicals described above, which are regulated separately by the NJDEP. However, there is also a procedure for odor issues, based on complaints and inspection by an NJDEP official. Fines range from $150 to $1,400 for a first offense. The US Center for Disease Control notes that the best strategy for addressing odor issues is prevention zoning, time of day operating restrictions, filtering, and emission control. [116]

Meteorology and Pollution

Pollution levels are affected by meteorological attributes like wind speed and direction, temperature, and solar radiation.[117] Meteorology is an important factor in the levels of ozone in particular, as it is largely a secondary pollutant created from the chemical reaction of other pollutants in the presence of heat and sunshine. Other pollutants, such as particulate matter and sulfur dioxide, can reach elevated levels across the state due to downwind sources such as coal-fired power plants in midwestern states and wildfires in the West and Canada.

Climate patterns and statistics in the area around the Borough which impact pollution levels. Of particular note is the effect of dominant westerly winds, which carry weather patterns and pollution from west of the state over and across New Jersey. In New Jersey, these westerly winds migrate substantially from north to south, bringing different levels of pollution from different areas outside the state from day to day and causing substantial variation within the state.

Natirar Park Trail, Somerset County Park Commission website

Chapter 10.

Climate Change

Climate Change

Climate Change refers to the impacts humans have on earth's climate as a result of activities which emit greenhouse gases. Greenhouse gases (GHGs) are defined by the NJDEP as atmospheric gases that slow the rate at which heat radiates into space. In a stable climate, sunshine heats the earth and that heat is then radiated back into space. Because GHGs do not block the sunshine, but prevent its heat from going back into space, they have a warming effect on the atmosphere much like the glass roof of a greenhouse. Most GHGs occur naturally in earth's atmosphere, but human activity has caused a substantial increase in the concentration of GHGs in the atmosphere, thereby holding more of the sun's heat in and warming the planet. This has a complex effect on the earth's climate, which can already be observed.

According to the NJDEP's **2020 Scientific Report on Climate Change**, the state's annual average temperature has already increased by 3.5°F since 1895.[118] According to Rutgers University's New Jersey Climate Change Resource Center, average annual precipitation has also increased by more than three inches since 1900, with greater volatility from year to year.[119] As noted by the same research center in its **2021 New Jersey State of the Climate Report**, this increased and more intense precipitation along with sea level rise have increased the frequency and length of coastal floods.[120] The recent storms, increasing temperatures, and particular impact on nighttime temperatures reflect how climate change has impacted the Borough of Peapack & Gladstone.

Climate Change can have impacts on the health of humans. According to the United States Center for Disease Control's (CDC) **Climate Effects on Health Resources**, the predicted effects of climate warming on human health include heat stress and increased air pollution in summer, along with increased spread of disease due to increased temperatures in winter. These effects will vary based on location—for example, residents of more urbanized areas are at more risk for heat stress. As noted in the CDC's **2020 Preparing for the Regional Health Impacts of Climate Change in the United States report**, climate-related disruptions to the water cycle will likely result in more intense rain events and more frequent periods of drought, causing disruptions to the food supply.[121]

New Jersey is already experiencing the effects of climate change.

Summers are growing longer and hotter, while winters are getting shorter and warmer.

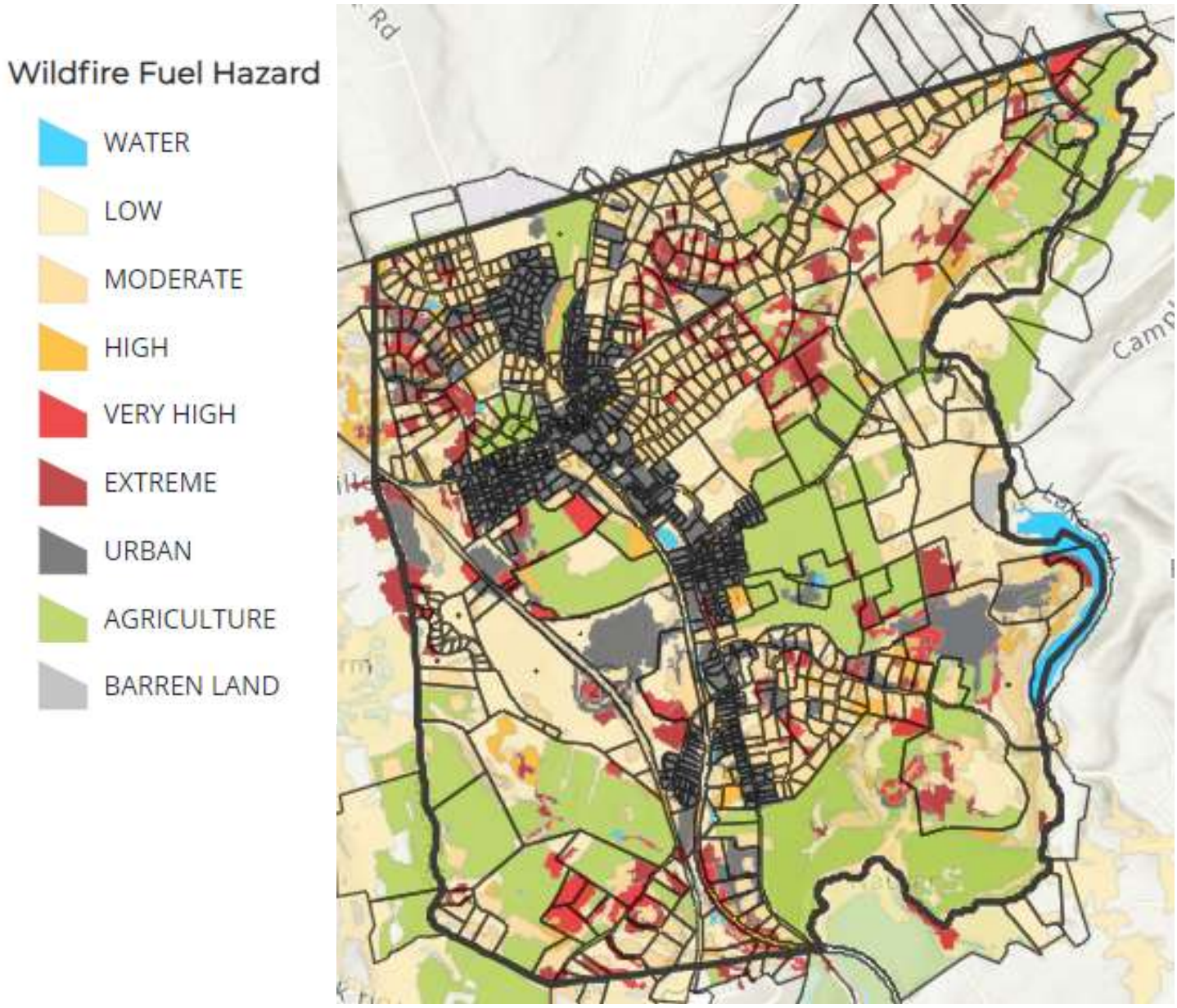
The CDC also notes that the Northeastern United States, with a high concentration of polluted sites along historically industrial waterways, is particularly vulnerable to chemical contamination when there is flooding. With a high concentration of ongoing industrial activity and other sources of pollution in the Northeast, hot days can result in dangerous air quality due to the formation of Ozone and the accumulation of pollutants.

Of the 10 hottest summers in New Jersey since 1895, all 10 have occurred since 1999. Nine have occurred since 2005.

- Office of the New Jersey State Climatologist, 2022 Summer Recap

Climate change will also have an impact on ecosystem health in the region. According to NJDEP's **2020 Environmental Trends - Climate Change report**, predicted ecosystem repercussions of increased temperatures include loss of critical habitat; further stress on already threatened and endangered species; impacts on the water supply, agriculture, and fisheries; and an increase in fires, pests, disease pathogens, and invasive weed species. The USDA's Forest Service has modeled the specific impact that climate change will have on forests and trees of the Mid-Atlantic region, which spans 60 million acres across New Jersey, Pennsylvania, Delaware, and most of New York and Maryland.[122] The Forest Service predicts increased temperatures and precipitation, along with drought risk. Other predicted impacts include an increased risk of wildfire, changing conditions for tree regeneration and recruitment, increased suitability for southern species, decreased suitability for northern species, and increased damage from invasive plants, pests, and pathogens.

Figure 23. Wildfire Fuel Hazard
(Source: Highlands Council)



Wildfires

Wildfires are worsening across the United States. Heat-trapping pollution is warming and affecting weather conditions and increasing the risks of wildfires. The NJDEP listed all of North Jersey as "very high" risk for wildfires. The report **Wildfire Weather: Analyzing the 50-year shift across America**, focused on three weather conditions key to fire weather such as relative humidity, temperature and wind.[123]

The NJ Forest Fire Service developed the wildfire fuel hazard ranking from low to extreme (**Figure 23**).

For the Borough of Peapack & Gladstone:

- 22% is ranked low.
- 27% is ranked moderate.
- 3% is ranked high.
- 5% is ranked very high.
- 5% is ranked extreme.

As temperatures rise, those moderate areas are have a higher potential of wildfires.

Flooding

With the changing climate, the Borough has seen an increase in storms and hurricanes which has led to flooding in regions previously not affected.

The Borough main flooding areas of concern are around the Peapack Brook**.** This flooding has led to other issues such as erosion, increased invasive plant species abundance, and increased tree disease.

- **Erosion:** Erosion occurs when which wind, moving water, ice, and gravitational forces cause soil and particulate materials to be displaced. This is typically a natural process, however, due to climate change erosion it is occurring at a much faster rate. Erosion has occurred the most on the high bank of the eastern side Peapack Brook.[124] Erosion in the brook has led to increased flooding in Rockabye Meadow.

- **Invasive Plant Abundance:** Invasive plants are increasing in the Borough due to climate change and increased flooding. Invasive plant species are plants that are not native to the environment and are able to out compete the native plants. They disrupt ecosystems, spread diseases, and increase risk of wildfires.[125] The areas surrounding Peapack Brook are the most impacted by invasive plants due to frequent flooding spreading them downstream.

According to the NJDEP website, there is a 2020 New Jersey Scientific Report on Climate Change, 2021 Statewide Climate Change Resilience Strategy and 2022 Human Health Addendum. The Resilience Action Plans will be based on the 2021 Strategy policy framework and research of the 2020 and 2022 reports. The Resilience Action Plan will cover specific climate threats to NJ, first being extreme heat releasing Spring 2024. A prelude to the plan recently release can be found here . Additionally, recently introduced Heat Hub NJ, a one-stop digital resource for all things related to extreme heat provides information on effects of extreme heat on individuals, communities, and the environment, along with real-time weather alerts, surveys, and quizzes. Furthermore, through participation in the Cooling Center Survey,individuals can contribute to the assessment and improvement of the facilities.

- **Increased Tree Diseases:** Invasive plant species leads to an increase of diseases for native plant life. The Borough's Environmental and Shade Tree Commission has led a multi-year campaign to address the pests and pathogens spread by the invasive *Ailanthus altissima* (Tree of Heaven) in Rockabye Meadow.

Urban Heat Island Effect

A heat island is a localized area which experiences higher temperatures than surrounding areas due to development.[126] Often referred to as the urban heat island effect, this phenomenon also effects both urban and suburban areas.

Heat islands are caused by modifications to the natural environment, such as buildings, roads, and other infrastructure. These features generally absorb more heat from the sun than natural ground cover would, in part due to their darker color. In addition, areas without trees do not benefit from the cooling effect of plants through a process known as evapotranspiration. Buildings and other structures may also block wind which would otherwise circulate cooler air. Waste heat from cars, air-conditioners, buildings, and industry is also concentrated in developed areas. The effect can be reduced through strategies such as:

- Lighter-color roofs
- Reduced paved surface
- Increased tree cover.

The Environmental & Shade Tree Commission notes that without a plantable curb box, the Commission is unable to plant trees that will shadethe town's thoroughfares.

Plant Hardiness Zones

Plant hardiness zones provide a general indication of the extent of overwintering stress experienced by plants and are based on the average annual extreme minimum temperatures.[127] Hardiness zones are used by horticulturists to evaluate the cold hardiness of plants. Plant hardiness zones and subzones are delineated according to the USDA's definitions, which break the geography into zones by 10°F (5.56 °C) increments of annual extreme minimum temperature. North America is divided into 11 separate planting zones; each growing zone is 10°F warmer (or colder) in an average winter than the adjacent zone. Currently, The Borough of Peapack & Gladstone is in the Plant Hardiness Zones of 6b and 7a which is -5 to 0°F and 0 to 5°F respectively. This could increase due to rising temperatures.

Climate Mitigation: Reducing Greenhouse Gas Emissions

The primary driver of climate change is the ongoing emission of GHGs into earth's atmosphere, primarily due to the extraction and combustion of fossil fuels. Reducing the continued emission of GHGs is the first and most direct step to mitigating climate change.[128]

Acknowledging the need to reduce GHG emissions to avoid the most damaging impacts of climate change, the NJ Legislature enacted the Global Warming Response Act (GWRA) in 2007 and updated it in 2019. This law requires a reduction of GHG emissions by 80% below 2006 levels by 2050. An intermediate reduction requirement of 20% by 2020 was achieved. The 2019 updates to the GWRA require that the NJDEP collaborate with other state agencies and to share recommendations for reducing emissions, and the NJDEP's **2020 Global Warming Response Act 80 x 50 Report (80 x 50 Report)** describes progress to date and strategies for reaching the required emissions reductions (**Figure 24**).[129]

The 2050 goal is calculated as 24.1 million metric tons of CO_2 equivalent (MMT CO_2e) per year, and 2018 emissions were estimated as 97.0 MMT CO_2e in the 80 x 50 Report. A breakdown of emissions sources is not available on the municipal level. However, carbon emissions per capita are generally highest in areas with car-dependent infrastructure and large homes. The **80 x 50 Report** attributes the state's success in meeting the 2020 emission reduction requirement to market and other forces which caused a transition from coal-fired power plants to power plants powered by natural gas.

The report recommends achieving the 2050 goal through transitioning the electric grid to:

- 100% renewable energy
- electrifying 100% of light-duty vehicles
- electrifying 90% of building and water heating.

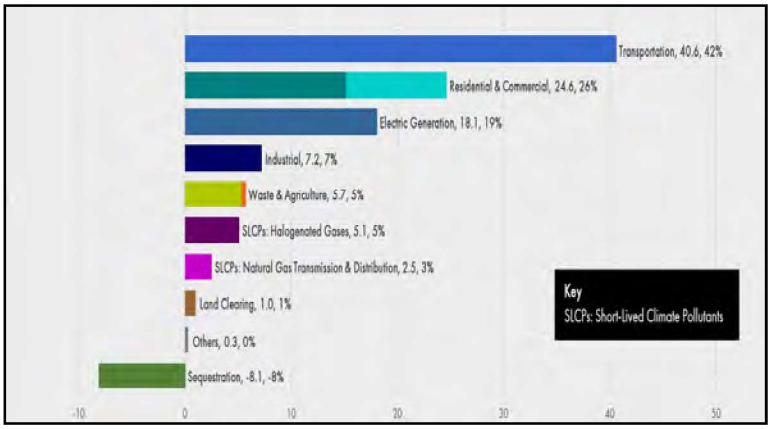


Figure 24. 80X50 Report-NJ GHG Emissions Inventory for 2018 *(MMT CO2e and Percentage)*

New Jersey's met its carbon emissions reduction goal for 2020 due to market forces. The 2050 goal, to reduce carbon emissions by 80%, will require a "seismic shift." (NJDEP)

There are other complementary strategies, such as increasing ridership on mass transit.

Legislation, agency reports, and executive orders relating to climate change continue to be produced. The **Energy Master Plan: Pathway to 2050** was released in 2019, outlining strategies to transition New Jersey's electrical grid to 100% renewables by 2050.[130] In 2020, Governor Murphy signed Executive Order 100: Protecting Against Climate Threats (PACT), which authorizes the NJDEP to make regulatory reforms to pursue the state's climate goal.[131]

Resilience: Living in a Changed Climate

There are currently no proven strategies to remove the excess GHGs which have built up in the atmosphere over the course of the industrial age, or to counter their effects on earth's climate. Unless currently experimental methods become feasible at a very large scale, earth's climate will continue to change even if all greenhouse gas emissions cease immediately. Along with action to reduce the scale of climate change, New Jersey is taking action to adapt to a changing climate.

The state's Climate Resilience Strategy report defines climate resilience as "the ability of social and ecological systems to absorb and adapt to shocks and stresses resulting from a changing climate, while becoming better positioned to respond in the future."

Many of the actions already discussed also have climate resilience components. For example, PACT authorizes the NJDEP to not only pursue the state's climate goal, but also to incorporate climate predictions into the agency's permitting process for construction and new development.

There is an ongoing effort to plan for climate resilience at the statewide level. In 2019, Governor Murphy signed Executive Order 89, creating the Interagency Council on Climate Resilience (ICCR).[132] The ICCR spans seventeen agencies working together to maintain New Jersey's economic, environmental, and natural resources. Executive Order 89 also created the New Jersey Climate and Flood Resilience Program (CFRP), responsible for releasing the state's first **Climate Resilience Strategy report** in 2021.

One component of the ICCR's work is the production of subject-specific **Resilience Action Plans**. The plan for extreme heat is scheduled for release in the fall of 2023, and more information about the process and public engagement opportunities is available here.

The Rutgers Climate and Energy Institute (RCEI) has recently been formed by combining the expertise of three well-established university institutes that specialize in climate, environment, and energy research. These institutes are the Rutgers Climate Institute (RCI), the Rutgers Energy Institute (REI), and the Rutgers Institute of Earth, Ocean, and Atmospheric Sciences (EOAS). The website (https://rcei.rutgers.edu/) features information on recent news & events, resources and encompasses all Rutgers programs related to climate research and resources.

The Resilience Action Plan and all other resilience work in the state is guided by the six main goals identified in the Climate Resilience Strategy, available here:

- Build resilient and healthy communities.
- Strengthen the resilience of New Jersey's ecosystems.
- Promote coordinated governance.
- Invest in information and increase public understanding.
- Promote climate informed investments and innovative financing.
- Coastal resilience.

Clean Energy Initiatives

Renters, homeowners, and businesses in New Jersey can take advantage of various state rebate programs on energy-saving measures through their local utility.[133] PSE&G offers resources for energy-saving practices, as well as a dedicated online marketplace for energy-saving items ranging from efficient water fixtures to smart home items.[134] Rebates are automatically included in purchases from PSE&G's online store at this website.

Sustainable Jersey

Sustainable Jersey is a nonprofit organization that certifies actions taken by municipalities in New Jersey to reduce waste, cut greenhouse gas emissions, and improve environmental equity. The organization provides the tools, training, and incentives needed for municipalities to achieve sustainability actions. The certification program allows participating municipalities to score points based on their sustainability achievements and gain Bronze, Silver, or Gold status. Of the 564 Municipalities in New Jersey, 466 are registered with Sustainable Jersey.[135]

The Borough of Peapack and Gladstone registered for Sustainable Jersey in March 2010, and does not currently have a certification.[136]

President Biden announced the Fifth National Climate Assessment (NCA5), which reveals a decline in U.S. greenhouse gas emissions despite population and GDP growth. The President has also committed over $6 billion in investments to enhance climate resilience, including strengthening the electric grid, supporting environmental justice initiatives, reducing flood risk, and advancing conservation efforts. For more information refer this factsheet: https://www.whitehouse.gov/briefing-room/statements-releases/2023/11/14/fact-sheet-biden-harris-administration-releases-fifth-national-climate-assessment-and-announces-more-than-6-billion-to-strengthen-climate-resilience-across-the-country/

Stream Clean Up Event

Chapter 11.

Known Contaminated Sites

Soil and groundwater contamination are tracked by the state and federal governments at varying degrees of contamination.[137] This includes the following type of sites and locations:

- Brownfields – extensive or long-term remediation, point source facilities that require continuous monitoring
- Community Right to Know Programs – point source sites that require ongoing, continuous monitoring; and
- Known Contaminated Sites – Point source occurrences are specific and limited.[138]

As of 2021, the NJDEP Site Remediation Program maintains a list of 14,461 sites with 11,205 of those sites listed as active cases managed by a New Jersey Licensed Site Remediation Professional (LSRP). Sites that have been confirmed as contaminated and are undergoing remedial investigation, cleanup, or awaiting assignment of a LSRP include private residences, active/abandoned manufacturing/commercial properties, and gas stations.[139] The list does not include sites that have been successfully remediated.

There are seven active Known Contaminated Sites (KCS) in the Borough of Peapack & Gladstone, five of which are non-homeowner sites.

Brownfields

A brownfield is any former or current commercial or industrial site, currently vacant or underutilized and on which there has been, or there is suspected to have been, a discharge of a contaminant. The State of New Jersey encourages municipalities and counties to redevelop their brownfields as part of Smart Growth initiatives. According to NJDEP's NJ-GeoWeb website, no brownfield sites were identified within in the Borough of Peapack & Gladstone.[140]

Community Right to Know

The Community Right to Know (CRTK) program is responsible for collecting and disseminating data on hazardous substances produced, stored, or used at companies in New Jersey.[141] Companies or organizations storing certain hazardous substances in levels above specific threshold amounts are required by state and federal law to file annual reports.

The Release and Pollution Prevention Report (RPPR) is used to collect information for the NJDEP Community Right to Know and Pollution Prevention programs. The RPPR gathers data on toxic chemical from multi-media environmental releases, on-site waste management, and off-site transfers, collectively known as material accounting. The Emergency Planning Community Right-to-Know Act (EPCRA) is a federal regulation that "establishes requirements ... regarding emergency planning and Community Right-to-Know reporting on hazardous toxic chemicals" to increase public knowledge and information about chemical uses.

Table 21 describes the Community Right to Know sites within the Borough, noting the facility name, and address of the site. There are currently five CRTK (non-homeowner) sites in the Borough.

Known Contaminated Sites

The Known Contaminated Sites (KCS) List for New Jersey includes those sites and properties within the state where contamination of soil or groundwater has been confirmed at levels equal to or greater than

Table 21. Community Right to Know Sites

PI Number	Facility Name	Physical Address	Status
0000009268	Creative Management Inc.	28 Rte. 206 N	CRTK/RPPR
00000070091	Gladstone Fuel LLC	1 Pottersville Road	CRTK/RPPR
00000073798	Gladstone Gas LLC	1 Pottersville Road	CRTK/RPPR
07329200000	Komline-Sanderson Corp.	12 Holland Avenue	CRTK/RPPR
60596900000	Gladstone Fuel LLC	1 Pottersville Road	CRTK/RPPR

Source: NJDEP Data Miner

applicable standards. KCS may include:

- *Active Sites* are those with confirmed contamination that have one or more active cases and any number of pending and/or closed cases;
- *Pending Sites* are those with one or more pending cases, no active cases, and any number of closed cases; and
- *Closed Sites* are those with only closed cases and no active or pending cases.

The KCS list was produced in response to the Brownfield and Contaminated Site Remediation Act (N.J.S.A. 58:10-23.16-17) which required the preparation a list of sites affected by hazardous substances. It also satisfied obligations under the New Jersey New Residential Construction Off-Site Conditions Disclosure Act (N.J.S.A. 46:3C1 et seq.). Sites included can undergo a wide variety of remedial activities, ranging from relatively simple cut and scrape cleanups to highly complex cleanups. The sites with complex contamination issues can have several sources of contamination, which can affect both soil and groundwater at the same time.

The Site Remediation Reform Act, N.J.S.A. 58:10C-1 et seq. (SRRA), enacted in 2009, has helped to speed up the remediation process, "thus helping to decrease the threat of contamination to public health and safety of the environment, and to quickly return underutilized properties to productive use." Active sites are rated with B, C1, C2, C3, or D depending on the type of severity of the contamination defined as follows:

- **B:** Remedial level associated with emergency response, simple removal activities of contaminants usually no impact to soil or groundwater.
- **C1:** Remedial levels are associated with simple sites one or two contaminates localized to soil and the immediate spill or discharge area.
- **C2:** Remedial levels are associated with more complicated contaminant discharges such as multiple site spills and discharges, or more than one contaminant, with both soil and groundwater impacted or threatened.
- **C3:** Remedial levels are associated with highly complex and threatening sites. These sites can have multiple contaminants, some at high concentrations with unknown sources continuing to impact soils, groundwater and possibly surface waters and potable water resources. These sites are dangerous for direct contact with contaminated soils.
- **D:** Same conditions as C3 except that D levels are also usually designated Federal "Superfund Sites."

Sites with documented groundwater contamination may also contain a Classification Exception Area (CEA), defined by NJDEP as "an area within which one or more constituent standards and designated uses are suspended."[142] A CEA is an institutional control prohibiting the use of groundwater for a defined period of time. **Table 22** identifies the KCS within the Borough, noting the status (active, pending or closed) and whether the site is a

Table 22. Known Contaminated Sites				
Category	Status			Total
	Active	Pending	Closed	
Homeowner	2	-	79	81
Non-Homeowner	5	-	36	41
Total	7	-	115	122
Source: NJDEP Data Miner				

homeowner property or not. **Table 23** and **Map 15** identifies and locates the seven active sites with confirmed contamination located within the Borough, noting the CEA status and remedial level.

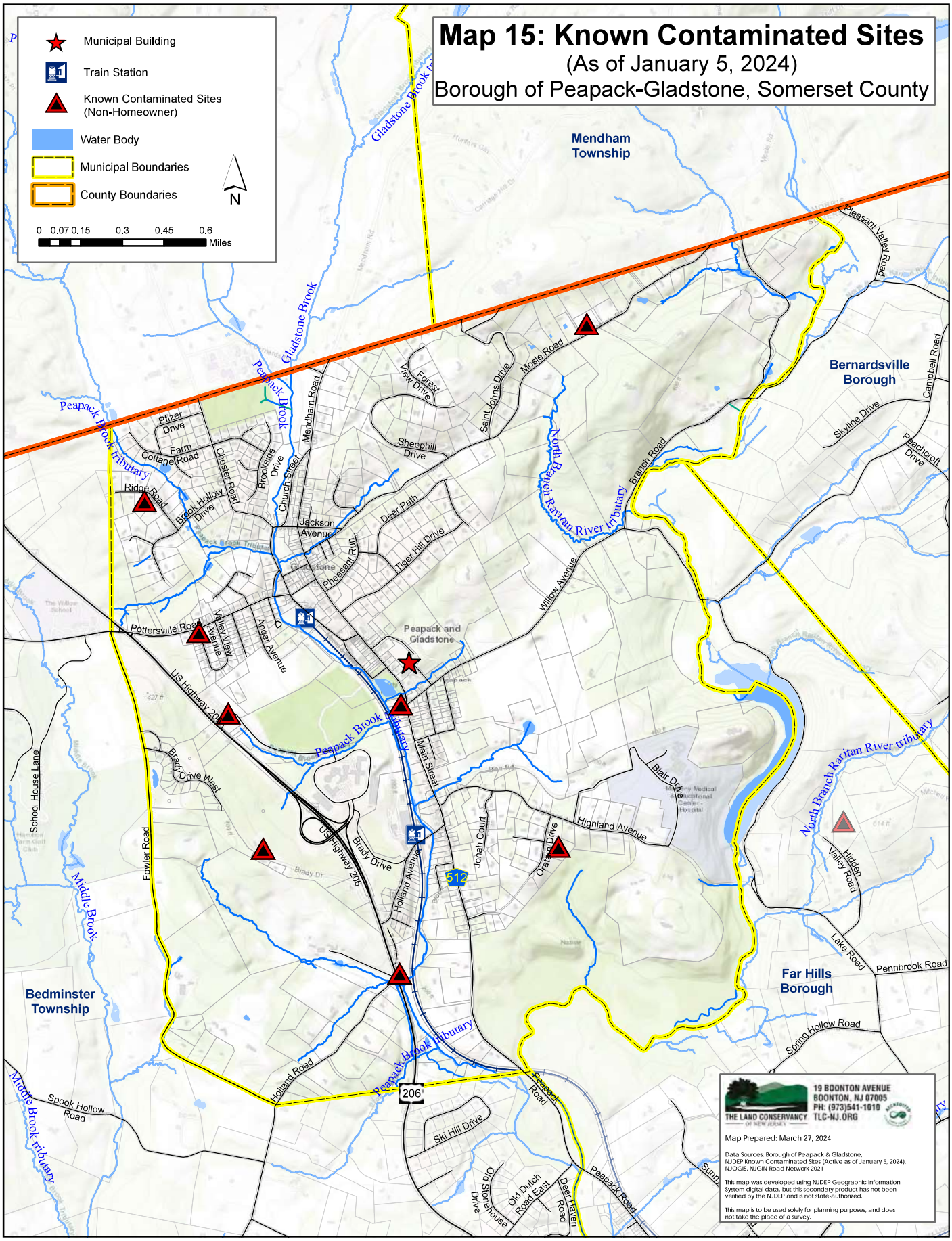
PFAS

Per- and polyfluoroalkyl substances, commonly referred to as **PFAS**, are synthetic chemicals that have been globally utilized in industry and consumer products since the 1940s.[143] They have found application in the production of nonstick cookware, water-repellent clothing, stain-resistant fabrics and carpets, certain cosmetics, specific types of firefighting foams, as well as items designed to resist grease, water, and oil.

The most extensively researched PFAS compounds include perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS). Additionally, perfluorohexane sulfonic acid (PFHxS) and perfluorononanoic acid (PFNA) have also received considerable attention. In the United States, the production and use of PFOA and PFOS have been phased out.

Throughout their production and utilization, PFAS have the capacity to migrate into the soil, water, and air. The majority of PFAS, including PFOA and PFOS, exhibit a remarkable resistance to breaking down, thus persisting in the environment. Given their widespread use and enduring presence in the environment, PFAS are detectable in the bloodstreams of both humans and animals across the globe. Additionally, they are present at trace levels in various food products and within the environment.

Table 23. Active Sites with Confirmed Contamination (Non-Homeowners)					
Site ID	PI Number	PI Name	Address	CEA Status	Remedial Level
013316	12557	Peapack Sunoco	28 Rte. 206 & Holland Road	Ongoing	C2
021948	000900	Clayton Amerman INC	163 165 Main Street	Ongoing	C2
431750	542001	89 Mosle Road	89 Mosle Road	Ongoing	C2
459289	579574	Pharmacia & Upjohn Company LLC	158 RT 206 N		
143623	814142	125 Route 206	125 RT 206		B
Source: NJGIN Open Data. KCSL (Non-Homeowners)					


Map 15: Known Contaminated Sites
(As of January 5, 2024)
Borough of Peapack-Gladstone, Somerset County
Municipal Building
Train Station
Known Contaminated Sites (Non-Homeowner)
Water Body
Municipal Boundaries
County Boundaries
N
0 0.07 0.15 0.3 0.45 0.6
Miles
Mendham Township
Bernardsville Borough
Bedminster Township
Far Hills Borough
Gladstone Brook
Peapack Brook
Peapack Brook Tributary
North Branch Raritan River tributary
Middle Brook
Middle Brook tributary
Pfizer Drive
Farm Cottage Road
Ridge Road
Chester Road
Brook Hollow Drive
Brookside Drive
Church Street
Mendham Road
Forest View Drive
Sheephill Drive
Saint Johns Drive
Mosle Road
Pleasant Valley Road
Campbell Road
Skyline Drive
Peachcroft Drive
Branch Road
Deer Path
Tiger Hill Drive
Jackson Avenue
Pheasant Run
Willow Avenue
Pottersville Road
Valley View Avenue
Apgar Avenue
Peapack and Gladstone
US Highway 206
Brady Drive West
Brady Drive
Main Street
Holland Avenue
Jonah Court
Orataro Drive
Highland Avenue
Blair Drive
Hidden Valley Road
Lake Road
Pennbrook Road
Spring Hollow Road
School House Lane
Fowler Road
Spook Hollow Road
Holland Road
Peapack Road
Ski Hill Drive
Old Dutch Road East
Deer Haven Road
Old Stonehouse Drive
512
206
19 BOONTON AVENUE
BOONTON, NJ 07005
PH: (973)541-1010
TLC-NJ.ORG
THE LAND CONSERVANCY OF NEW JERSEY
Map Prepared: March 27, 2024
Data Sources: Borough of Peapack & Gladstone, NJDEP Known Contaminated Sites (Active as of January 5, 2024), NJOGIS, NJGIN Road Network 2021
This map was developed using NJDEP Geographic Information System digital data, but this secondary product has not been verified by the NJDEP and is not state-authorized.
This map is to be used solely for planning purposes, and does not take the place of a survey.

Certain PFAS compounds can accumulate in living organisms with repeated exposure over time.

Numerous scientific studies have been conducted to examine the effects of PFAS exposure on health. While establishing direct causation between substances and health conditions in humans can be challenging, these studies have suggested potential links between environmental PFAS exposure and adverse health effects in both humans and animals.

On March 14, 2023, the U.S. EPA announced the proposed National Primary Drinking Water Regulation (NPDWR) concerning six PFAS compounds, which include perfluorooctanoic acid (PFOA), perfluorooctane sulfonic acid (PFOS), and perfluorononanoic acid (PFNA).

The NJDEP Drinking WaterWatch offers insights into PFAS contamination in both public and private water systems.[144] As of the most recent testing conducted on January 17, 2024, the data pertaining to the Elizabeth City based New Jersey American Water system which provides water and serves as the reference point for the Borough of Peapack & Gladstone, indicates compliance with the NJDEP Maximum Contaminant Levels (MCLs). The test results are found in **Table 24.** This signifies that the PFAS concentrations in the public water system fall below the established thresholds for contamination.[145]

Table 24. PFAS Contamination

Contaminant	Maximum Contaminant Level (MCL) (g/L or ppb)	Ground Water Quality Standards (GWQS) (g/L or ppb)	Test Result (g/L or ppb)
PFOA	0.014	0.014	0.003
PFOS	0.013	0.013	0.0037
PFNA	0.013	0.013	<0.002

Source: NJ DEP, Agency for Toxic Substances and Disease Registry (ATSDR)

Appendix

97 **Appendix A: Agricultural Soils in Peapack and Gladstone Borough**

(Source: Draft Comprehensive Farmland Preservation Plan Update 2022, Borough of Peapack and Gladstone, Pages 6-9)

102 **Appendix B: Historic and Cultural Features**

(Source: 2013 Environmental Resource Inventory, Borough of Peapack and Gladstone, Pages 64-70 and Appendices B, C, and D)

113 **Appendix C: Invasive Plants In and Around Peapack & Gladstone**

(Source: Borough of Peapack and Gladstone Environmental Commission, 2021)

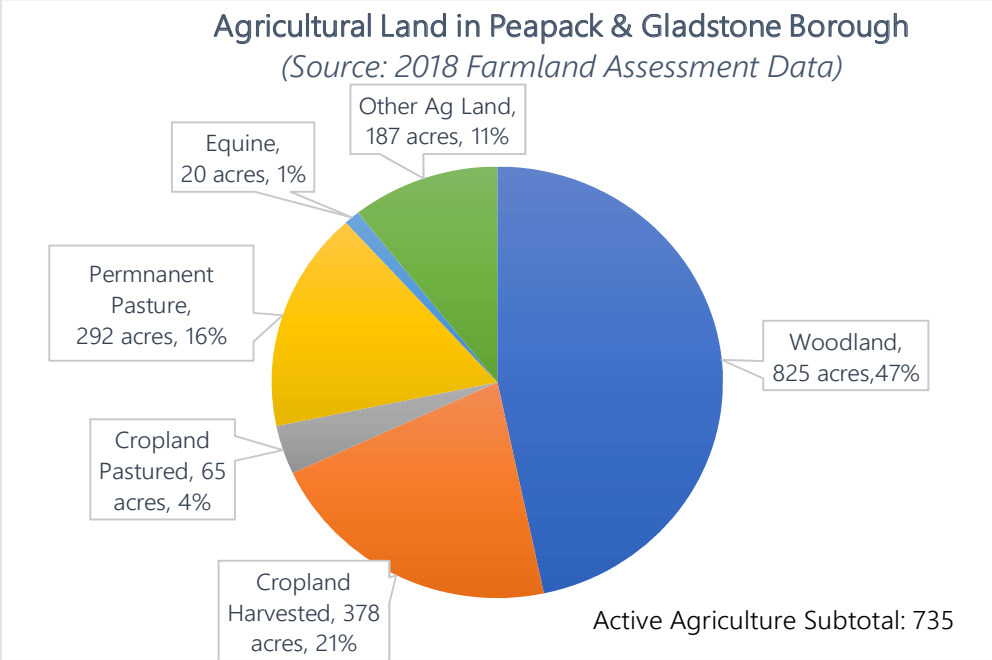
125 **Appendix D: Blue Line Stream**

(Source: 2013 Environmental Resource Inventory, Borough of Peapack and Gladstone, Appendix E)

Appendix A

98 Agricultural Soils in the Borough of Peapack and Gladstone

(Source: Draft Comprehensive Farmland Preservation Plan Update 2022, Borough of Peapack and Gladstone, Pages 6-9)

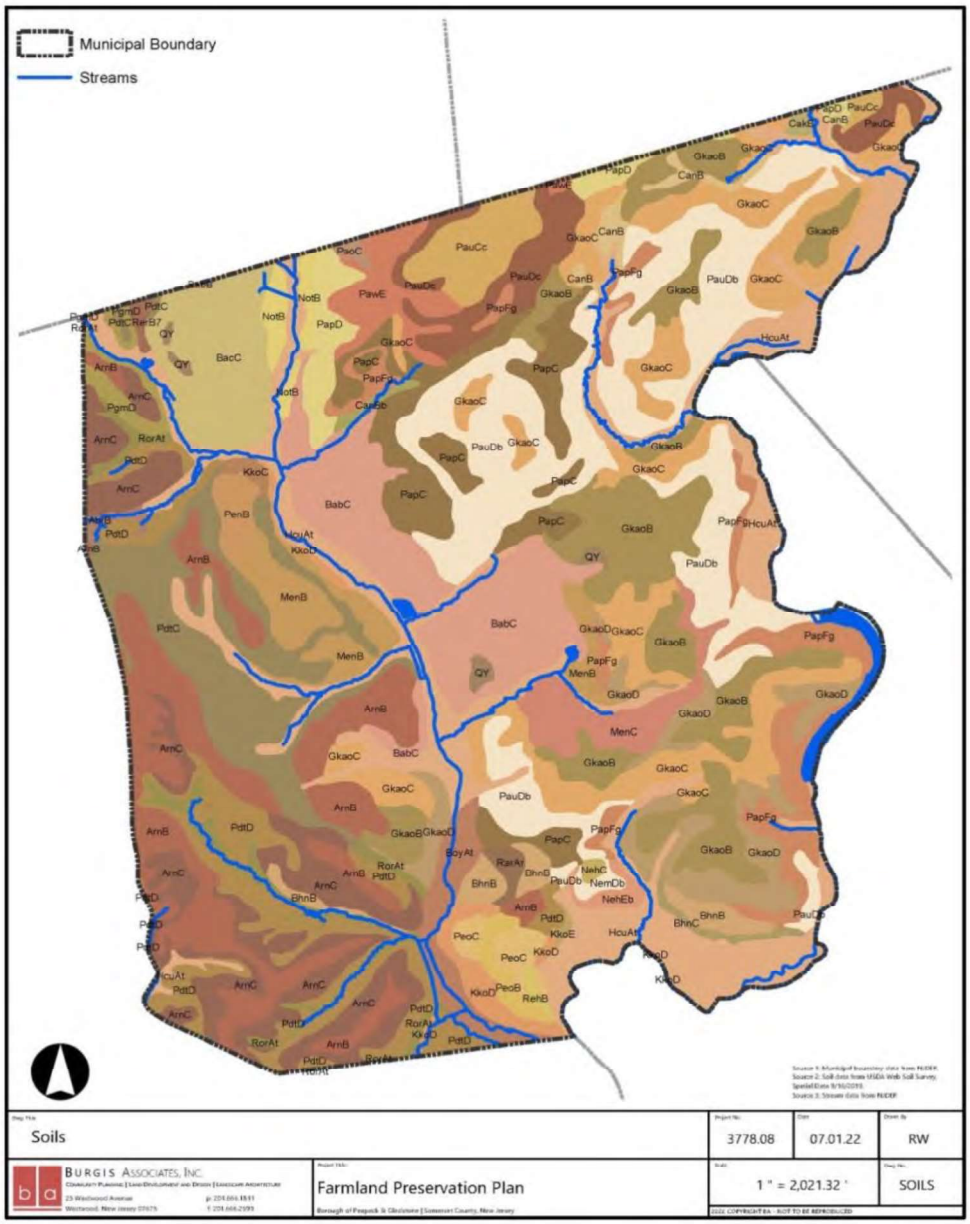


According to the State's 2018 Farmland Assessment data, the Borough's largest category of agriculturally assessed land is woodland which comprises 47% of the total acreage assessed as farmland. Harvested cropland is the next largest category at 21% followed by pastures (both cropland and permanent) at 20%.

Soils are classified by the Natural Resources Conservation Service (NRCS) which identifies soils as prime, of statewide importance or unique based upon their agricultural productivity. Significantly, 754 acres or 20% of the Borough's soils are classified as prime farmland while another 1,610 acres or 31% are deemed soils of statewide importance. Combined, 51% of the soils within the Borough are considered significant to agriculture.

NRCS soil classifications for soils within the Borough as well as a chart illustrating the percentage of agriculturally significant soils is presented below.

Soils of the Borough of Peapack & Gladstone, New Jersey Source: Natural Resources Conservation Service Soil Data Mart Website				
Soil Abbr	Name	Acres	Percent	Soil Category
AbrB	Abbottstown silt loam, 2 to 6 percent slopes	5.7	0.20%	Statewide
ArnB	Arendtsville gravelly loam, 2 to 6 percent slopes	253.2	6.90%	Prime
ArnC	Arendtsville gravelly loam, 6 to 12 percent slopes	204.5	5.50%	Statewide
BabB	Bartley loam, 3 to 8 percent slopes	1.1	0.00%	Prime
BabC	Bartley loam, 3 to 15 percent slopes	215.8	5.80%	Statewide
BacC	Bartley gravelly loam, 8 to 15 percent slopes	105.8	2.90%	Statewide
BhnB	Birdsboro silt loam, 2 to 6 percent slopes	40.1	1.10%	Prime
BhnC	Birdsboro silt loam, 6 to 12 percent slopes	8.1	0.20%	Statewide
BoyAt	Bowmansville silt loam, 0 to 2 percent slopes, frequently flooded	45.9	1.20%	Statewide
CakB	Califon loam, 3 to 8 percent slopes	4.1	0.10%	Prime
CanB	Califon gravelly loam, 3 to 8 percent slopes	21.1	0.60%	Prime
CanBb	Califon gravelly loam, 0 to 8 percent slopes, very stony	6.6	0.20%	
GkaoB	Gladstone gravelly loam, 3 to 8 percent slopes	287.6	7.80%	Prime
GkaoC	Gladstone gravelly loam, 8 to 15 percent slopes	290.3	7.90%	Statewide
GkaoD	Gladstone gravelly loam, 15 to 25 percent slopes	107	2.90%	
HcuAt	Hatboro-Codorus complex, 0 to 3 percent slopes, frequently flooded	427.8	11.60%	
KkoC	Klinesville channery loam, 6 to 12 percent slopes	5.9	0.20%	Local
KkoD	Klinesville channery loam, 12 to 18 percent slopes	33.9	0.90%	
KkoE	Klinesville channery loam, 18 to 35 percent slopes	2.6	0.10%	
MenB	Meckesville moderately well drained gravelly loam, 2 to 6 percent slopes	80.6	2.20%	Prime
MenC	Meckesville moderately well drained gravelly loam, 6 to 12 percent slopes	57.7	1.60%	Statewide
NehC	Neshaminy silt loam, 6 to 12 percent slopes	2.9	0.10%	Statewide
NehEb	Neshaminy silt loam, 18 to 35 percent slopes, very stony	10.4	0.30%	
NemDb	Neshaminy-Mount Lucas silt loams, 12 to 18 percent slopes, very stony	5.8	0.20%	
NotB	Norton loam, 2 to 6 percent slopes	23.5	0.60%	Prime
PaoC	Parker gravelly sandy loam, 3 to 15 percent slopes	4.6	0.10%	Statewide
PapC	Parker very gravelly sandy loam, 3 to 15 percent slopes	142.3	3.90%	
PapD	Parker very gravelly sandy loam, 15 to 25 percent slopes	52.3	1.40%	
PapFg	Parker very gravelly sandy loam, 25 to 45 percent slopes, rocky	114.5	3.10%	
PauCc	Parker-Gladstone complex, 0 to 15 percent slopes, extremely stony	59.8	1.60%	
PauDb	Parker-Gladstone complex, 15 to 25 percent slopes, very stony	409.1	11.10%	
PauDc	Parker-Gladstone complex, 15 to 25 percent slopes, extremely stony	78.7	2.10%	
PawE	Parker-Rock outcrop complex, 25 to 45 percent slopes	52.4	1.40%	
PdtC	Pattenburg gravelly loam, 6 to 12 percent slopes	190.2	5.10%	Statewide
PdtD	Pattenburg gravelly loam, 12 to 18 percent slopes	166.9	4.50%	
PenB	Penn silt loam, 2 to 6 percent slopes	19.4	0.50%	Prime
PeoB	Penn channery silt loam, 2 to 6 percent slopes	15.9	0.40%	Prime
PeoC	Penn channery silt loam, 6 to 12 percent slopes	21.7	0.60%	Statewide
PgmD	Penn-Klinesville channery silt loams, 12 to 18 percent slopes	21.2	0.60%	
QY	Quarries	10.3	0.30%	
RarAr	Raritan silt loam, 0 to 3 percent slopes, rarely flooded	8.1	0.20%	Prime
RehB	Reaville silt loam, 2 to 6 percent slopes	2.8	0.10%	Statewide
RerB7	Reaville deep variant channery silt loam, 0 to 6 percent slopes	5.0	0.10%	Statewide
RorAt	Rowland silt loam, 0 to 2 percent slopes, frequently flooded	50.6	1.40%	Local
WATER	Water	21.4	0.60%	
	TOTAL	***3,695***	***100%***	


Municipal Boundary
Streams
Soils
3778.08
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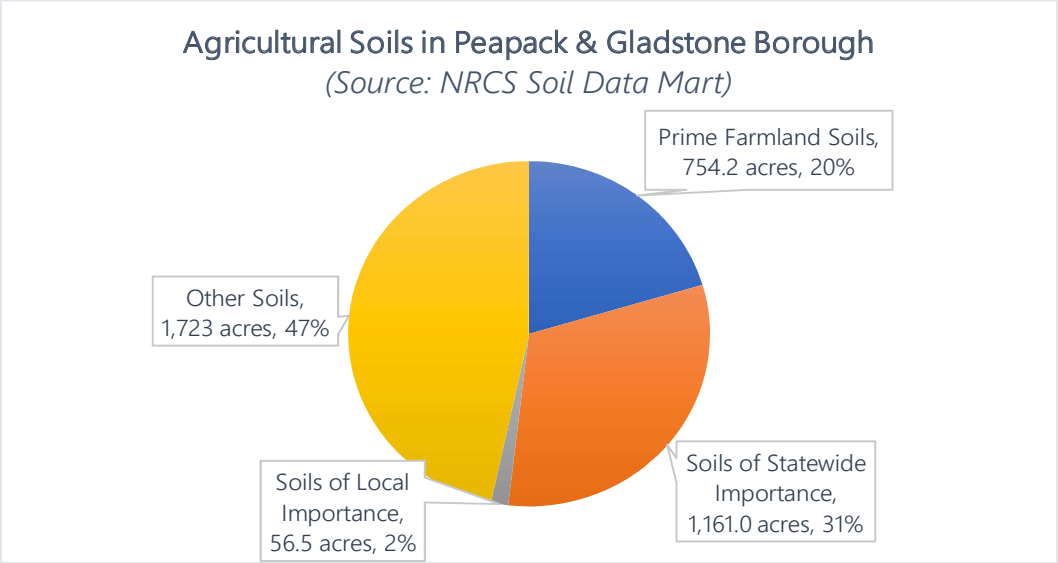
RW
BURGIS ASSOCIATES, INC.
Farmland Preservation Plan
1 " = 2,021.32 '
SOILS



The significant percentage of soils characterized as either prime or of statewide importance coupled with the trend in declining acreage devoted to farming highlights the importance of the farmland preservation program to protecting the rural character that has traditionally characterized the Borough throughout the years.

Water is a critical component to the farming industry which cannot function without this invaluable resource. The Borough is situated within the Highlands Physiographic Province, wherein the conservation and utilization of water resources was the primary purpose of the state's adoption of the Highlands Water Protection and Planning Act in 2004. Designed to protect the drinking water of over 5.4 million people the Act established the New Jersey Highlands Council with responsibility for the planning and regulation of water and other natural resources within its jurisdiction.

The following mapping is derived from the 2008 Highlands Regional Master Plan (Highlands RPM):

Appendix B

103 Appendix B: Historic and Cultural Features

(Source: 2013 Environmental Resource Inventory, Borough of Peapack and Gladstone, Pages 64-70 and Appendices B, C, and D)

Since the completion of the 2013 Environmental Resource Inventory, the Borough of Peapack and Gladstone's Historic Preservation Committee has added one site to their Historic Site Inventory, the **Moses Craig Lime Kilns**. More information on this historic site can be found here.

HISTORIC AND CULTURAL FEATURES

History

A *Historic Preservation Plan Element* was part of the 1996 *Master Plan*. This element gave a brief overview of the history of Peapack & Gladstone, which is summarized below.

The first known inhabitants of this area were Native Americans known as Lenni-Lenape, part of the Iroquois nation, classified as Algonquin. According to John Smith, Chair of the Historic Preservation Commission, they lived here for almost 10,000 years before white settlers came. The next to settle here were farmers, who generally purchased land either from the Lenni-Lenape or from the holders of the Peapack Patent. This patent, which had been purchased from the Dutch in 1701, covered a large tract of land that included the present-day Townships of Bedminster and Bernards. The earliest deed reference for land purchased in the Borough is from 1708. According to Smith, by 1808 the village contained four houses and the Jeroleman and Van Doren Mills. By 1880 there were a hotel, two grist mills, a post office, two churches, four stores, three blacksmith shops, three wheelwrights, a distiller and several lime kilns.

Peapack was originally part of Bedminster Township (incorporated in 1749). In the 1890s, the residents of northern Peapack incorporated as the separate village of Gladstone in order to have their own post office. In 1912, the two villages seceded from Bedminster Township and incorporated as the Borough of Peapack & Gladstone.

One of the major support industries in Peapack for some time was the quarrying and processing of lime. Lime burning began in Peapack as early as 1794 but became a more extensive industry by 1830. Lime kilns processed lime for agricultural purposes and as an ingredient for making mortar. A historic marker denotes the site of a double lime kiln on Main Street.

By the last decade of the 1800s, two railroad lines served Peapack & Gladstone. The line still operating today was completed in 1890 as an extension of the existing line between Bernardsville and Hoboken. Originally known as the Passaic Valley & Peapack Railroad, it was sold to the Delaware Lackawanna & Western and eventually became part of the NJ Transit system. Both the line between Summit and Gladstone and the Gladstone station have been proposed for state and national register listing. The station was added to both registers in 1984.

The other line, the Rockaway Valley Railroad, ran between Whitehouse and Morristown through the northwestern portion of the Borough beginning around 1888. Peach freight made up the bulk of the rail line's business, although it also carried lime, coal and passengers. Rockabye Meadow, now public open space in the Borough, is named eponymously for the nickname given this line due to its unsteady ride over high terrain and steep grade: "Rock-a-Bye Baby." The line ceased operation around 1913.

The availability of rail service made the scenic Peapack & Gladstone region attractive to wealthy New Yorkers. Four large ***estates*** with holdings in Peapack & Gladstone were:

- Blairsden, originally a 423-acre estate extending from Main Street to Ravine Lake on the North Branch of the Raritan River and crowned by a 38-room Louis XIII-style mansion built by New York financier Clinton Ledyard Blair in 1903. After Blair's death in 1949, the land was divided up.

    - The property at the south end of Ravine Lake now owned by the Somerset Lake and Game Club contains the original entrance to the estate from Lake Road.

    - Dower Farm, a 30-acre farm preserved in 2010, was formed from a portion of the estate, including the landmark Blairsden rear entrance gate on Main Street in Peapack.

    - A portion of the property fronting Highland Avenue became property of the Matheny Medical and Educational Center.

    - The hilltop acres containing the mansion were bought by the Sisters of St. John the Baptist in 1950 and sold to The Foundation for Classical Architecture in 2002, which was said to be restoring the mansion and grounds. In 2012, ownership transferred to Blairsden Hall, LLC .

  More information on historic Blairsden is available from The Historical Society of Somerset Hills (*http://www.historicalsocietyofsomersethills.org/blairsden.php*)

- *Hamilton Farm,* created by New York financier James Cox Brady beginning in 1911 once totaled 5,000 acres and covered portions of three counties. The ornate stable, constructed of brick, concrete and steel, tile walls, terrazzo floors and brass fittings; became the permanent home of the U.S. Equestrian Team in 1961, and in 1978 the Georgian mansion (rebuilt in 1921) and surrounding land was purchased from the Brady family use as a corporate conference center. Today it is home to the private Hamilton Farm Golf Club.

- *Hillandale* was created in 1906 by a wealthy local businessman, George Mosle, who built the western portion of Mosle Road as a private driveway to Mosle Manor. The Sisters of St. John the Baptist purchased the estate in 1926 for use as a convent, orphanage; school and summer camp. In 2008 the Sisters sold the back two-thirds of the property to a consortium of public/nonprofit partners to be used as Mendham Township parkland now open to the public as the 120-acre Mosle Preserve. The remaining acreage, including the estate and school buildings, is still owned by the Sisters, with a portion located in Peapack & Gladstone.

- *Natirar* (see *Historic Districts* section below)

The book *A Journey Through Peapack and Gladstone,* by Jacqueline Tutton (c. 1993), the *Somerset County Cultural Resource Survey* (1989) and other historical publications are available at the Peapack & Gladstone Library.

Historic and Cultural Sites

Maintaining the rural character of Peapack & Gladstone is important to its residents, and this especially true for the village area. This is recognized in the zoning of this central area of town as Village Neighborhood (VN), by the suggestion of creating a village greenbelt, which has carried through several re-examinations of the *Master Plan*, and by a historic walking/driving tour mapped by Historic Preservation Commission Chair John Smith. The route of this walking tour is indicated on the *Greenway* map in the *Open Space and Recreation Plan Update – 2011.* In addition, several areas in Peapack & Gladstone have been proposed as historic districts, several of the estate mansions remain, archeological sites have been identified, and at least one working farm has been preserved.

Historic Properties.

The 1989 *Somerset County Cultural Resources Survey* listed 25 sites in the Borough of Peapack & Gladstone the County considered eligible for the National Register of Historic Places and located them on an Historic Sites Inventory map. The map and list, excerpted from the 1996 *Master Plan*, are included in this *ERI Update* as *Appendix 2 and Appendix 3)*. The list included several private residences, including Natirar (at the time owned by the King of Morocco), the mansion at Blairsden, a horse farm, a farmhouse, a bridge and two lime kilns. Most are concentrated in the village area of the Borough, but the horse farm is located on Holland Road. One residence and Smith Bridge are located along Branch Road, and the North Branch of the Raritan River, while Blairsden and Natirar occupy lands east and south of the village.

The *Historic Map & Walking Tour of Peapack & Gladstone Circa 1938* compiled by John C. Smith, Chair of the Historic Preservation Commission, in 2006 focuses on the village area of Peapack & Gladstone. The map (too large to include in this *ERI Update*) identifies many historic locations, including a mill race from the 1850s and several lime kilns, and provides brief descriptions and photos for 26 of the sites:

1. The Rockaway Valley Railroad (1890-1913) (see *History* above); today Rockabye Meadow Preserve eponymously bears the railroad's nickname
2. Stone Arch Bridge on Jackson Avenue, circa 1858 (replaced)
3. William Van Doren House, ca. 1814, SW corner of Main Street and Jackson Ave. (private residence)
4. Blacksmith Shop, 1836; this stone structure was combined with an adjacent building in 1972 (private residence)
5. Andrew Rarick Farmhouse, ca. 1840 / Gladstone Hotel ca. 1930, Pottersville Road and Main Street; now the Gladstone Tavern
6. **Gladstone Train Station**, ca. 1890-91; Main Street; ***on the national and state registers of historic places:*** NR 6/22/1984; SR 3/17/1984; the entire Gladstone branch line is also listed on the state register with SHPO opinion of eligibility (1978)

7. Tiger Family Stone Barn, 1829, across from train station
8. Garner F. Hill Feed Mill, 1910, adjacent to the railroad line (destroyed by fire in 1979)
9. The Boy Scout Cabin, 1934, Park Avenue; log cabin built with WPA funds sits on Borough-owned property across Park Avenue from the pond at Liberty Park
10. Liberty Park, 1920; established to honor war veterans. Includes several memorial markers (swimming in the pond was discontinued in the late 1930s because of pollution from development)
11. Lowrance Mill & Homestead, ca. 1670-1721; the oldest known structure in the Borough; original extent of property included a mill race and mill pond;
12. The Howard House, circa 1902/The Peapack Hotel, corner of Main and Holland Avenue; now the site of low-moderate income apartments.
13. Essex Hunt Club and Fox Hounds, 1913, between U.S. 206 and Fowler Road; now two private clubs: the Essex Fox Hounds, which runs hunts, and the Essex Hunt Club, a recreational club.
14. Union Cemetery, 1875, Mendham Road near Church Street; many graves were moved from other cemeteries to this spot.
15. United Methodist Church of Gladstone, 1839, Church Street and Jackson Avenue; originally built to face south, it was turned in 1860 to face due west.
16. Hillandale Estate and Mosle Parkway, 1906. Mosle Road/St. John's Drive; (see *Estates* above)
17. Peapack Reformed [Dutch] Church, 1848, 224 Main Street; after a fire destroyed the original structure the present structure replaced it in 1874.
18. Ellis Tiger Hardware Store, 1905, Mendham Road and Main Street; owner of a lumber yard along the railroad tracks in 1893, Tiger built the hardware store in 1905, then carved out a corner of it for the first branch of the Peapack & Gladstone bank, of which he was co-founder. It is now known as the Conover Corners Building.
19. St. Luke's Episcopal Church, 1905, 182 Main Street; notable ivy-covered façade.
20. St. Brigid Roman Catholic Church, 1938, 129 Main Street; inspired by the 16th-century stone churches of Ireland.
21. Perry-Todd Quarry. East of Main Street. Limestone quarry operational from 1749 through the 1950s.
22. Main Street Lime Kiln. The stonework of a double kiln is still visible on Main street north of Highland Avenue. (see *Lime Kiln*s section below)

23. Blairsden Estate, c. 1903. Highland Avenue (see *Estates* above); SHPO Opinion 8/8/2000; COE: 6/14/1993

24. Jeroleman Family Cemetery, Northeast corner of Highland Avenue and Main Street; private cemetery for family who settled in the area in 1808 and operated the mill across the street

25. Ludlow Meat Market Barn, c. 1870, razed in 1990

26. Maple Cottage and The Ladd Estate (see *Natirar Estate Historic District* below), c. 1895; cottage no longer stands, but served as the first location of the Kate Macy Ladd Convalescent Home

Historic Districts

The following have been proposed as historic districts:

Peapack Brook Rural Industrial Historic District. This district is predominantly in Bedminster Township between Old Dutch and Peapack Roads. The State Historic Preservation Office (SHPO) issued an Opinion of Eligibility in 1997. The historical marker reads:

> "The confluence of the Peapack Brook and the North Branch of the Raritan River became a rural industrial center during the 18th century, when a saw mill, grist mill, tannery, and bark mill were located nearby. The Peapack Brook Rural Industrial Historic District includes five houses, several farm outbuildings and mill structures that reflect the industrial and agricultural development of the area, ca. 1750-1900."

Natirar Estate Historic District. This district, which encompasses lands in Peapack, Far Hills and Bedminster Township is located along CR 512. The State Historic Preservation Office issued a Certificate of Eligibility (COE) in 2002. The country estate of Walter and Kate Macy Ladd beginning in 1905, subsequently owned by the King of Morocco, Natirar is now the property of the Somerset County Park Commission. The SHPO issued a Certificate of Eligibility (COE) 10/25/2002

The portion of Natirar in Bedminster Township overlays the Peapack Brook Rural Industrial Historic District and includes a grist mill, two cottages, a corn crib and a frame barn, among other buildings. It is currently closed to the public but restoration work is under way and a community garden may be located there.

The portion of Natirar in Peapack & Gladstone encompasses the main estate buildings, including the 40-room Ladd mansion, the grey barn complex, gatehouse and several other buildings. The mansion, once home to the Kate Macy Ladd convalescent center for women, stables and the surrounding 90 acres is now leased to a resort developer. The resort area also includes the 90 Acres Culinary Center, located in the Carriage House and Garage, and a farm. The County park area includes the grey barn complex, the gatehouse and acres of open land in both Peapack & Gladstone and Far Hills that provide an expansive and bucolic venue for public enjoyment along the North Branch of the Raritan River.

More information on Natirar is available on the Somerset County Park Commission website (*https://somersetcountyparks.org/parksFacilities/natirar/Natirar.html*)

As a result of the *Somerset County Cultural Resources Survey*, the following two districts were recommended by the Somerset County Cultural & Heritage Commission as proposed historic districts eligible for the National Register. (See the SCC&HC Proposed Historic Districts map, *Appendix 4,* and more detailed descriptions in the 1996 Master Plan Historic Preservation Plan Element.)

Peapack-Gladstone Historic District (Proposed). This district encompasses the village areas of Gladstone and Peapack from Church Street south to Railroad Avenue. Buildings date from the early 1700s to the late 1930s, with many from the 19th century.

Pleasant Valley (O-Wan-O-Massie) Historic District (Proposed). This district encompasses lands on both banks of the North Branch of the Raritan above Ravine Lake, including portions of properties along Branch Road in Peapack & Gladstone. It is rural in nature with meadows, woodlands, rural vistas, houses from the 18th and 19th centuries and outbuildings from the 19th and early 20th centuries.

Archeological Grids

According to the NJDEP *Archaeological Site Grid of New Jersey, Edition 2010*, three archeological cells are sited partially in Peapack & Gladstone. One straddles the North Branch of the Raritan River in the vicinity of the eastern portion of Natirar. The other two stretch from just west of U.S. 206 through the southern portion of Natirar. Each cell in the archeological grid is approximately ½ mile square. The grid protects the location of specific sites from destruction and vandalism while "alerting users of this data to the potential presence of archaeological resources in their area of interest." *(NJ Historic Preservation Office)*

The *Historic Map & Walking Tour of Peapack & Gladstone Circa 1938* compiled by John Smith, HPC Chair, denotes the lime kiln locations as archeological sites.

Bridges

- CR 512 Bridge over NJ Transit Gladstone Branch, MP 40.24; SHPO Opinion: 10/20/2010 (NJDEP HPO)
- North Branch Raritan River Bridge, NJ Transit Gladstone Branch over North Branch Raritan River, MP 40.21; SHPO Opinions: 1999 and 1997. Demolished (NJDEP HPO)
- Peapack Brook Bridge, NJ Transit Gladstone Line, MP 40.82 over Peapack Brook; SHPO Opinion 2/3/1999 (NJDEP HPO)
- Peapack Brook Bridge, NJ Transit Gladstone Line, MP 41.99 over Peapack Brook; SHPO Opinion 2/3/1999 9 (NJDEP HPO)
- Metal Truss Bridge over North Branch Raritan River, off Branch Road in the proposed Pleasant Valley Historic District (SCCRS; see Historic Sites Inventory map in *Appendix*)

Caves, Quarries and Lime Kilns

Caves and Quarries. A NJDEP publication, *Caves of New Jersey, Bulletin 70,* published in 1976 reported that four caves had been identified in the Peapack & Gladstone area, all associated with the Todd-Perry-Ferrante Quarry and all now closed. The first, thought to be perhaps the largest cave in New Jersey, was entered in 1901 by workmen at the quarry. The entrance has since been closed up and the location is now uncertain. Two more, one known to have contained snow-white flowstone, stalactites and reddish-brown draperies, were "quarried away." The fourth, discovered in 1958 and containing at least two fairly large rooms, was closed at the time the bulletin was published. The quarry was situated in Leithsville Formation carbonate rock area (see the *Bedrock Geology* section and the *Carbonate Rock* map within this *ERI Update*).

Lime Kilns. The lime kilns were used to process lime used for agricultural purposes and in making mortar. According to John Smith, Chair of the Historic Preservation Commission, by 1880 there were six perpetual lime kilns and nine "small hearth type" set kilns. On the *Historic Map & Walking Tour* he compiled of Peapack & Gladstone circa 1983, two lime kiln locations are sited on the east side of Main Street. A third is referenced by the Somerset County survey as located on the "west side of Peapack Creek [Brook] 0.1 mile west of 125 Main Street."

The stonework of the Main Street Kiln double kiln is still visible on the east side of Main Street north of Highland Avenue. A historical marker identifies it as Peapack-Gladstone Lime Kiln Park and indicates it was the site of "lime burning" operations 1749-1945. The property is now owned by The Historical Society of The Somerset Hills.

Scenic Corridors & Roadways

The 1992 *Somerset County Scenic Corridor and Roadway Study* proposed the designation of CR 512 as a scenic roadway and CR 647 and 671 as scenic corridors. *Making Connections,* the Somerset County 2011 Circulation Plan update, references this study, indicating that:

> "To preserve the rustic and scenic character of the County's Scenic Byways, all road construction and maintenance operations along scenic corridors should follow context sensitive design guidelines. This includes a reduced roadway width, as stipulated in the County's design standard for scenic roadways, and signage, striping, landscaping, etc. that do not detract from the historic, scenic, and natural character or aesthetics."

These roadways were mapped in the 1996 *Master Plan Historic Preservation Element* along with the following locally designated scenic roads:

- Mosle Road
- Willow Avenue
- Branch Road
- Fowler Road
- Holland Road

Source: 1989 Somerset County Cultural Resources Survey excerpted from the Borough of Peapack & Gladstone 1996 Master Plan

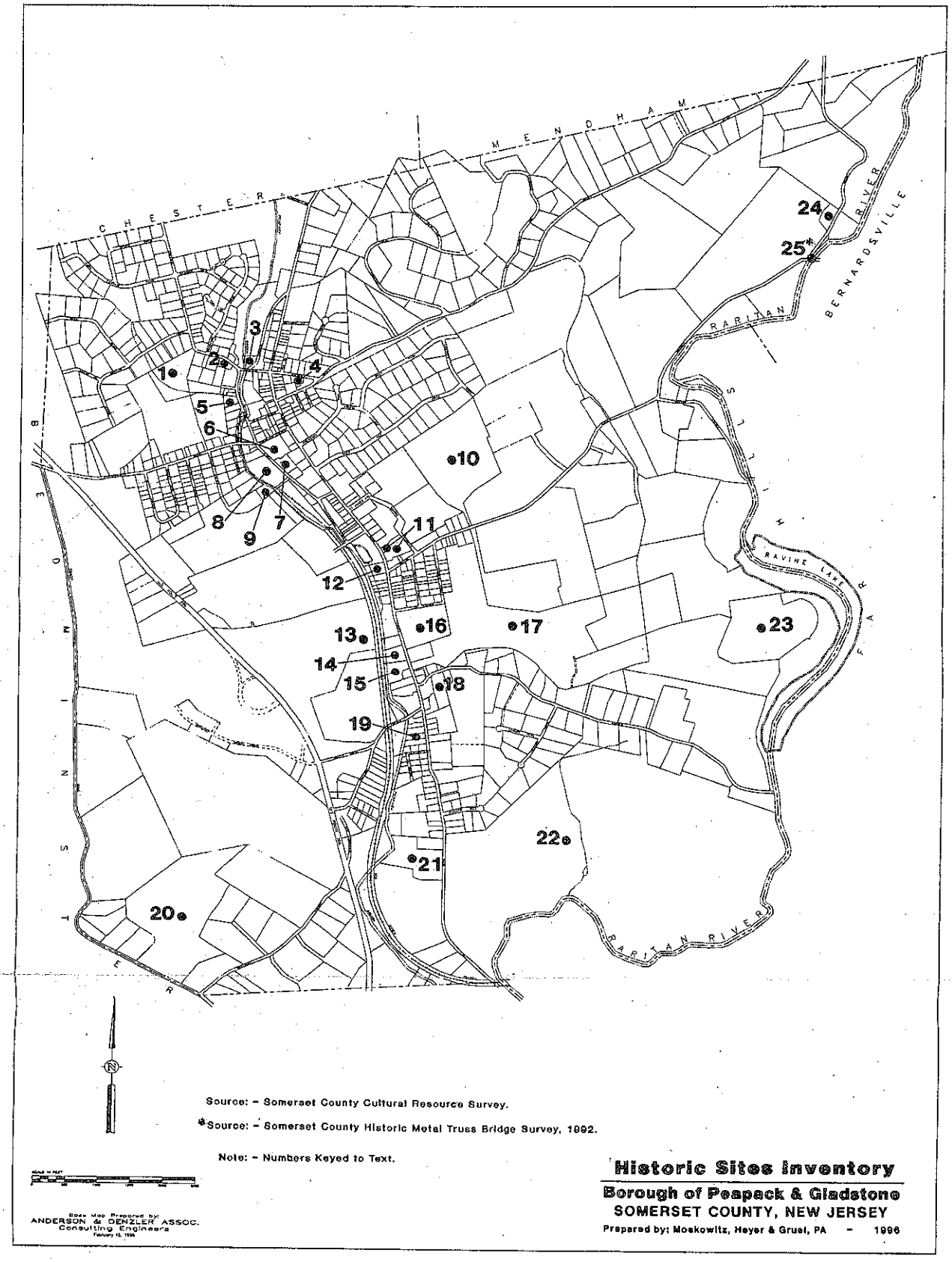


Table VII-1

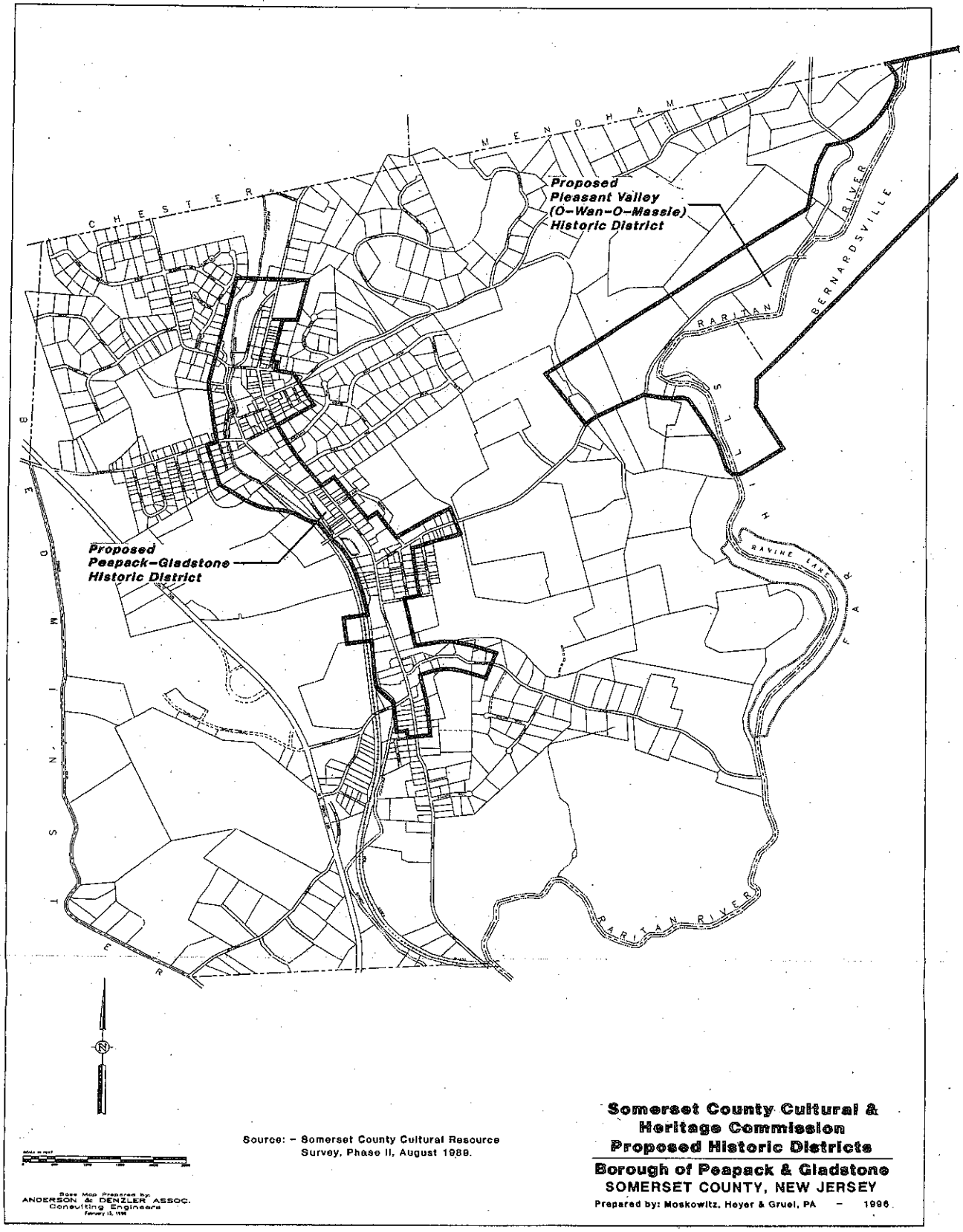
SOMERSET COUNTY RECONNAISSANCE LEVEL INVENTORY PROPERTIES ELIGIBLE FOR THE NATIONAL REGISTER OF HISTORIC PLACES BOROUGH OF PEAPACK AND GLADSTONE[1]

Key Map #	Use	Address/Location
1	Residence	End of private drive, southwest side of Chester Road, 0.15 miles west of Jackson Avenue
2	Residence	South side of Chester Road, approximately 200 feet west of Jackson Avenue
3	Residence	Northwest corner of Jackson Avenue and Church Street
4	Residence	South side of Jackson Avenue, 0.1 mile east of Mendham Road
5	Residence	291 Main Street
6	Residence	248 Main Street
7	Storage	West side of Main Street, 0.1 mile south of Overlook Avenue
8	Railroad Station	Gladstone railroad passenger station (State and National Register)
9	Residence	End of drive, West side of Main Street & NJ Transit railroad tracks between Lackawanna Avenue & Pottersville Road
10	Residence	End of private drive, north side of Willow
11	Residence	156 Main Street
12	Residence	165 Main Street
13	Lime Kiln - Archeological Site	West side of Peapack Creek, 0.1 mile west of 125 Main Street
14	Residence	101 Main Street
15	Residence & Auto Repair	99 Main Street
16	Lime Kiln - Archeological Site.	East side of Main Street, 0.15 miles north of Highland Avenue
17	Farmhouse	North side of drive 0.3 mile east of Blairsden gate of the east side of Main Street, approximately 350 feet north of Highland Avenue
18	Residence	4 Highland Avenue
19	Residence	63 Main Street
20	Residence & horse farm	End of private drive, northeast side of Division Road., 0.2 miles northwest of Holland Road
21	Farmhouse	West side of Peapack Road, 0.5 miles south of Holland Avenue
22	Residence	End of private drive, 0.75 miles northeast of crossing of Main Street over NJ Transit railroad tracks; Natirar, King of Morocco estate
23	Retreat House	End of 1.2 mile drive that begins at Blairsden Gate on the east side of Main Street, 350 feet north of Highland Avenue (St. Joseph's Villa; Blairsden)
24	Residence	West side of Branch Road, 2 miles north of Smith Bridge
25	Bridge	

Source: Somerset County Cultural Resources Survey, 1989 & Somerset County Historic Metal Truss Bridge Survey, 1992.

[1] Does not include historic districts.

Source: 1989 Somerset County Cultural Resources Survey excerpted from the Borough of Peapack & Gladstone 1996 Master Plan



Appendix C

114 Appendix C: Invasive Plants In and Around Peapack & Gladstone

(Source: Borough of Peapack and Gladstone Environmental Commission, 2021)

Invasive Plants
In and Around
Peapack & Gladstone

Multiflora Rose

Contents

1. Plants Considered to be the Most Invasive (accompanied by photos for accurate identification)
2. Invasive Plants in NJ Considered to be a Problem
3. All Invasive Plants Found in New Jersey (Rutgers New Jersey Agricultural Experiment Station)
4. Links to Control of Invasive Plants

Information Compiled by Andrew Goode
Peapack & Gladstone Environmental Commission 2021

Section 1: Plants Considered to be the Most Invasive

Three of the most invasive plants are Japanese Hops, Ailanthus and Mugwort

Herbaceous Plants:

- Japanese Stiltgrass (*Microsteggium vimineum*)


- Japanese Knotweed (*Fallopian japonica*)


- Common Mugwort (*Artimisia vulgaris*)

- Chinese Silvergrass* (*Miscanthus sinensis*)

Plants Considered to be the Most Invasive

Herbaceous Plants (continued):

- Lesser Celandine (*Ficaria verna*)

***Woody Invasive Vines**:*

- Japanese Honeysuckle (*Lonicera japonica*)

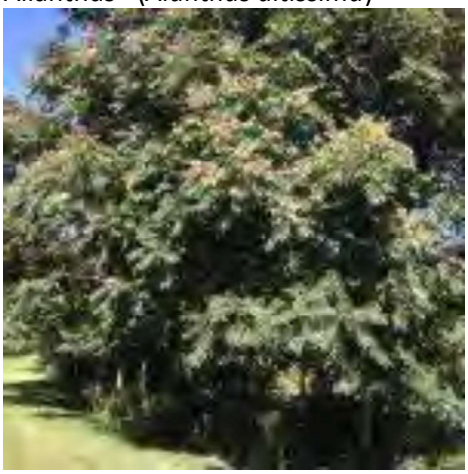
- Japanese Hop* (*Humulus japonica*)

- Oriental Bittersweet* (*Celastrus orbiculatus*)

Plants Considered to be the Most Invasive

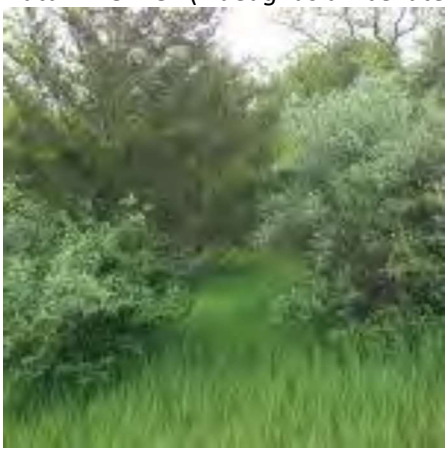
Invasive Shrubs/Trees:

- Ailanthus* (*Alanthus altissima*)




- Norway Maple (*Acer platanoides*)

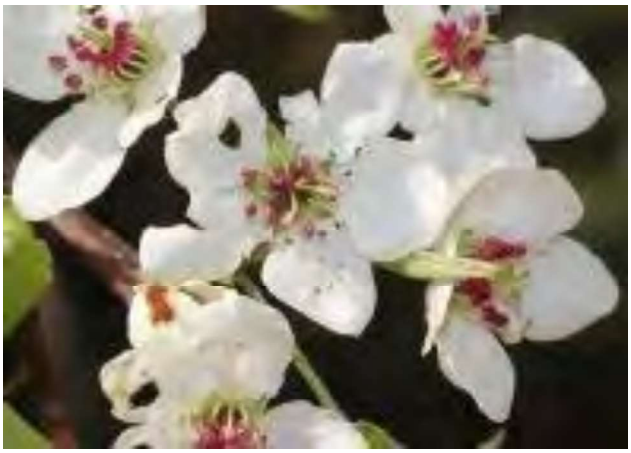

- Autumn Olive* (*Elaeagnus umbellate*)




Plants Considered to be the Most Invasive

- Bush Honeysuckle (*Lonicera maackii*)


- Callery Pear* (*Pyrus calleryana*)

- Japanese Barberry (*Berberis thunbergii*)


Plants Considered to be the Most Invasive

- Multiflora Rose (*Rosa multiflora*)

Section 2: Invasive Plants in NJ Considered to be a problem:

(The Native Plant Society of New Jersey). These lists are not complete:

Photos can be found on the Smithsonian National Museum of Natural History, Botany Collections, Plant Photo Archive website https://collections.nmnh.si.edu/search/botany

Category 1 - Strongly Invasive and Widespread

Type	Scientific Name	Common Name
Herbaceous Dicots	Achillea millefolium	Yarrow
Herbaceous Dicots	Ajuga reptans	Common Bugleweed
Herbaceous Dicots	Alliaria officinalis	Garlic Mustard
Herbaceous Dicots	Artemisia vulgaris	Mugwort
Herbaceous Dicots	Cardamine impatiens	Narrowleaf Bittercress
Herbaceous Dicots	Centaurea maculosa	Spotted Knapweed
Herbaceous Dicots	Cichorium intybus	Chickory
Herbaceous Dicots	Cirsium arvense	Canada Thistle
Herbaceous Dicots	Coronilla varia	Crown Vetch
Herbaceous Dicots	Cynanchum nigrum	Black Swallow-wort
Herbaceous Dicots	Cynanchum rossicum	Pale Swallow-wort
Herbaceous Dicots	Daucus carota	Wild Carrot
Herbaceous Dicots	Fallopia sachalinensis	Giant Knotweed
Herbaceous Dicots	Ficaria verna	Lesser Celandine
Herbaceous Dicots	Glechoma hederacea	Gill-Over-The-Ground
Herbaceous Dicots	Hesperis matronalis	Dame's Rocket
Herbaceous Dicots	Lespedeza cuneata	Sericea Lespedeza
Herbaceous Dicots	Lythrum salicaria	Purple Loosestrife
Herbaceous Dicots	Malva moschata	Musk Mallow
Herbaceous Dicots	Meliotus alba	White Sweet Clover
Herbaceous Dicots	Persicaria perfoliata	Mile-A-Minute
Herbaceous Dicots	Plantago lanceolata	English Plantain
Herbaceous Dicots	Plantago major	Common Plantain
Herbaceous Dicots	Polygonium cuspidatam	Japanese Knotweed
Herbaceous Dicots	Ranunculus ficaria	Lesser Celandine
Herbaceous Dicots	Rumex crispus	Curly Dock
Herbaceous Dicots	Taraxacum officinale	Common Dandelion
Herbaceous Dicots	Trifolium pratense	Red Clover
Herbaceous Dicots	Trifolium repens	White Clover
Aquatic Dicots	Cabomba caroliniana	Carolina Fanwort
Aquatic Dicots	Eichhornia crassipes	Common Water Hyacinth
Aquatic Dicots	Hydrilla verticillata	Hydrilla
Aquatic Dicots	Ludwigia peploides	Creeping Waterprimrose
Aquatic Dicots	Myosoton aquaticum	Giant Chickweed
Aquatic Dicots	Myriophyllum aquaticum	Parrotfeather
Aquatic Dicots	Myriophyllum spicatum	Eurasian Water Milfoil
Aquatic Dicots	Potamogeton crispus	Curly Pondweed
Aquatic Dicots	Trapa natans	European Water Chestnut
Monocots	Allium vineale	Field Garlic
Monocots	All bamboo except native cane	Any Hardy Bamboo

Type	Scientific Name	Common Name
Monocots	Carex kobomugi	Japanese Sedge
Monocots	Carex macrocephala	Largehead Sedge
Monocots	Cynodon dactylon	Bermuda Grass
Monocots	Dactylis glomerata	Orchard Grass
Monocots	Dendrocalamus, etc.	Bamboo
Monocots	Digitaria sanguinalis	Crab Grass
Monocots	Echinochloa crusgalli	Barnyard Grass
Monocots	Eragrostis curvula	Weeping Lovegrass
Monocots	Hemercallus fulva	Day Lily
Monocots	Iris pseudacorus	Yellow Iris
Monocots	Microstegium vimineum	Japanese Stilt Grass
Monocots	Miscanthus sinensis	Chinese Silvergrass
Monocots	Phalaris canariensis	Canarygrass
Monocots	Phragmites australis	Common Reed
Vines & Woody Dicots	Acer platanoides	Norway Maple
Vines & Woody Dicots	Acer pseudoplatanus	Sycamore Maple
Vines & Woody Dicots	Akebia quinata	Chocolate Vine
Vines & Woody Dicots	Alianthus altissima	Tree Of Heaven
Vines & Woody Dicots	Alnus glutinosa	European Black Alder
Vines & Woody Dicots	Ampelopsis brevipedeenculata	Porcelainberry
Vines & Woody Dicots	Aralia elata	Japanese Angelica Tree
Vines & Woody Dicots	Berberis Thunbergii	Japanese Barberry
Vines & Woody Dicots	Celastrus orbiculatus	Asian Bittersweet
Vines & Woody Dicots	Clematis flammula	Fragrant Clematis
Vines & Woody Dicots	Clematis terniflora	Sweet Autumn Clematis
Vines & Woody Dicots	Cornus kousa	Kousa Dogwood
Vines & Woody Dicots	Elaeagnus angustifolia	Russian Olive
Vines & Woody Dicots	Elaeagnus umbellata	Autumn Olive
Vines & Woody Dicots	Eleutherococcus sieboldianus	Five-Leaf Aralia
Vines & Woody Dicots	Euonymus alatus	Winged Burning
Vines & Woody Dicots	Frangula alnus	Glossy Buckthorn
Vines & Woody Dicots	Hedera helix	English Ivy
Vines & Woody Dicots	Ligustrum obtusifolium	Border Privet
Vines & Woody Dicots	Ligustrum vulgare	European Privet
Vines & Woody Dicots	Lonicera japonica	Japanese Honeysuckle
Vines & Woody Dicots	Lonicera maackii	Amur Honeysuckle
Vines & Woody Dicots	Lonicera morrowii	Fly Honeysuckle
Vines & Woody Dicots	Lonicera tatarica	Tatarian Honeysuckle
Vines & Woody Dicots	Malus toringo	Japanese Crabapple
Vines & Woody Dicots	Pueraria montana	Kudzu
Vines & Woody Dicots	Photinia villosa	Oriental Photinia
Vines & Woody Dicots	Prunus subhirtella var. pendula	Weeping Higan Cherry
Vines & Woody Dicots	Rhamnus cathartica	European Buckthorn
Vines & Woody Dicots	Rhamnus frangula	Alder Buckthorn
Vines & Woody Dicots	Rhodotypos scandens	Jetbead Rhsc
Vines & Woody Dicots	Rosa multiflora	Multiflora Rose
Vines & Woody Dicots	Rosa rugosa	Seaside Rose
Vines & Woody Dicots	Rubus phoenicolasius	Wine Raspberry

Type	Scientific Name	Common Name
Vines & Woody Dicots	Ulmus procera	English Elm
Vines & Woody Dicots	Viburnum dilatatum	Linden Viburnum
Vines & Woody Dicots	Viburnum plicatum	Japanese Snowball
Vines & Woody Dicots	Viburnum setigerum	Tea Viburnum
Vines & Woody Dicots	Viburnum sieboldii	Siebold'S Arrowwood
Vines & Woody Dicots	Zelkova serrata	Japanese Zelkova

Category 2 - Invasive, But Not As Widespread (Yet)

Type	Scientific Name	Common Name
Herbaceous Dicots	Chelidonium majus	Celandine
Herbaceous Dicots	Chrysanthemum leucanthemum	Ox-Eye Daisy
Herbaceous Dicots	Dianthus armeria	Depford Pink
Herbaceous Dicots	Galinsoga ciliata	Galinsoga
Herbaceous Dicots	Lamium purpureum	Purple Dead Nettle
Herbaceous Dicots	Linaria vulgaris	Butter-And-Eggs
Herbaceous Dicots	Lysimachia nummularia	Moneywort
Herbaceous Dicots	Matricaria matricariodes	Pineapple Weed
Herbaceous Dicots	Mentha spicata	Spearmint
Herbaceous Dicots	Polygonum persicaria	Lady's-Thumb
Herbaceous Dicots	Portulaca oleracea	Purslane
Herbaceous Dicots	Ranunculus acris	Common Buttercup
Herbaceous Dicots	Ranunculus bulbosus	Bulbous Buttercup
Herbaceous Dicots	Ranunculus repens	Creeping Buttercup
Herbaceous Dicots	Rumex acetosella	Sheep's Sorrel
Herbaceous Dicots	Rumex obtusifolius	Broad Dock
Herbaceous Dicots	Tanacetum vulgare	Tansy
Herbaceous Dicots	Verbascum blattaria	Moth Mullein
Herbaceous Dicots	Verbascum thapsus	Common Mullein
Monocots	Commelina communis	Day Flower
Vines & Woody Dicots	Albizia julibrissin	Mimosa
Vines & Woody Dicots	Buddleja davidii	Butterfly Bush
Vines & Woody Dicots	Prunus avium	Crab Cherry
Vines & Woody Dicots	Wisteria floribunda	Wisteria
Vines & Woody Dicots	Wisteria frutescens	Wisteria

Section 3: All Invasive Plants Found in New Jersey

(Rutgers New Jersey Agricultural Experiment Station)

- Aster
- Bamboo Grass
- Barberry
- Barnyardgrass
- Bedstraw
- Bittercress
- Black Medic
- Brambles
- Broadleaf Plantain
- Broomsedge
- Buckhorn Plantain
- Bull Thistle
- Bur Cucumber
- Burdock
- Canada Thistle
- Carpetweed
- Chicory
- Cocklebur
- Common Mullein
- Common Pigweed
- Common Reed
- Corn Chamomile
- Crabgrass
- Curled Dock
- Cut-Leaved Evening Primrose
- Daisy Fleabane
- Dandelion
- Deadnettle
- DodderDog Fennel
- Eastern Gamma-grass
- Evening Primrose
- Fall Dandelion
- Fall Panicum
- False Dandelion
- Field Bindweed
- Field Pansy
- Galinsoga
- Garlic Mustard
- Giant Foxtail
- Giant Ragweed
- Goldenrod
- Goosegrass
- Grass Leaved Stitchwort
- Greenbriar
- Ground Ivy
- Groundsel
- Hawkweed
- Hedge Bindweed
- Hemp Dogbane
- Henbit
- Honeysuckle
- Horsenettle
- Horsetail
- Horseweed
- Indian Strawberry
- Japanese Knotweed
- Jerusalem Artichoke
- Jimsonweed
- Johnson Grass
- Knotweed
- Kudzu
- Lambsquarters
- Mary's Grass
- Meadow Foxtail
- Mile-a-Minute Weed
- Milkweed
- Moneywort
- Morning Glory, Ivy-Leafed
- Moth Mullein
- Mouse-Ear Chickweed
- Mugwort
- Multiflora Rose
- Musk Thistle
- Nimblewill
- Nutsedge (Yellow)
- Oxalis (Yellow Wood Sorrel)
- Oxeye Daisy
- Paspalum
- Pennycress
- Pepperweed
- Pineapple Weed
- Potentilla
- Prickly Lettuce
- Prickly Pear
- Prickly Sida
- Prostrate Pigweed
- Purslane
- Quackgrass
- Rabbitfoot Clover
- Ragweed
- Redstem Filaree
- Roundleaf Mallow
- Salsify
- Sandbur
- Scarlet Pimpernel
- Sheep Sorrel
- Shepherd's Purse
- Smartweed
- Sow Thistle
- Speedwell
- Spiny Pigweed
- Spotted Knapweed
- Spotted Spurge
- Spurred Anoda
- Star-of-Bethlehem
- Sweet Vernal Grass
- Teasel
- Three Awn Grass
- Tick Trefoil
- Timothy
- Tree of Heaven
- Trumpetcreeper
- Velvetleaf
- Venus Looking Glass
- Veronica
- Vetch
- Violet
- Virginia Creeper
- White Campion
- White Clover
- Whitlowgrass
- Wild Carrot
- Wild Cucumber
- Wild Garlic
- Wild Grape
- Wild Lettuce
- Wild Turnip
- Wirestem Muhly
- Yarrow
- Yellow Foxtail
- Yellow Rocket
- Yellow Sweet Clover

Section 4: Links to Control of Invasive Plants

- New Jersey Strategic Management Plan for Invasive Species
  - https://www.nj.gov/dep/njisc/docs/Final%20NJ%20Strategic%20Management%20Plan%20for%20Invasive%20Species%2011.09.pdf
- US Department of Agriculture National Invasive Species Information Center
  - https://www.invasivespeciesinfo.gov/us/new-jersey
- New Jersey Forestry Association, Invasive Plants in New Jersey Woodlands
  - http://njforestry.org/wp-content/uploads/NJFA-Brochure-Invasives-8-23-2010-Final.pdf
- State of New Jersey Department of Environmental Protection, New Jersey Invasive Species Council
  - https://www.nj.gov/dep/njisc/
- Jersey-Friendly Yards, Avoid Invasive Plants
  - https://www.jerseyyards.org/jersey-friendly-plants/invasive-plants/

Appendix D

126 Appendix D: Blue Line Stream

(Source: 2013 Environmental Resource Inventory, Borough of Peapack and Gladstone, Appendix E)

Documentation provided by Susan R. Rubright, Member, Park Manor Peapack L.L.C. regarding Blue Line Stream – Block 8, Lot 19. Letter dated April 2, 2013.

PARK MANOR PEAPACK, L.L.C.
14 Ridge Road
Gladstone, NJ 07934

April 2, 2013

VIA HAND DELIVERY

Gian-Paolo Caminiti, Chair
Borough of Peapack & Gladstone
Land Use Board
P.O. Box 218
Peapack, New Jersey 07977

RE: Environmental Resource Inventory Update-2013/draft

Dear Mr. Caminiti and Members of the Land Use Board:

Park Manor Peapack, LLC owns property located at 156 and 158 Main Street and known as Block 8, Lots 19 and 20, respectively, on the Borough of Peapack & Gladstone tax maps. We have reviewed the Environmental Resource Inventory Update 2013/draft, which indicates it was "compiled by the Land Conservancy of New Jersey with the Borough of Peapack & Gladstone Environmental Commission" (the "ERI"). We have a number of comments regarding the ERI and appreciate the opportunity to present them along with certain supporting documentation.

First, it is our understanding that the ERI is not a regulatory document. Second, we understand that the data in the ERI were gathered from a variety of existing data sources, including the New Jersey Department of Environmental Protection ("NJ DEP"). Neither the Land Conservancy nor the Borough conducted any independent studies or individual site investigations. Neither the Land Conservancy nor the Borough compared the source documents with actual site conditions. Accordingly, the ERI is not to be used to impose restrictions on land or landowners; rather, it is a tool to be utilized by the Borough for general planning purposes. Site specific data would prevail over the secondary source data reflected in the ERI.

The maps in the ERI show a "blue line stream" on a portion of Block 8, Lot 19. Map 12, entitled "Streams and Open Water Buffers", attributes a 300' buffer along the alleged blue line stream. According to a determination by the NJ DEP in 2007 that was based on an on-site inspection and analysis, this alleged stream does not exist and, accordingly, neither does the buffer. This determination was then independently verified by an environmental scientist in 2012. In support of the above, please find the following:

1. **Letter dated August 27, 2007 from Terry Pilawski, Chief, Bureau of Watershed Management, to Ray C. Liotta, Maser Consulting, PA, RE: Jurisdictional Determination, Lots 19 & 20, Block 8, Borough of Peapack-Gladstone, Somerset County, NJ.** (A copy of that letter, along with portions of a survey of the property prepared by Maser Consulting of the areas in question, and attached by the property owner are enclosed).

BE:1658218.1/RUB138-263506

In the letter, Ms. Pilawski states that "the stream line shown adjacent to the (sic) Willow Avenue on the USGS quadrangle map does not physically exist. The site visit conducted on May 11, 2007 confirmed this fact and also no evidence of any relocation or piping of this stream was found."

Ms. Pilawski also notes that the "man-made drainage ditch located to the west of Route 512 is not a stream and is fed by stormwater runoff from the drainage conveyance system of Main Street." This ditch is located between the gray house next to Liberty Park and Liberty Park, directly across from the parking lot on 156 Main Street, Block 8, Lot 19 owned by Park Manor Peapack.

2. **Letter dated February 22, 2012 from Stephen J. Souza, Ph.D., President, Princeton Hydro, LLC., to William Ryden, P.E.** (copy enclosed). In this letter Dr. Souza states that "the objective of my site inspection of this parcel (Block 8, Lot 19) was to determine whether a blue line feature that appears on the NJDEP I-Map coverage of the site is an actual waterway or is the artifact of an older, now non-exiting feature." His conclusion is that "the blue line feature that appears on the I-Map and Google Maps is an artifact of a previous condition". He also opined that the parcel is not encumbered by any NJ DEP regulated features.

3. **Resolution memorializing grant of minor subdivision and variance approval dated November 3, 2004 to Nicolas Villa for property located at 2 School Street and known as Block 8, Lots 2.01 and 2.05.** That property is located directly across School Street from the Park Manor Peapack property and a blue line stream and 300' buffer are likewise shown on the ERI's Map12 to exist on Mr. Villa's property. Neither the resolution nor any document in the subdivision application file makes reference to a blue line stream, stream buffer or any NJ DEP regulated feature existing on Mr. Villa's property or in the area. It is extremely unlikely that the Planning Board would have missed the existence of such a feature during the review and approval process had it in fact existed.

We understand that the Borough is not in a position to change the NJ DEP maps. We are bringing this matter regarding our property to the Board's attention with the hope that language might be added to the ERI further clarifying that the ERI maps are based on secondary source materials, that independent verification via site inspections was not made and that site specific data prevail over information found in secondary source documents.

We appreciate your time and consideration.

Very truly yours,

Susan R. Rubright, Member

Arthur C. Rubright, Member

cc: Peapack & Gladstone Environmental Commission (w/enclosure)
Land Conservancy of New Jersey (w/enclosure)

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Division of Watershed Management
Bureau of Watershed Regulation
P.O. Box 418, 401 East State Street
Trenton, New Jersey 08625-0418
Telephone: (609) 984-6888
Fax: (609) 984-6505
www.state.nj.us/dep/watershedmgt

JON S. CORZINE
Governor

LISA P. JACKSON
Commissioner

Raymond C. Liotta
Maser Consulting P.A.
Perryville III Corporate Park
53 Frontage Road, Suite 120
P.O.Box 4017
Clinton, NJ 08809

AUG 2 7 2007

Re: Jurisdictional Determination
Lots 19 & 20, Block 8
Borough of Peapack – Gladstone, Somerset County, NJ

Dear Mr. Liotta:

This letter is in response to your correspondence dated June 20, 2007 requesting Jurisdictional Determination for the applicability of Special Water Resource Protection Area (SWRPA) as per Stormwater Management Rules (N.J.A.C. 7:8) for your project.

The stream line shown adjacent to the Willow Avenue on the Soil Survey map and on USGS quadrangle map does not physically exist. The site visit conducted on May 11, 2007 confirmed this fact and also no evidence of any relocation or piping of this stream was found. Hence there is no requirement for SWRPA along this virtual stream line.

The man-made drainage ditch located to the west of Route 512 is not a stream and is fed by the stormwater runoff from the drainage conveyance system of Main Street. Hence the SWRPA requirement does not apply to this feature either.

Based on the detailed review of the existing conditions, USGS quadrangle map, County Soil survey and category one waterbodies list together with the fact that the discharge from the proposed site does not discharge to the man-made recreational pond located west of Route 512 and provides approximately 750 feet travel distance prior to discharge in the Peapack Brook, it is determined that the SWRPA requirements does not apply to this pond.

RECEIVED
AUG 29 2007

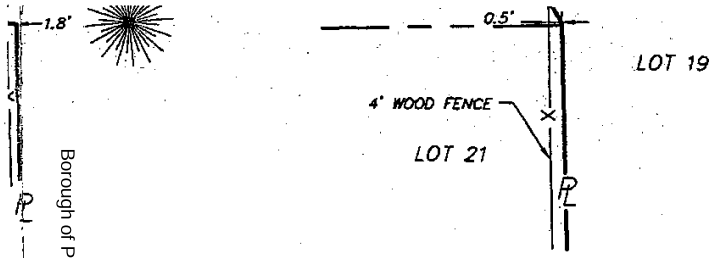
This letter does not relieve the applicant of the responsibility of obtaining any other required Federal, State or local permits and approvals as required by law and is based on a review of the information submitted to the Department.

The Department hopes this answers your concern satisfactorily. Should you have any questions in this regard, please contact, Kunal Patel, of my staff at 609-984-6888.

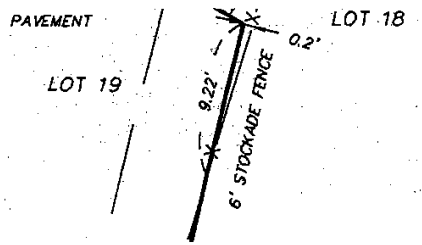
Sincerely,

for Terry Pilawski, Chief
Bureau of Watershed Regulation

cc: Borough of Peapack-Gladstone Township Engineer, Borough of Peapack-Gladstone
Kunal Patel, Bureau of Watershed Regulation, NJDEP



DETAIL 'E'
N.T.S.



DETAIL 'F'
N.T.S.

MASER CONSULTING P.A.
Consulting, Municipal & Environmental Engineers
Planners ▪ Surveyors ▪ Landscape Architects
State of N.J. Certificate of Authorization: 24GA27986500

CLINTON OFFICE
Perryville III Corporate Park
53 Frontage Road, Suite 120
P.O. Box 4017, Clinton, NJ 08809
Phone (908) 238-0900
Fax (908) 238-0901
E-mail - solutions@maserconsulting.com

Regional Offices
Red Bank, N.J.
Hamilton Square, N.J.
Logan, N.J.
Mt. Arlington, N.J.
Newburgh, N.Y.
West Nyack, N.Y.
Bethlehem, PA.

FEASIBILITY STUDY

BOUNDARY AND TOPOGRAPHIC SURVEY

FOR

Susan R. Rubright, Esq.

BLOCK NUMBER 8
LOTS 19 & 20

TOWNSHIP OF PEAPACK–GLADSTONE SOMERSET COUNTY NEW JERSEY

JOB NUMBER:	DATE:
07000117A	4/24/07
SCALE: 1" = 30'	LATEST REVISION: 6-12-07
INDEX NUMBER: CLSU005516	DESIGN BY: JEH
SHEET NUMBER: 1 of 1	

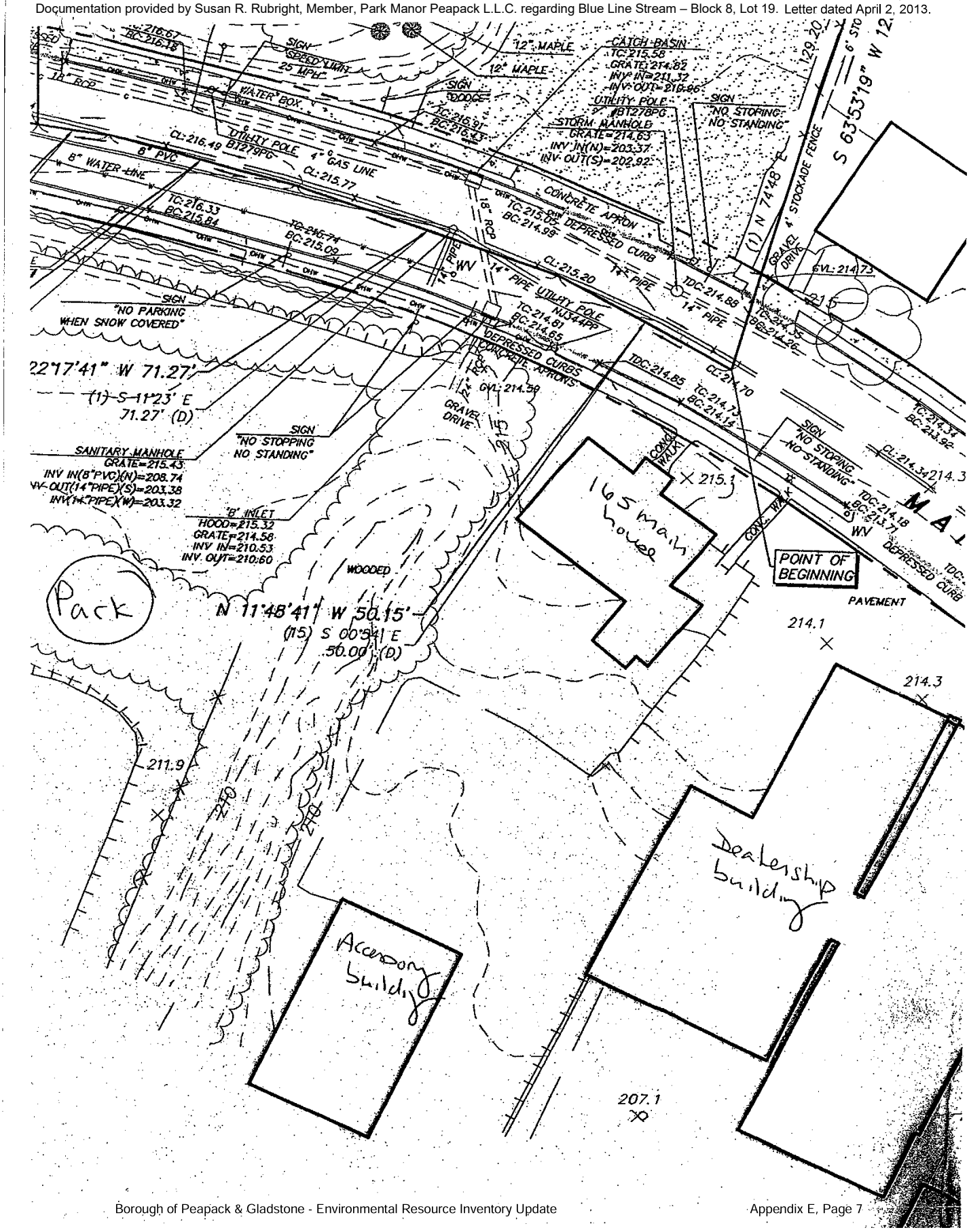
LEONARDO E. PONZIO
NEW JERSEY PROFESSIONAL
LAND SURVEYOR LIC. NO. 39402

Appendix E, P

Borough of Peapack & Gladstone - Environmental Resource Inventory Update

Documentation provided by Susan R. Rubright, Member, Park Manor Peapack L.L.C. regarding Blue Line Stream – Block 8, Lot 19.
Letter dated April 2, 2013.

Documentation provided by Susan R. Rubright, Member, Park Manor Peapack L.L.C. regarding Blue Line Stream – Block 8, Lot 19. Letter dated April 2, 2013.



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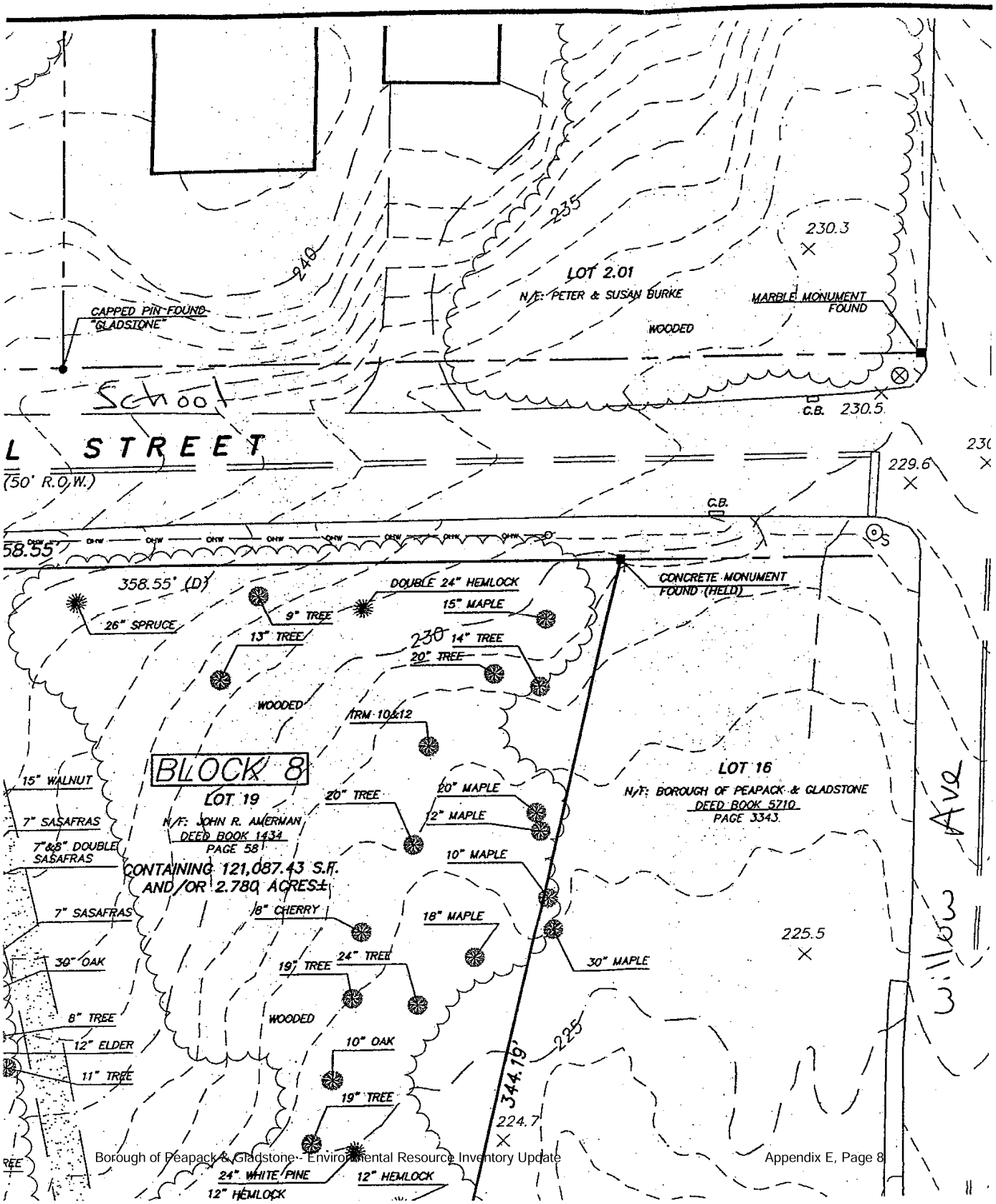


Documentation provided by Susan R. Rubright, Member, Park Manor Peapack L.L.C. regarding Blue Line Stream – Block 8, Lot 19. Letter dated April 2, 2013.

Princeton Hydro

Scientists, Engineers & Environmental Planners Designing Innovative Solutions for Water, Wetland and Soil Resource Management

22 February 2012

Mr. William Ryden, P.E.
Anderson & Denzler Associates, Inc.
519 Ridgedale Avenue
P.O. Box 343
East Hanover, NJ 07936

Dear Mr. Ryden:

The following letter report submitted by Princeton Hydro, LLC summarizes our review of Block 8, Lot 19, 156 Main Street, Borough of Peapack and Gladstone, NJ. The lot is essentially bounded by Main Street to the west, School Street to the east and Willow Avenue to the south. The objective of my site inspection of this parcel was to determine whether a blueline feature that appears on the NJDEP I-Map coverage of the site is an actual waterway or is the artifact of an older, now non-existing feature. This same mapped feature appears on Google Maps. My inspection of the site was conducted on 17 February 2012.

Historically, there was likely some type of water conveyance feature that ran through the center of this parcel. However, I have concluded that presently there is no feature on the site that can be considered a waterway, intermittent stream or stormwater conveyance ditch. I reached this conclusion on the basis of four basic observations:

1. The stormwater collection and conveyance system that services School Street and Willow Avenue effectively diverts runoff from the parcel. Although there is no curb and gutter system, any runoff that flows down School Street towards Willow Avenue is channeled along the edge of the roadway to three (3) stormwater catch basins. These basins interconnect with the stormwater collection system located along Willow Avenue. This essentially eliminates the conveyance of stormwater runoff to the subject parcel. Additionally, as a result of some recent grading and the presence of a small (18" corrugated metal pipe) culvert, stormwater running down the north side of Willow Avenue upgradient of the School Street intersection is collected and diverted into the Willow Avenue stormwater collection system. This runoff likely served as the headwater for the artifact blueline stream. As such, essentially there is presently no source of storm event inflow due to the presence of the highly developed School Street and Willow Avenue stormwater collection and conveyance system (Photos 1-3).
2. Examination of the parcel itself revealed that although a topographic depression runs through the approximate center of the parcel, this feature is discontinuous as a result of past filling and grading activities. The greatest amount of filling and

Princeton Hydro, LLC
□ 1108 Old York Road Suite 1, PO Box 720 Ringoes, NJ 08551 t. 908.237.5660 f. 908.237.5666
□ 1200 Liberty Place, Sicklerville, NJ 08081 t. 856.629.8889 f. 856.629.8866
□ 120 East Uwchlan Avenue Suite 204 Exton, PA 19341 t. 610.524.4220 f. 610.524.9434

www. PrincetonHydro.com

regrading occurs towards the lower edge of the parcel where it abuts a paved parking lot that is used as a sales lot for the car dealership located on Main Street. This filling and regrading essentially eliminates any potential for a functional swale. As such, although there is a topographic depression present in the subject parcel, it is discontinuous and cannot function in the capacity of a waterway, intermittent stream or stormwater conveyance ditch (Photo 4).

3. Examination of the vegetation present in the aforementioned topographic depression revealed no wetland or riparian vegetation. The understory of the area is vegetated by upland grasses and invasive plant species, in particular mugwort. There was also a dense amount of catbrier and wild blackberry (Photo 4). The over story consisted of maples and oaks. I observed no species of plants that are associated with wetland, stream or riparian systems. Although I did not conduct any actual soil borings, I did make a number of shallow (6") hand excavations into the soils located within the topographic depression. I observed a soil condition reflective of an upland area with no evidence of wetland like conditions.
4. Examination of the stormwater catch basin located on Main Street, which is immediately down gradient and essentially aligned with the approximate center of the subject parcel, has no inflow pipe that could be serving this parcel. As per my inspection of this catch basin there is no evidence of any subsurface drain or pipe that could be collecting runoff or flow from the subject parcel.

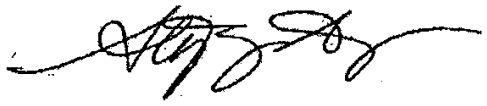
As such, based on the above I concluded that the blueline feature that appears on I-Map and Google Maps is an artifact of a previous condition. Largely as a result of the School Street / Willow Avenue stormwater collection system, what ever opportunity for runoff or flow to be directed to the subject parcel has been effectively eliminated. Additionally, although there is a topographic depression that runs through the majority of the approximate center of the subject parcel, grading and filling activities on the subject lot and adjacent lots has eliminated any vestiges of what was likely at some time a swale. Physically, there is no way for flow to be continuously conveyed from the top (School Street end) to the bottom (Main Street end) of the lot. Additionally, examination of the Main Street stormwater collection system did not reveal the presence of any subsurface pipe emanating from the approximately location of the subject parcel.

Related to my examination of the blueline feature, I was asked to also comment on the likelihood of the subject parcel being affected by the riparian buffer (Special Water Resource Protection Area – SWRPA) associated with Peapack Brook or Liberty Pond. The parcel is more than 300' from the top of bank of Peapack Brook. While within 300' of the edge of Liberty Pond, the pond itself will not likely qualify as a C-1 waterbody. I make this statement for two main reasons. First, the pond is man-made and is an off-line impoundment not directly subject to inflow from Peapack Brook. Second, the pond's primary source of inflow is stormwater runoff from the surrounding streets; as such it

functions in the capacity of a stormwater management basin. Even if it was assigned a riparian buffer, the land adjacent to the pond that would be encompassed by the buffer is already significantly altered and developed and as such has lost its ecological functions and services.

In conclusion, I found no evidence of any waterway or other feature on the subject parcel (Block 8, Lot 19) that would qualify as a blueline stream. Additionally, in my professional opinion, based on dealing with SWRPA and riparian buffer issues, I do not feel that the parcel is encumbered by any NJDEP regulated features. In its present state it is a partially developed, historically altered parcel that can be best characterized as a disturbed upland property. Should you have any questions or comments please contact me.

Sincerely,



Stephen J. Souza, Ph.D.
President, Princeton Hydro, LLC

R-18 Zone. Lot 2.05 consists of 12.660 acres of property and is located in the RR-1 Zone. The Applicant is seeking to reduce the size of Lot 2.05 to 12.162 acres of property and attaching the 0.498 acres of property to Lot 2.01. That lot would then exist in both the R-18 and RR-1 Zones. In addition, the Applicant would provide a dedication to the Borough of Peapack and Gladstone for road frontage on Willow Avenue of 0.225 acres. He then seeks to subdivide Lot 2.01 into two lots. New Lot 2.01 would consist of 45,631 square feet and new Lot 2.10 would consist of 28,162 square feet.

On proposed Lot 2.01, there is an existing 2-story frame dwelling. He originally proposed to construct a garage which would measure 23 feet by 23 feet. He subsequently modified that proposal to increase the garage dimension to 24 feet by 24 feet.

On proposed Lot 2.10, he intends to construct a 2-family dwelling that would have the architecture similar to a barn and would be 35 feet by 45 feet. He also originally proposed to construct a garage of 22 feet by 22 feet that was subsequently modified to 24 feet by 24 feet.

Both garages are proposed to be 19 feet 6 inches with a cupola. This will require height variances for accessory structures. The proposed 2-family dwelling on new Lot 2.10 also requires a use variance since two family dwellings are not permitted within the zone. The two new lots would be located in both the R-18 and the RR-1 Zones. There would also be a floor area ratio variance for the proposed 2-family dwelling since the proposal is for 12 percent versus 10 percent authorized. Additional variances are required for front yard setback for the garage on Lot 2.10 and a side yard setback variance on Lot 2.10 for 15 feet versus 25 feet. Finally, there is a lot area variance since proposed Lot 2.10 is 28,162 square feet in a zone requiring 45,000 square feet.

R-18 Zone. Lot 2.05 consists of 12.660 acres of property and is located in the RR-1 Zone. The Applicant is seeking to reduce the size of Lot 2.05 to 12.162 acres of property and attaching the 0.498 acres of property to Lot 2.01. That lot would then exist in both the R-18 and RR-1 Zones. In addition, the Applicant would provide a dedication to the Borough of Peapack and Gladstone for road frontage on Willow Avenue of 0.225 acres. He then seeks to subdivide Lot 2.01 into two lots. New Lot 2.01 would consist of 45,631 square feet and new Lot 2.10 would consist of 28,162 square feet.

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' Documentation provided by Susan R. Rubright, Member, Park Manor Peapack L.L.C. regarding Blue Line Stream – Block 8, Lot 19. Letter dated April 2, 2013.

The Applicant, Mr. Villa, testified that he believed that the proposal advances the purposes of zoning by providing less density, promotes desirable visual environment, provides good civic design and planning of structures without adversely affecting either the public good o the zone plan. He advised the Board that he has the right to reacquire approximately 1.5 acres from Lot 2.05, Block 8. This is shown on the map by way of a dotted line. He indicated that the 1.5 acres will allow for the construction of a single-family residence in accordance with the RR-1 zoning. He also believed that he would have sufficient land in the R-18 Zone to resubdivide existing Lot 2.01 into three lots with few or no variances. He suggests to the Board that such a proposal, while more in line with the strict interpretation of the applicable ordinances, would not advance good planning in the area. He believes that his proposal maintains the rural character of this portion of the Borough by maintaining many of the natural characteristics of the area. He introduced various architectural sketches which suggest that the proposed 2-family dwelling and garage to be located on new Lot 2.10 will be in keeping with the character of the area. There is an existing barn in the neighborhood and his plan is to maintain that rustic character on new Lot 2.10.

The Applicant goes on to testify that the location of the proposed 2-family house and garage are intended to both preserve the natural features of the lot and preserve the street scape along Willow Avenue. He notes that there are slopes on the southerly portion of proposed Lot 2.10 along Willow Avenue. His proposal will allow him to maintain those largelyundisturbed. The same is true with regard to existing tree lines on both new Lots 2.10 and 2.01. There was discussion with regard to either reorienting the house so that the front door would face School Street (its current proposed location faces Willow Avenue) or to reorient the garage and the

house so that the garage would be on the northerly side of the lot. The Applicant indicates that to do so would adversely affect the street scape and push the house into the slopes located on the southerly side of the lot.

A concern was raised with regard to the option land on Lot 2.05. The Applicant presented evidence that Lot 2.05 has a deed restriction against further subdivision. Thus, with the acquisition of only a portion of the option land from Lot 2.05 and the integration of it into the proposed subdivision, the balance of the option land would remain incorporated as part of Lot 2.05 and would therefore be subject to the restriction against further subdivision as contained in the Deed.

The Applicant further discussed the height variances that he requested. He provided various renderings showing the structures at different heights and suggested to the Board that the proposal was the optimum height for an appropriate architectural character for the neighborhood and provides symmetry to the proposed 2-family dwelling.

The Applicant, in response to questions by both the Board and the Staff, presented an exhibit which established an area straddling Lots 2.10 and 2.01 which would be non-disturbance. The area is approximately 168 feet long by 50 feet wide. The Applicant agreed that this area would be restricted by deed on both lots further preserving the street scape along Willow Avenue and School Street.

The Board Engineer, Mr. Ryden, rendered a report dated May 18, 2004, which was incorporated into the record. The Board Planner, Mr. Coppola, also rendered a report dated June 10, 2004, which was also incorporated into the record.

In addition to the testimonial evidence, the Applicant submitted the following

documentary evidence:

A-1. Outline of Testimony for Land Use Board;

A-2. Photo Board of Prior Projects;

A-3. Conceptual Subdivision dated June 8, 2004;

A-4. Architectural Sketch of the new structures;

A-5. Sketch of the floor plan;

A-6. Subdivision Plat dated June 8, 2004;

A-7. Grading Exhibit dated June 14, 2004;

A-8. Architectural Sketches of the height of the two structures to be built;

A-9. Photo Board;

A-10. Deed;

A-11. Deed;

A-12. Deed of Lot 2.05, dated April 5, 2004, showing no further subdivision authorized;

A-13. Sketch of Non-disturbed Area on Lots 2.10 and 2.01;

A-14. Alternative Views from School Street of 2-family dwelling and garage;

A-15. Further Alternative from School Street, attached garage;

A-16. Sketch of Proposal.

The meeting was opened to the public and no public comment was received.

WHEREAS, the Land Use Board in reviewing the testimony and documentary evidence, makes the following findings of fact and conclusions:

1. The Board finds that the use variance can be granted since the Applicant has shown that good civic design and good planning is being employed by the proposal. In this case, the

Board finds that the potential of having four separate structures, three of which are in the R-18 Zone and one in RR-1 Zone is density that is not in character with the area. Rather, the proposal for a 2-family structure and one additional single-family lot that conforms with the RR-1 Zone is preferable. The Board further finds that the proposal is compatible with and consistent with the Master Plan and the Zoning Ordinance. The Board further finds that the grant of such a variance would not create substantial detriment to either the zone plan or to the neighborhood.

2. The height variance can be granted for 19 feet 6 inches, plus the cupola, for the accessory structures since the architecture for those garages will be in keeping with the area and will be similar in character to the principle structures.

3. The side yard variance for the 2-family house can be granted on the basis that the relocation of the house in accordance with the setback requirement will push the development into slopes which are currently being preserved under the proposal.

4. The lot area variance for proposed Lot 2.10 can be granted because the Applicant has shown that good planning practices and a desirable visual environment will be created by the configuration of the lots.

5. The Board further finds that the FAR variance can be granted for Lot 2.10 since the 2-family unit will tend to preserve the street scape and, by incorporating the barn architecture, and will maintain the rustic environment of the area.

6. The Board further finds that there is no negative impact to either the zone plan or to the neighborhood by the grant of any of the variances referenced hereinbefore.

NOW, THEREFORE, BE IT RESOLVED that the Land Use Board of the Borough of Peapack and Gladstone does hereby approve the minor subdivision and variances requested by

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Chapter 11

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