

NATURAL RESOURCES INVENTORY

BOROUGH OF NORTH HALEDON

PASSAIC COUNTY, NEW JERSEY



DECEMBER 2023



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Our File #: NH-711

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I. Introduction

A. Natural Resources Inventory

A Natural Resources Inventory (NRI) is a comprehensive compilation and analysis of significant natural resources within a specific area, such as the Borough of North Haledon. Beyond natural elements, an NRI also encompasses cultural resources, including historical, scenic, and recreational assets. The primary purposes of an NRI include providing foundational information for comprehensive land-use and conservation planning, integrating natural resource data into local planning and zoning initiatives, and offering unbiased documentation on the location, sensitivity, and status of various natural features, spanning geological data to wildlife habitats.

This inventory serves as a crucial tool for municipal planning, empowering local governments to make well-informed decisions. The initial step in adopting a proactive and ecologically sound approach to safeguarding natural resources and the overall community well-being involves creating an inventory of the borough's environmental and biological infrastructure. By considering diverse variables and analyzing the data, communities can comprehend the involved ecological processes and recognize the consequences of neglecting them. This understanding aids local land planners in developing and sustaining an ecologically healthy community.

B. Methods

The NRI for the Borough of North Haledon has meticulously compiled current information on the physical and biological environment. Utilizing the latest Geographic Information System (GIS) data from the New Jersey Department of Environmental Protection (NJDEP), Bureau of GIS, and other relevant sources (refer to Appendix B), the inventory aims to offer a comprehensive understanding of the borough's natural resources.

Key areas covered by the NRI include climate, geology, soils, water systems, floodplains, wetlands, forests, and cultural resources. By consolidating and analyzing this data, the NRI serves as a valuable resource to provide insights into the diverse natural and cultural elements that contribute to the character and sustainability of North Haledon.

C. Limitations

It's important to acknowledge that this NRI does not serve as a substitute for the primary data sources upon which it relies. This document is designed to be dynamic, a living resource that may require periodic updates as new and improved information becomes available or as the status and condition of resources change over time. All source information for the data layers utilized in this inventory will be duly documented in the provided Appendix.

The NRI is specifically intended for the preliminary assessment of a project. However, it should be noted that it does not replace the necessity for on-site testing and evaluation.

Furthermore, it does not exempt any parties from adhering to all regulatory requirements.

D. General Description of the Borough of North Haledon

The Borough of North Haledon, situated in Passaic County, is surrounded by several neighboring municipalities. To the west lies the Township of Wayne, while to the south, it shares borders with the Boroughs of Haledon and Prospect Park. To the east, the Borough of Hawthorne is its neighbor, and to the north, it is bordered by the Borough of Franklin Lakes and the Township of Wyckoff.

The local waterways contribute to the borough's geography. The Molly Ann Brook flows from the north to the south, meeting Falls Brook and Squaw Brook before converging into Oldham Pond near the southern boundary of the borough. Eventually, Molly Ann Brook joins the Passaic River, which in turn merges with the Hackensack River before meandering towards Newark Bay and ultimately emptying into the Atlantic Ocean. This interconnected network of water bodies plays a significant role in shaping the natural landscape of North Haledon.

The community of North Haledon originated from sections of the region previously recognized as Manchester Township and attained incorporation on March 20, 1901.

Encompassing an area of 3.53 square miles (equivalent to 2259.200 acres), North Haledon had an estimated population of 8,927 as reported by the 2020 Census.

E. Land Use

Figures I-A through **I-E** depict aerial photography of North Haledon and the surrounding area. These images show the evolution of land use within the Borough over the last ninety years.

Figure I-A illustrates the prevalence of agriculture and forests and lack of development in the 1930's. The aerial photographs taken in 1995, 2007, 2015, 2020 and 2023 are shown within **Figures I-B, I-C, I-D, and I-E respectively.**

The NJDEP has utilized aerial photography taken in 1986, 1995, 2002, 2007, and 2020 to determine land use and land use change. There are six general land use categories including agriculture, barren, forest, urban, water, and wetlands. These classifications are defined as follows:

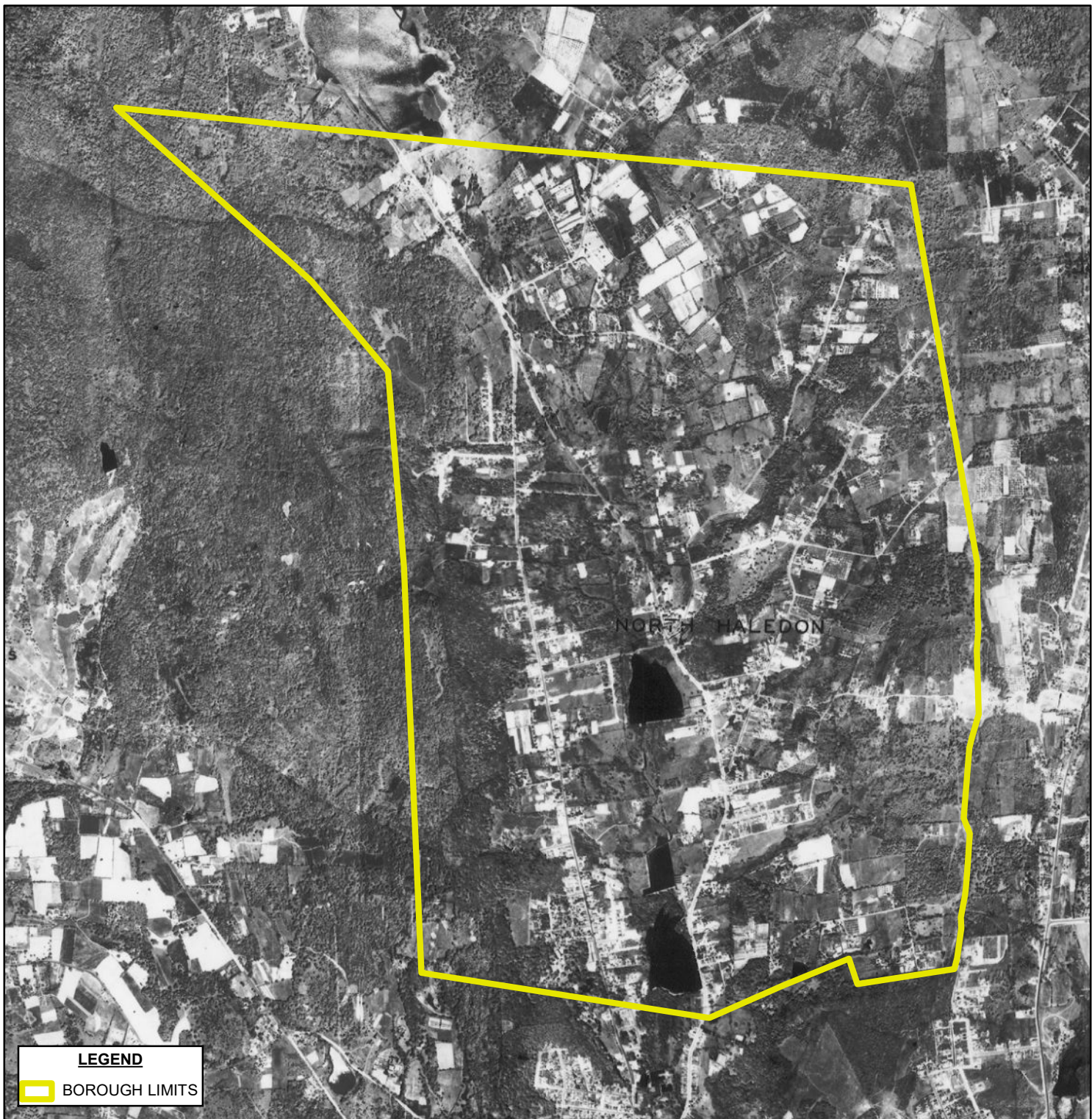
- **Agriculture:** All lands used primarily to produce food and fiber and associated farm structures.
- **Forest:** Lands covered by woody vegetation, excluding wooded wetlands. These areas can produce timber and other wood products and support many kinds of outdoor recreation. Forests are environmentally significant as they impact air and water quality, wildlife habitat, and climate.
- **Water:** Any areas periodically covered by water.
- **Wetlands:** Transitional areas situated between permanently flooded deepwater environments and well-drained uplands. The water table is usually at or near the surface or the land is covered by shallow water. The term wetlands encompasses mangroves, marshes (salt, brackish, intermediate, and fresh), swamps, forested wetlands, bogs, wet prairies, prairie potholes, and vernal pools. Wetlands are lands where saturation is the primary factor in soil development and the plants and animal communities they support. Most wetlands are characterized by soil or a substrate that is at least periodically saturated with or covered by water.

- **Barren Land:** Areas being developed or cleared at the time the photos were taken.
- **Urban Land:** Lands characterized by intensive land use or where the landscape has been altered by human activities. Including residential, commercial, educational, and industrial land.

The 2007 Land Use Types within the Borough of North Haledon is depicted in **Figure I-F** and summarized in **Table I-1**. North Haledon is mainly 71.64% urban and 23.00% forested lands. Detailed categories of land use/cover are shown in **Section VI. A** of this report.

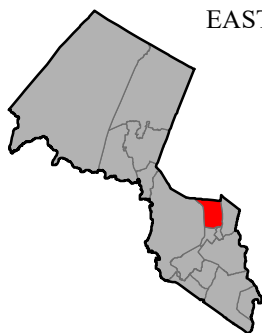
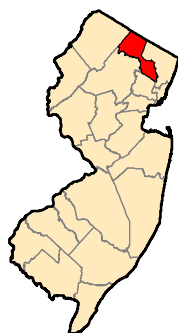
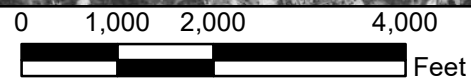
Table I-1: 2007 Land Use Type

Land Use Type	Acres	Percent
AGRICULTURE	10.557	0.47
BARREN LAND	11.058	0.49
FOREST	519.125	23.00
URBAN	1616.932	71.64
WATER	43.861	1.94
WETLANDS	55.555	2.46
Total Acres	2257.088	100.00
Source: NJDEP, January 2019		



LEGEND
 BOROUGH LIMITS

SOURCE: 1930 NJDEP AERIAL



NORTHING: 775,652
 EASTING: 577,771



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AERIAL MAP (1930)
NATURAL RESOURCES INVENTORY
 BOROUGH OF NORTH HALEDON

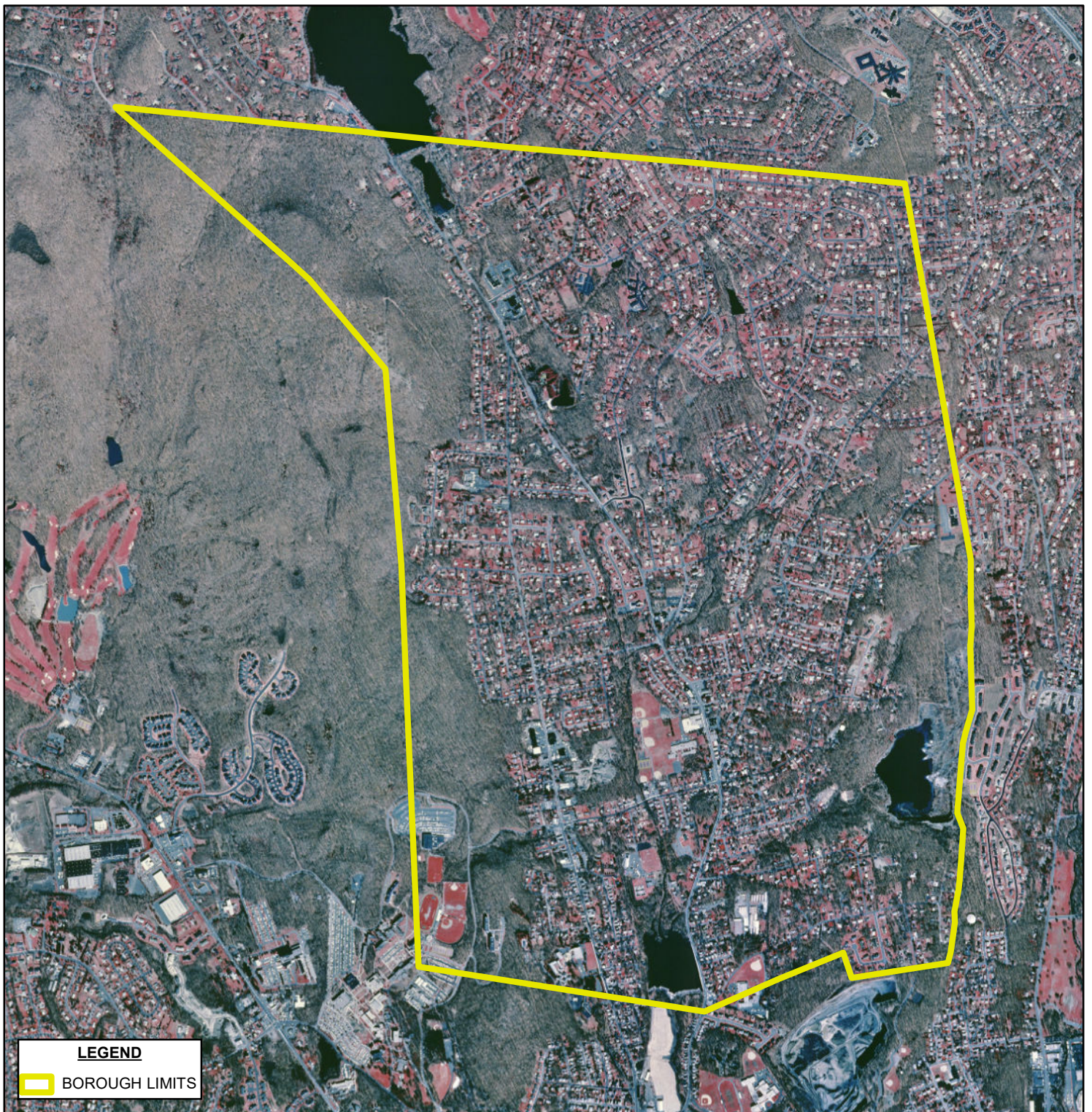
PASSAIC COUNTY

NEW JERSEY

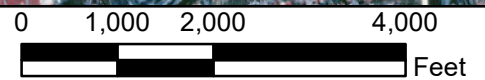
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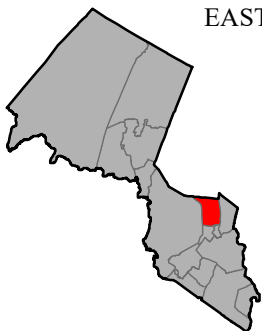
JOB NO. NH-711
 FIGURE I-A



SOURCE: 1995 NJDEP INFRARED ORTHOIMAGERY



NORTHING: 775,652
EASTING: 577,771



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330 PHILLIPS AVE., SOUTH HACKENSACK, N.J. 07606

AERIAL MAP (1995)
NATURAL RESOURCES INVENTORY
BOROUGH OF NORTH HALEDON

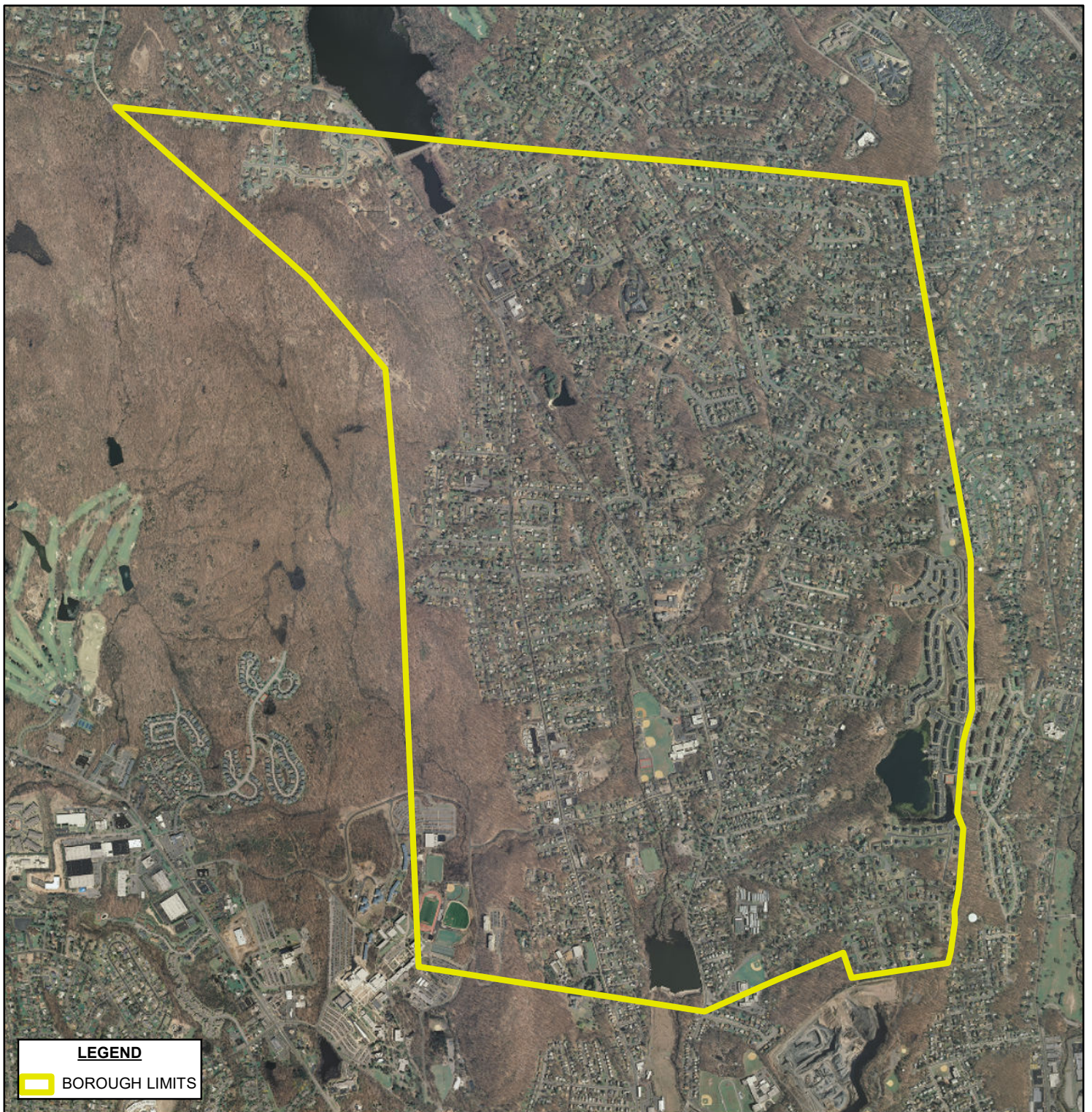
PASSAIC COUNTY

NEW JERSEY

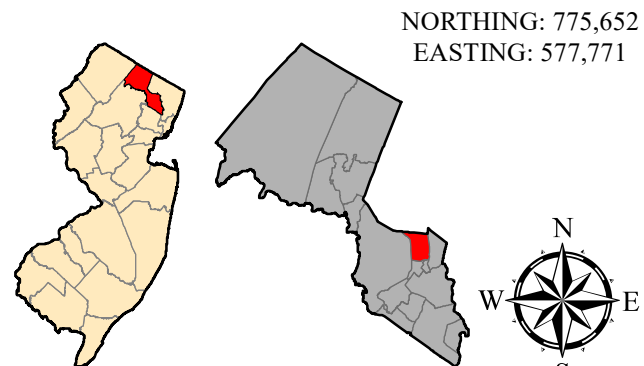
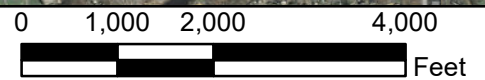
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JOB NO. NH-711
FIGURE I-B



SOURCE: 2007 NJDEP INFRARED ORTHOIMAGERY



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AERIAL MAP (2007)
NATURAL RESOURCES INVENTORY
 BOROUGH OF NORTH HALEDON

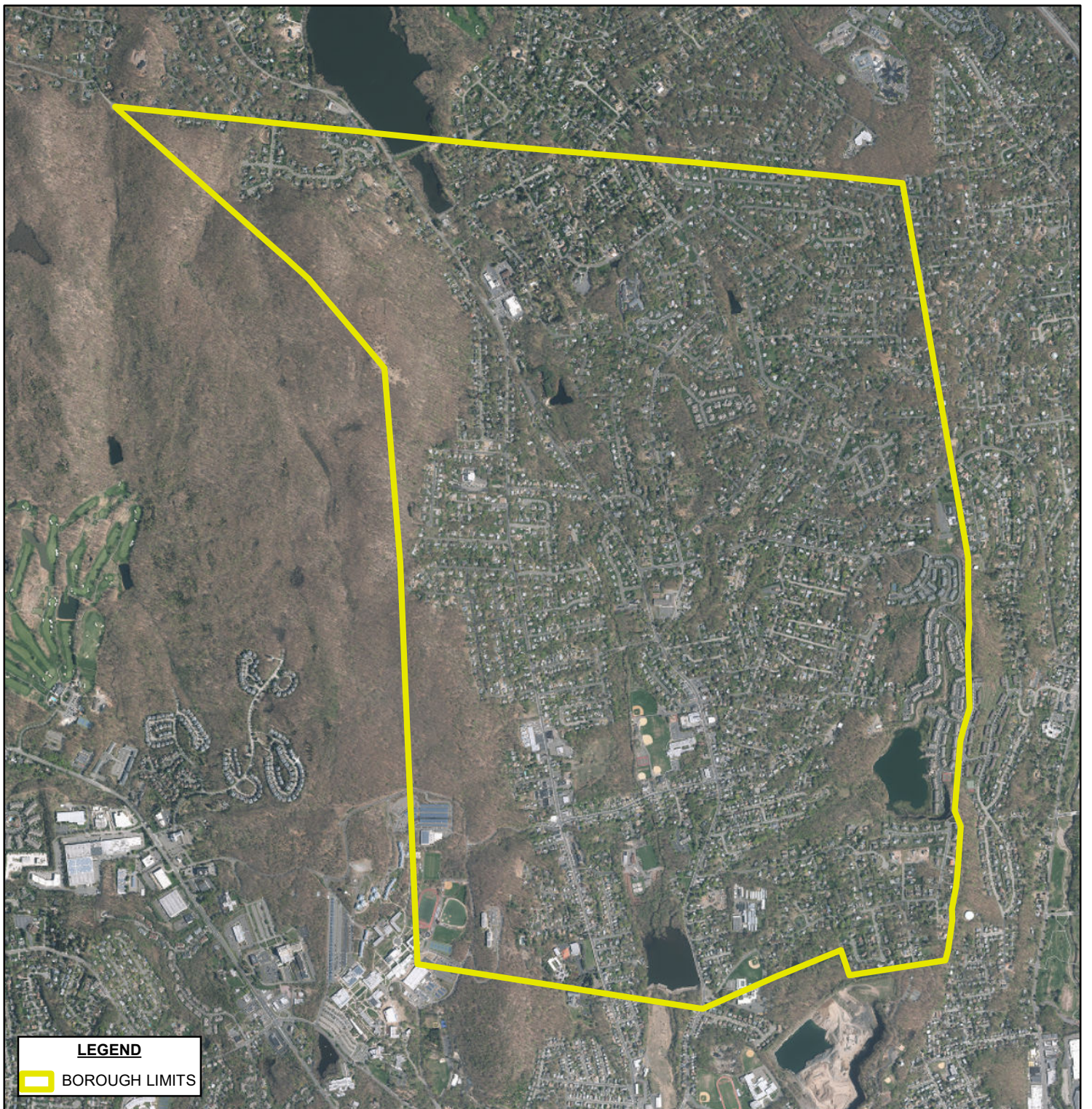
PASSAIC COUNTY

NEW JERSEY

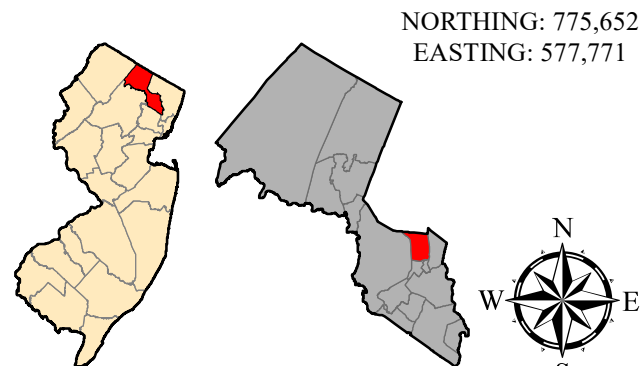
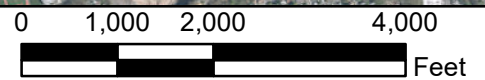
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DATE: NOVEMBER 2023

JOB NO. NH-711
FIGURE I-C



SOURCE: 2015 NJDEP INFRARED ORTHOIMAGERY



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AERIAL MAP (2015)
NATURAL RESOURCES INVENTORY
 BOROUGH OF NORTH HALEDON

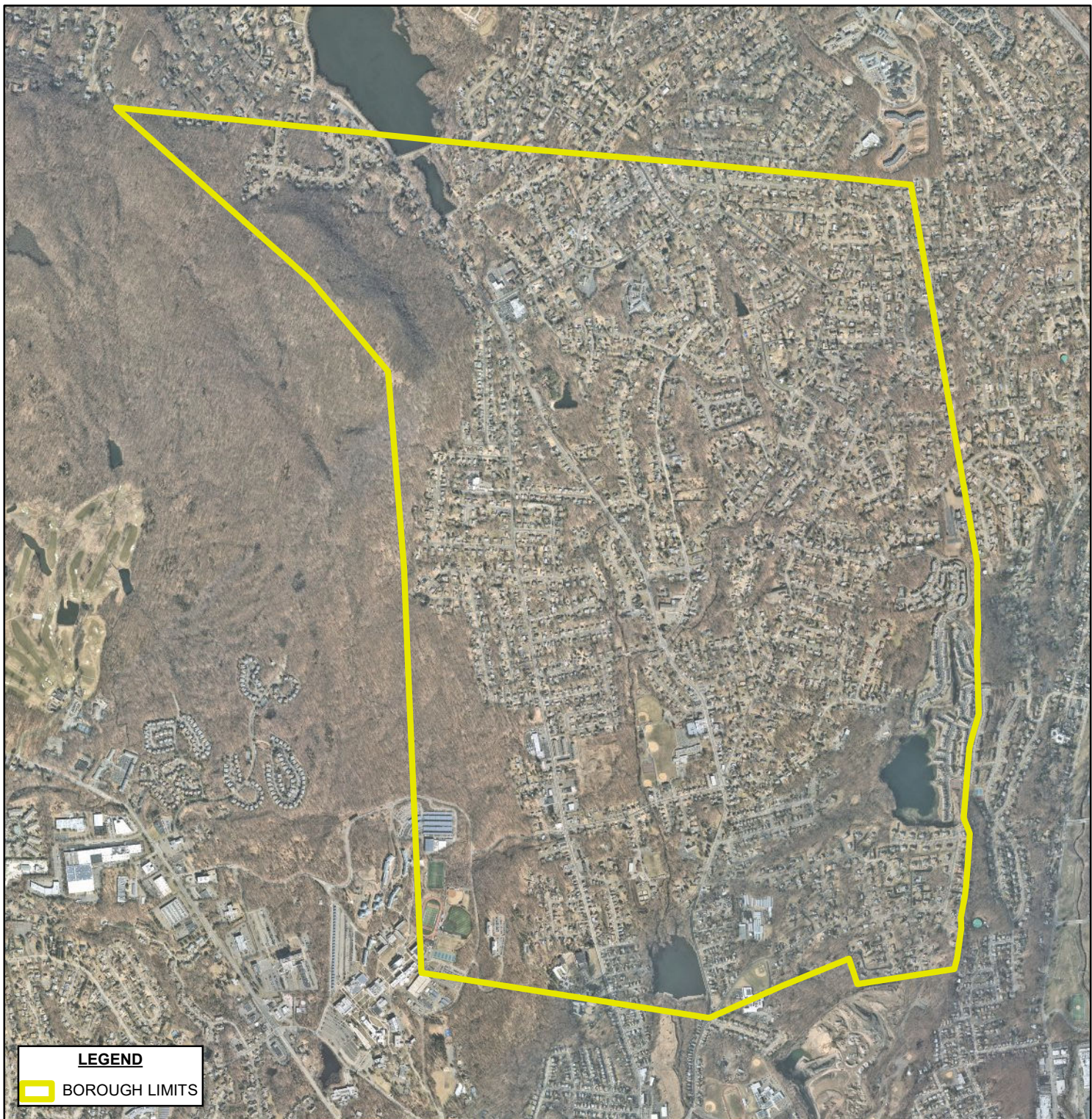
PASSAIC COUNTY


NEW JERSEY

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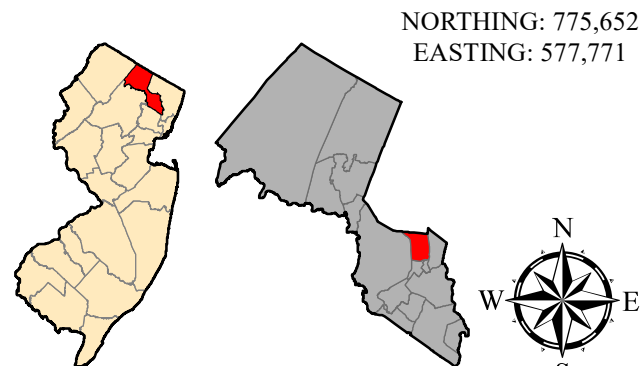
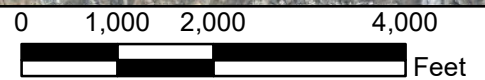
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FIGURE I-D

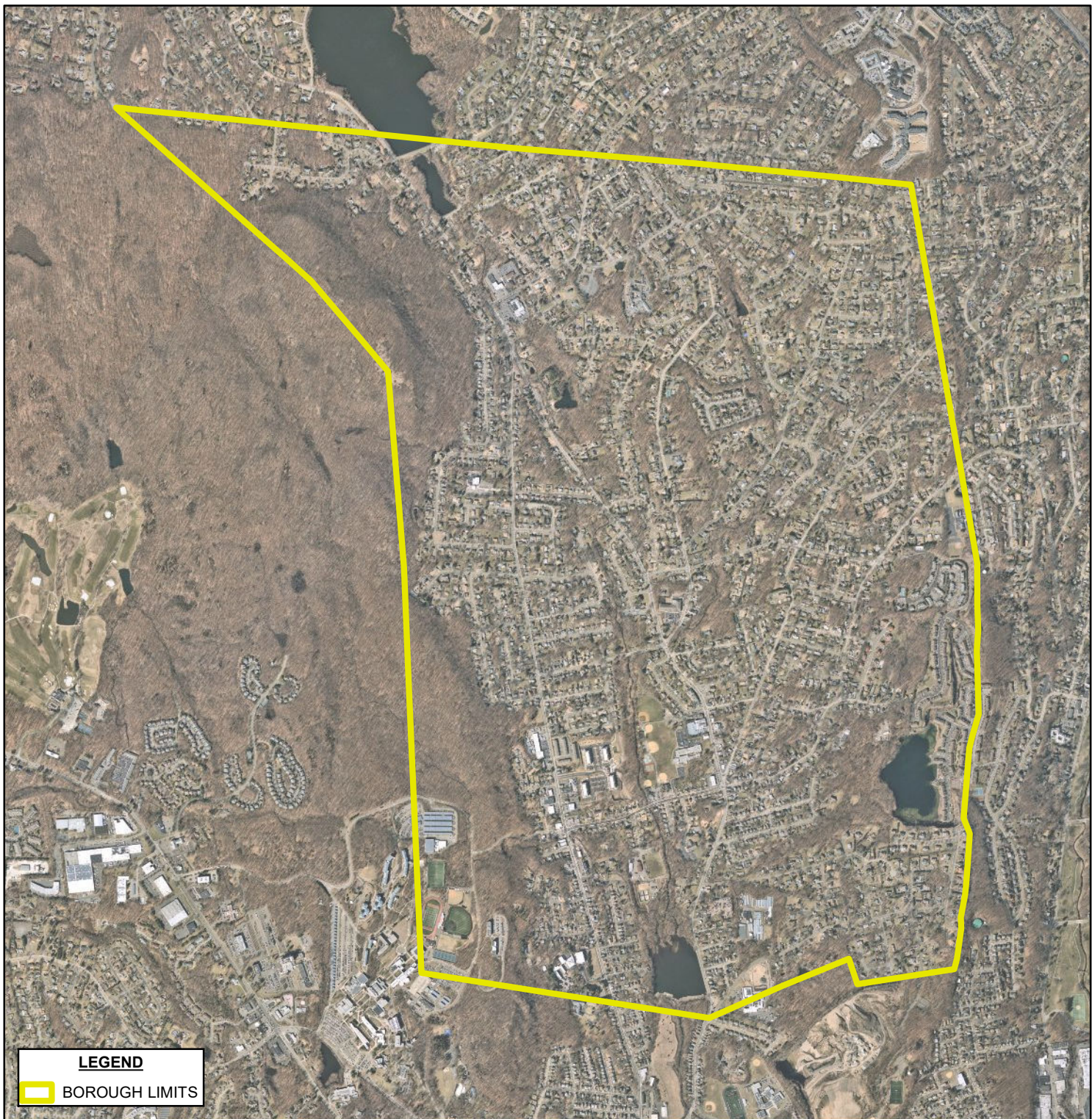


LEGEND
 BOROUGH LIMITS

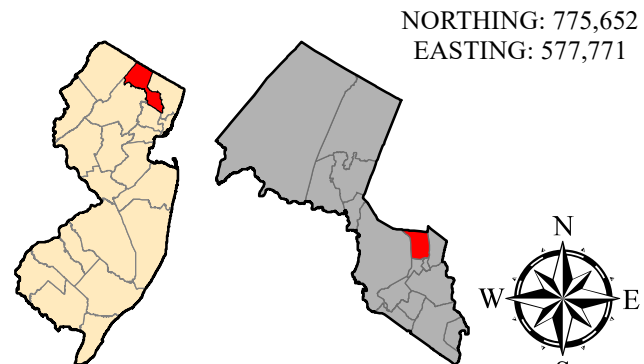
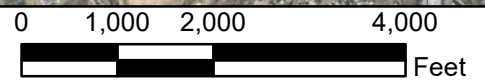
SOURCE: 2020 NEARMAP AERIAL IMAGERY



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AERIAL MAP (2020) NATURAL RESOURCES INVENTORY BOROUGH OF NORTH HALEDON		
PASSAIC COUNTY		NEW JERSEY
DR. BY: JMW CKD. BY: FJR	SCALE: 1 IN = 2,000 FT DATE: NOVEMBER 2023	JOB NO. NH-711 FIGURE I-E



SOURCE: 2023 NEARMAP AERIAL IMAGERY



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330 PHILLIPS AVE., SOUTH HACKENSACK, N.J. 07606

AERIAL MAP (2023)
NATURAL RESOURCES INVENTORY
 BOROUGH OF NORTH HALEDON

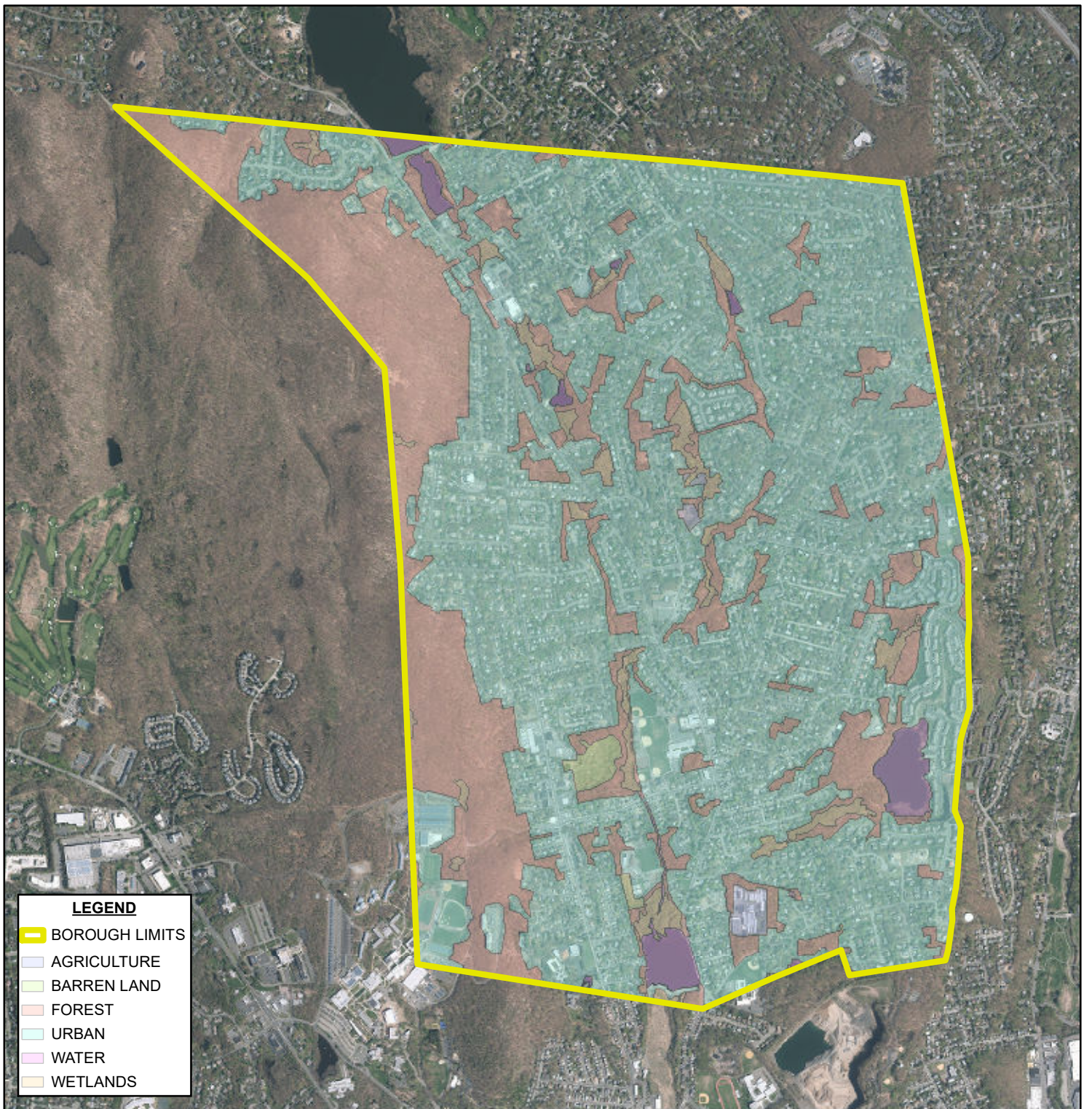
PASSAIC COUNTY

NEW JERSEY

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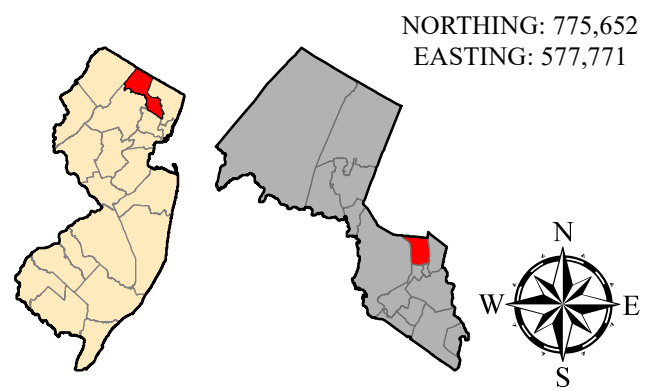
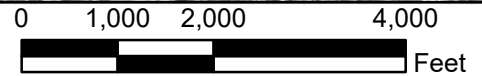
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DATE: NOVEMBER 2023

JOB NO. NH-711
FIGURE I-F



LEGEND	
	BOROUGH LIMITS
	AGRICULTURE
	BARREN LAND
	FOREST
	URBAN
	WATER
	WETLANDS

SOURCE: NJDEP LAND USE/ LAND COVER 2015 DATA LAYER



	BOSWELL ENGINEERING 330 PHILLIPS AVE., SOUTH HACKENSACK, N.J. 07606	
	LAND USE TYPE MAP NATURAL RESOURCES INVENTORY BOROUGH OF NORTH HALEDON	
PASSAIC COUNTY		NEW JERSEY
DR. BY: JMW CKD. BY: FJR	SCALE: 1 IN = 2,000 FT DATE: NOVEMBER 2023	JOB NO. NH-711 FIGURE I-G

II. Local and Regional Conditions

A. Climate and Meteorology

Climate

Climate indeed exerts a significant influence on the composition of flora and fauna within an ecosystem. In the case of New Jersey, the state is characterized by a temperate climate, featuring moderate average temperatures, distinct seasons, and a relatively evenly distributed rainfall pattern throughout the year. The prevailing atmospheric circulation is governed by the westerlies, a broad and undulating airflow from west to east across the middle latitudes of North America.

During the summer, prevailing winds typically come from the southwest, while in the winter, they shift to originate from the northwest. This climatic pattern contributes to the seasonal variations experienced in New Jersey, influencing the types of plants and animals that thrive in the region. The state's temperate climate and well-defined seasons create a diverse and dynamic environment for various species to adapt and flourish.

Precipitation and Temperature

The movement of the prevailing westerlies, shifting both north and south and varying in intensity, plays a crucial role in transporting different types of airstreams—wet, dry, hot, and cold. These airstreams contribute to the variability in daily weather experienced throughout New Jersey. The state witnesses a relatively even distribution of rainfall across the year, with measurable precipitation occurring approximately 120 days annually.

To further understand the climatic nuances, the Office of the New Jersey State Climatologist (ONJSC) has categorized the state into five distinct climate regions. North Haledon, situated within New Jersey, straddles the Northern and Central Zones, experiencing the unique climatic characteristics associated with these regions. This division helps capture the diverse weather patterns and conditions within the state.

Northern Zone

The ONJSC defines the Northern climate zone, encompassing elevated highlands and valleys of the Appalachian Uplands, as having a continental climate with minimal influence from the Atlantic Ocean, marked by prevailing southwest winds in summer and northwest winds in winter. Notably colder than other state zones, the Northern Zone exhibits average temperatures over ten degrees Fahrenheit cooler in winter and experiences annual snowfall of 40 to 50 inches compared to 10-15 inches in the south.

The highlands and mountains significantly influence the climate, with orographic effects enhancing clouds and precipitation. Thunderstorms, predominant during the warm season, contribute to a higher rainfall frequency compared to the coastal zone, where the nearby ocean stabilizes the atmosphere, resulting in approximately twice as many thunderstorms.

Central Zone

According to the ONJSC, the Central Zone extends from New York Harbor and the Lower Hudson River to the great bend of the Delaware River near Trenton. This area includes numerous urban locations with elevated pollutant levels.

The abundance of buildings and paved surfaces contributes to increased heat retention, leading to consistently warmer nighttime temperatures in heavily developed zones compared to suburban and rural areas. Additionally, the northern boundary of the Central Zone often serves as the demarcation between freezing and non-freezing precipitation during winter

B. Air Quality

Air pollution is a pervasive issue across the entire state, stemming from various sources such as industry, utilities, manufacturing, commercial activities, vehicles, and residential practices. The Clean Air Act of 1970 prompted the U.S. Environmental Protection Agency (USEPA) to establish National Ambient Air Quality Standards (NAAQS) for six Criteria Pollutants: nitrogen dioxide, lead, sulfur dioxide, ozone, carbon monoxide, and particulate matter. Compliance with these standards is monitored through a nationwide planning process.

New Jersey, in line with USEPA regulations, annually reports emissions from major sources. The Emission Statement Rule (N.J.A.C. 7:27-21) mandates the reporting of emissions for various air contaminants, including carbon monoxide, sulfur dioxide, ammonia, total suspended particulate matter, respirable particulate matter, lead, volatile organic compounds, oxides of nitrogen, carbon dioxide, methane, and 36 toxic air pollutants.

While the City of Paterson hosts the nearest air monitoring station, the results may not accurately represent North Haledon due to the area's dense population and extensive development. The Ramapo monitoring station in the Borough of Wanaque, measuring ozone levels, would provide a more representative assessment of regional air quality.

C. Existing Infrastructure

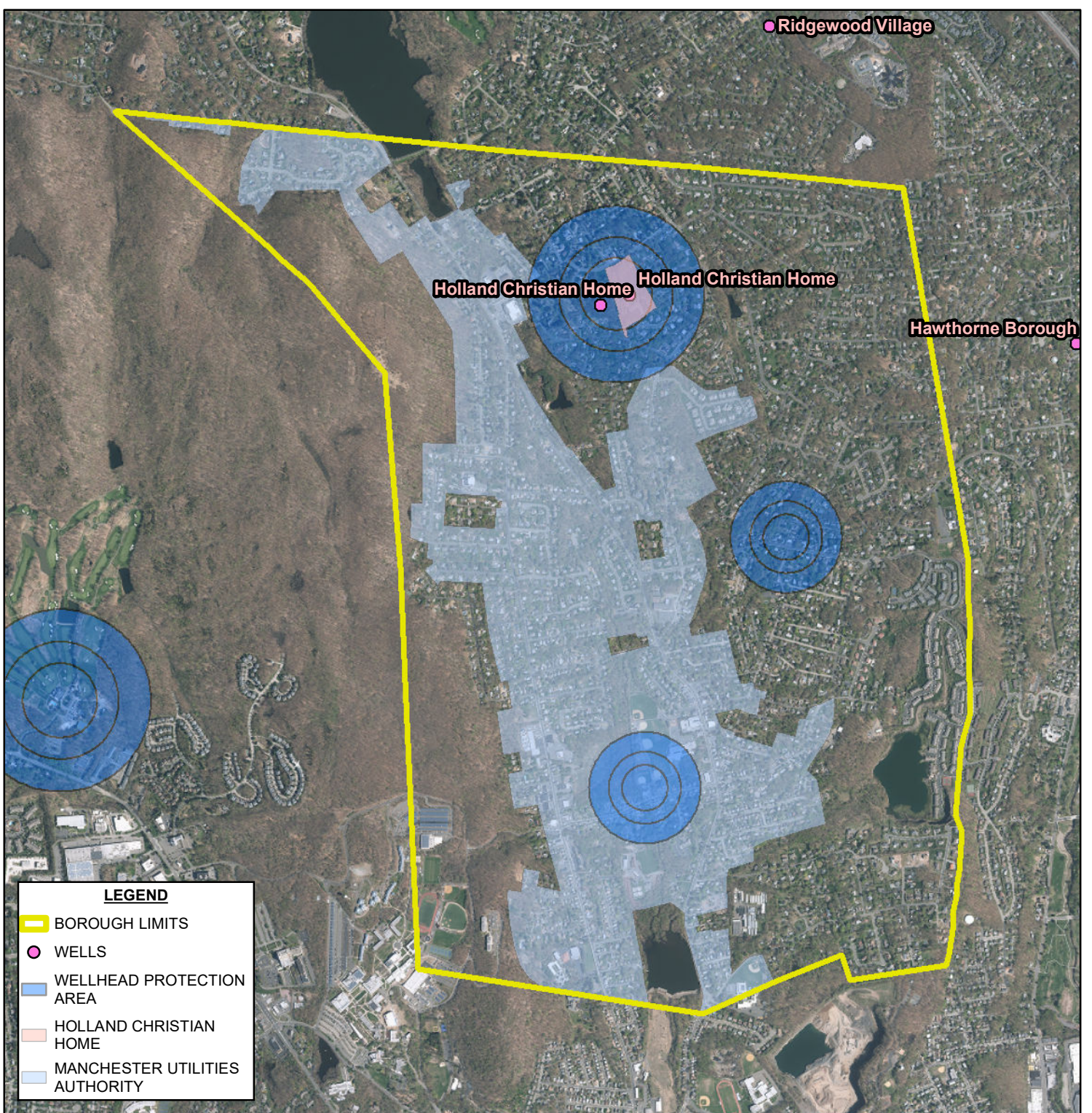
Public Water

Public water purveyors, which can be government agencies, private companies, or quasi-government entities, are subject to regulation by the NJDEP Bureau of Safe Drinking Water under the Safe Drinking Water Act. Public Community Water Supply (PCWS) wells specifically cater to providing potable water to public communities.

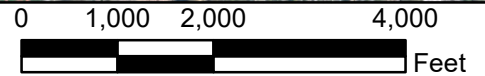
In North Haledon, water services are a mix of sources, including water from the Manchester Utilities Authority (Haledon Water), Public Community Water Supply wells, and private homeowner wells. The locations of public wells and Purveyor Service Areas within North Haledon are illustrated on Figure II-A.

Sewer Service Areas

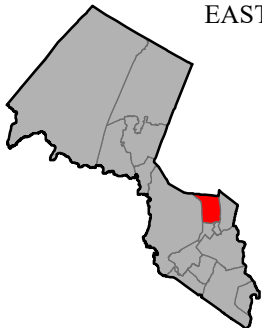
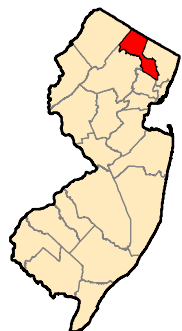
Sewer Service Areas (SSA) delineate the planned approach for wastewater disposal in specific regions. This can involve collection at a regional treatment facility, on-site treatment, discharge to surface or groundwater, or collection through individual subsurface disposal systems. In the developed areas of the Borough of North Haledon, sewer services are provided by the Passaic Valley Sewerage Commission, as depicted in Figure II-B.



SOURCE: NJDEP WELLS, WELLHEAD PROTECTION, AND PURVEYOR SERVICE AREA DATA LAYERS



NORTHING: 775,652
EASTING: 577,771



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330 PHILLIPS AVE., SOUTH HACKENSACK, N.J. 07606

PURVEYOR AND WELL WATER SUPPLY MAP
NATURAL RESOURCES INVENTORY
BOROUGH OF NORTH HALEDON

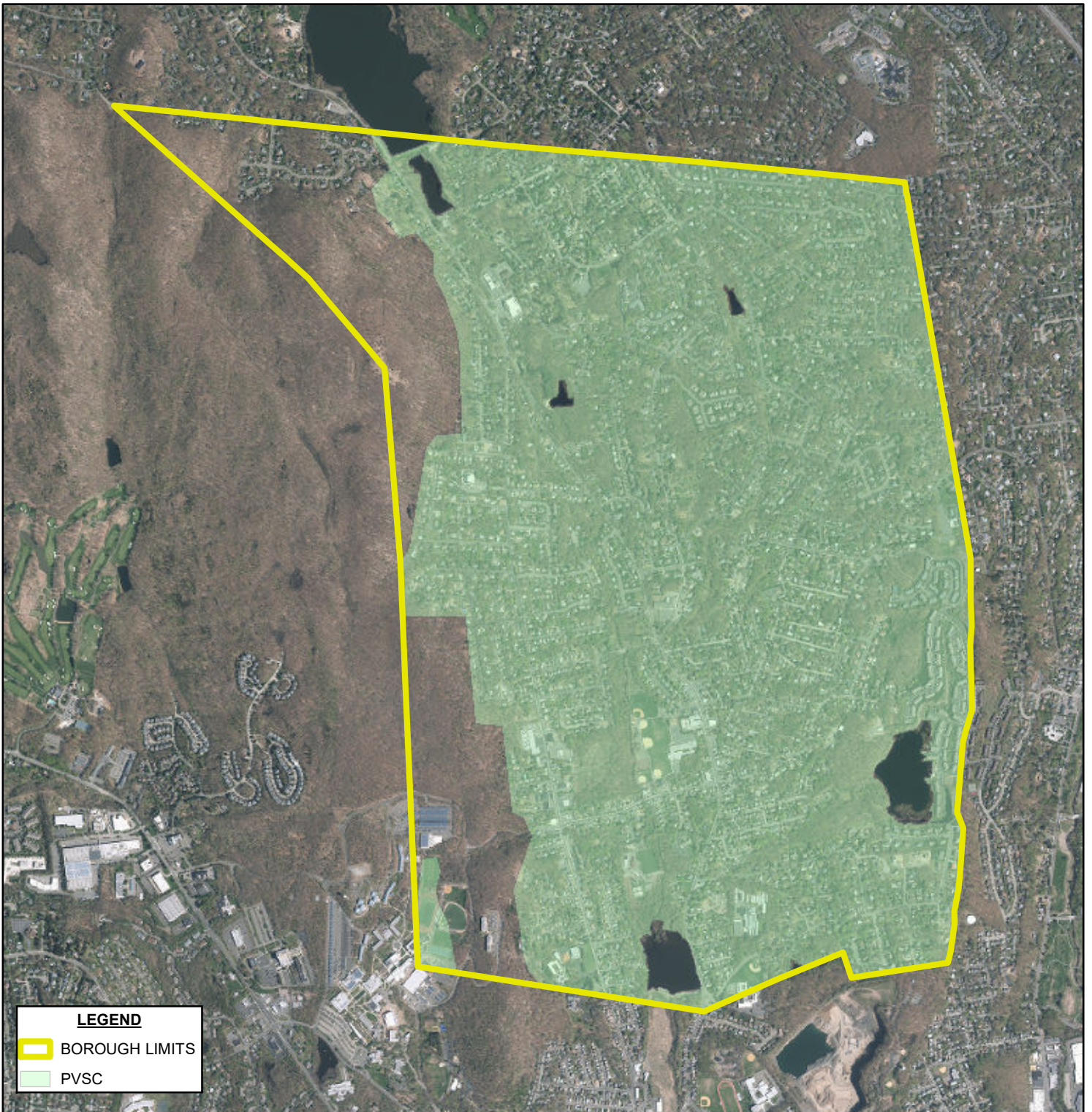
PASSAIC COUNTY

NEW JERSEY



DR. BY: JMW
CKD. BY: FJR

SCALE: 1 IN = 2,000 FT
DATE: NOVEMBER 2023

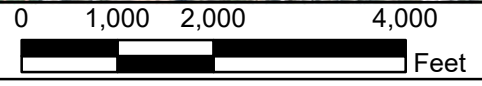
JOB NO. NH-711
FIGURE II-A



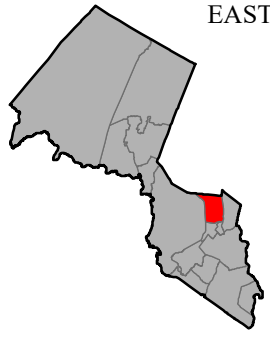
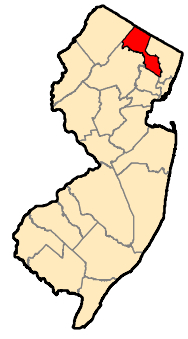
LEGEND

-  BOROUGH LIMITS
-  PVSC

SOURCE: NJDEP STATEWIDE SEWER SERVICE AREA DATA LAYER



NORTHING: 775,652
EASTING: 577,771



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330 PHILLIPS AVE., SOUTH HACKENSACK, N.J. 07606

SEWER SERVICE AREA MAP
NATURAL RESOURCES INVENTORY
BOROUGH OF NORTH HALEDON

PASSAIC COUNTY NEW JERSEY

DR. BY: JMW
CKD. BY: FJR

SCALE: 1 IN = 2,000 FT
DATE: NOVEMBER 2023

JOB NO. NH-711
FIGURE II-B

III. Physiography, Topography, and Geology

A. Physiography

New Jersey is comprised of four physiographic provinces, regions with shared geological history, rock type sequences, and structures. North Haledon falls within the Piedmont physiographic province, situated in the larger Appalachian Highlands, which encompasses the Ridge and Valley, Blue Ridge, Piedmont, and Appalachian Plateau provinces (**Figure III-A**). A summary of New Jersey's geologic history is summarized in **Table III-1**.

In the Precambrian and Paleozoic Eras, the state was submerged in a sea near the equator. Around 400 million years ago, during the latter half of the Paleozoic Era, the collision of Europe and North America formed the towering Appalachian Mountains, surpassing the current elevation of the Rocky Mountains.

The segment of the Appalachian Mountains in New Jersey is identified as the Valley and Ridge Province, marked by extensive, parallel ridges and valleys. This province covers the northwestern portion of New Jersey. To the southeast, it is bordered by the Highlands Province, characterized by a series of ridges composed of resistant metamorphic granite and gneiss rocks. These rocks, resilient to erosion, contribute to the creation of hilly uplands and deep, steep-sided valleys carved by streams.

North Haledon lies entirely within the Piedmont physiographic province, separated from the Highlands Province by significant faults. The Piedmont province spans approximately 125 miles in width and extends around 600 miles from northern New Jersey to Alabama. Among the provinces of the Appalachian Highlands, the Piedmont has the fewest mountains and is recognized for its rolling uplands featuring a handful of monadnocks—prominent hills that stand out from the surface. These remaining monadnocks are composed of exceptionally hard rocks that have resisted erosion. The Piedmont is characterized as a fertile agricultural region with a relatively low, rolling plateau.

The Piedmont province is characterized by a diverse array of highly complex metamorphic and igneous rocks, which, over time, have weathered to create a surface with minimal relief. The predominant metamorphic rocks in this region are schist and gneiss, while the primary igneous rocks are mainly granites that have undergone slight metamorphism. The geological history of the Piedmont involves horst-and-graben faulting, leading to the formation of structural basins filled with Mesozoic sediments, classified as Triassic-Jurassic basins.

These sediments, predominantly of terrestrial origin, have given rise to sandstones and conglomerates containing intriguing features such as dinosaur prints, rain imprints, ripple marks, and fossils of plants and freshwater fish. Notably, these Mesozoic rocks are often interbedded with dark lavas, adding further complexity to the geological composition of the Piedmont province.

The Piedmont is a notable source of valuable geological materials such as kyanite, granite, granite-gneiss, and marble, often used in construction. Historically, the region has played a significant role in the extraction of coal and gold.

Approximately 200 million years ago, during the Jurassic Period of the Mesozoic Era, the breakup of Pangea led to the formation of the Atlantic Ocean. The Piedmont Province is adjacent to the Coastal Plain Province, characterized by a relatively flat landscape and composed of unconsolidated sedimentary formations, including sands, clays, and marls.

Over the past two million years, the climate has undergone alternating periods of cool and warm. These climate fluctuations have contributed to glaciation events in North Haledon and fluctuations in sea levels. At times, the sea covered the coastal plain, while at others, it receded, extending well beyond the present shoreline.

Table III-1: Summary of New Jersey’s Geologic History

Period	Million Years Ago	Description of Climate and Fossils Found in Corresponding Bedrock
Precambrian Era		
	Up to 544	Climate: New Jersey was under the sea. Fossils: stromatolites; most life forms were soft bodied and left no fossils
Paleozoic Era		
Cambrian Period	544 - 505	Climate: New Jersey was close to the equator, covered by warm tropical seas. Fossils: trilobites, brachiopods, stromatolites, worm burrows
Ordovician Period	505 - 440	Climate: New Jersey continued to be underwater, as the sea above deepened to oceanic depths. Fossils: trilobites, brachiopods, coral, nautiloids, clams, crinoids, and snails
Silurian Period	440 - 410	Climate: The sea level rose and fell, with New Jersey remaining at the sea floor. Fossils: coral, brachiopods, clams, brine shrimp, primitive fish, eurypterids (sea scorpions), arthropycus (fossilized feeding burrow made by a worm-like animal)
Devonian Period	410 - 360	Climate: Europe collided with North America, forming the mountains which are now the Ridge and Valley and Highlands provinces of New Jersey. The fossils found continued to be aquatic life forms. Fossils: brachiopods, clams, trilobites, nautiloids, crinoids, coral, snails, stromatoporoids, ostracodes, bryozoa
Mississippian, Pennsylvanian & Permian Periods	360-248	Climate: No geologic record of these time periods is present in New Jersey. At some point, the sea subsided, and New Jersey became dry land, at least in part. Fossils: none
Mesozoic Era		
Triassic Period	248 - 200	Climate: New Jersey was next to Morocco, part of the supercontinent Pangaea. In the dry interior of the continent, the area experienced greater daily and seasonal fluctuations than the coasts. The rugged landscape consisted of high young mountains and deep valleys formed by faults. The brief rainy seasons' flashfloods dropped mud and silt in low areas, where playa lakes formed. In the end of the Triassic the climate became desert-like. The lakes began to dry up and became salty, resulting in an environment where brine shrimp flourished. When a lake went dry, some fish and other aquatic life became fossils. Fossils: dinosaur footprints, thecodonts, fish (including coelacanths), phytosaurs, amphibians, insects, plants

Period	Million Years Ago	Description of Climate and Fossils Found in Corresponding Bedrock
Jurassic Period	200 - 145	<p>Climate: The breakup of Pangaea resulted in the beginning of the Atlantic Ocean. Igneous intrusions (molten rock forced into earlier rock formations) formed diabase and basalt bedrock. Because the terrain was mountainous, the net geologic action was erosion, not deposition.</p> <p>Fossils: There are no late Jurassic deposits in New Jersey; therefore, no fossils exist from this period. However, the fauna probably consisted of the same dinosaurs as the American West, including sauropods, armored dinosaurs, ornithopods (forerunner of hadrosaurus), tenontosaurus (relative of the iguanodon). True flowering plants (angiosperms) appeared at this time.</p>
Cretaceous Period	145 - 65	<p>Climate: Northern New Jersey was above sea level, while southern New Jersey experienced flooding and ebbing. The sea level changed cyclically from deeper to shallower water in this tropical environment. During flooding, greensand marl (glauconite) was formed. During ebbing, clay and sand were deposited.</p> <p>Fossils: Fossil phytoplankton, clams, snails, crustaceans, ammonites, oysters, reptiles, sharks, burrows, worm tubes and vertebrates such as mosasaurs have been found in New Jersey's coastal plain. The fossil dinosaurs found include hadrosaurus (which probably washed downstream during a flood), ornithomimus, <i>Dryptosaurus aquilunguis</i> (a 17' predator with a great hand claw), <i>Hadrosaurus foulkii</i>, and <i>Hadrosaurus minor</i>.</p>
Cenozoic Era		
Tertiary Period	65 - 1.8	<p>Climate: The climate was warm, and the sea level was higher, covering the much of the Coastal Plain.</p> <p>Fossils: Fossils of land animals include birds, such as the diatryma (a giant flightless bird), tillodont (an extinct mammal the size of a bear, but with rodent-like teeth) and possibly others similar to those found in the South Dakota badlands, such as brontotherium, ancestral horses, entelodonts (resembled giant warthogs), diceratherium (semi-aquatic rhinoceros), peccary, prosynthetoceras (a camel), anchitherium (horse), and a primitive doglike carnivore. Fossils found in the Outer Coastal Plain include brachiopods, corals, sponges, clams, sharks, mollusks, crinoids, mammals (probably washed to the sea in floods), crocodiles, snakes, and early whales.</p>
Quaternary Period	1.8 - present	<p>Climate: The climate alternated between cool and warm, resulting in four intervals of glaciation. The glaciers covered northern New Jersey, reaching as far south as Belvidere on the Delaware River. South of the glacial ice, treeless, frozen tundra existed. When water was frozen in glaciers, the sea level was lower, resulting in a shoreline over a hundred miles east of the present coast.</p> <p>Fossils: Fossils of many familiar and some extinct animals have been found in nearby areas. There were insects, turtles, and snakes. Herbivores included squirrels, groundhogs, porcupines, beaver, muskrats, voles, mice, eastern cottontail rabbits, white-tailed deer, peccaries, tapirs, giant ground sloth, the elk-moose, giant beaver, American mastodon, and mammoth. Carnivores included otters, skunks, bobcats, foxes, black bears, coyotes, jaguars, jaguarundi, short-faced bear and a saber-toothed cat.</p>
Sources: USGS, 2008; NJDEP WRM 2012		

B. Topography

Topography serves as a representation of relief features in a specific area. In North Haledon, the elevation varies from around 860 feet above sea level (NAVD 88) near the western border of the Borough around High Mountain to approximately 200 feet above sea level (NAVD 88) near the southern border along Oldham Pond. The topographic map (**Figure III-B**) employs 10-foot contours to showcase the region's topography, which is notably characterized by steep slopes

Steep slopes are particularly susceptible to erosion. As the gradient or percent of slope increases, the velocity of runoff water also rises, intensifying its erosive force. It's important to note that a doubling of the velocity of runoff water doesn't simply double its erosive power; rather, it increases fourfold. This results in the ability to carry 32 times the amount of material of a given particle size compared to lower velocities. The increased force on steep slopes significantly amplifies the erosive potential of runoff water.

Erosion gives rise to several detrimental effects on the environment, including the loss of crucial soil that sustains plants and wildlife, depletion of soil fertility, formation of gullies, reduction in water availability for plant growth and groundwater recharge, sedimentation of streams, and deposition of soil in navigable waters. Sediment carried by erosion contains nutrients, pesticides, and other chemicals, exerting various negative impacts on aquatic life. This sedimentation can bury fish eggs, diminish light accessibility for aquatic plants, and compromise the recreational quality and aesthetics of affected areas.

C. Bedrock Geology

Bedrock constitutes the solid rock beneath the layers of soil and surficial rock. In North Haledon, four distinct bedrock types are present. The borough lies entirely within the Piedmont Province, characterized by soft shales, sandstone, and hard basalt, formed during the late Triassic to early Jurassic periods, approximately 240 to 140 million years ago (Figure III-C).

Late Triassic and Early Jurassic Bedrock of the Piedmont (240 to 140 million years old)

In the late Triassic Period, the fragmentation of the supercontinent Pangaea initiated. As the Highlands experienced uplift, the eastern region shifted downward, giving rise to the Piedmont. The climate during this period was arid, and sediments from the mountains underwent erosion during seasonal heavy rains, depositing in expansive alluvial fans over the plains. These sediments, forming the Newark Supergroup, take on a northeast-trending lens shape and are bounded on the northwest by faults. The cumulative thickness of the Newark basin's layers amounts to approximately 7,500 meters (24,600 feet).

North Haledon is situated on the Brunswick group of the Newark Supergroup. The bedrock in the borough comprises four formations: the Preakness Basalt, Feltville Formation, Orange Mountain Basalt, and Passaic Formation Quartzite-Clast Conglomerate facies (**Table III-2**).

Table III-2: Characteristics of Bedrock Types Found in North Haledon

Geologic Formation	Lithology		Area (acres) in North Haledon	Percent of North Haledon
	General	Detailed		
Jp Preakness Basalt Brunswick	Basalt, fine to coarse grained	Dark-greenish-gray to black, very-fine grained, dense, hard basalt composed mostly of intergrown calcic plagioclase and clinopyroxene (pigeonite and augite). Crystals are generally less than 1 mm (0.04 inches) long, but locally feldspar crystals are larger than 1.3 cm (0.5 inches). Small spherical to tubular cavities (gas-escape vesicles) may be filled by zeolite minerals or calcite. Thickness ranges from 250 meters (820 feet) to 320 meters (1,050 feet).	361.125	16.00
Jf Feltville Formation Brunswick	Sandstone, siltstone, silty mudstone, fine- to coarse grained, and less abundant calcareous siltstone and mudstone, carbonaceous limestone	Interbedded brownish-red to light-grayish red, fine to coarse grained sandstone, and silty mudstone, with a maximum thickness about 155 meters (510 feet). Where the formation came in contact with the Preakness Basalt, the rocks metamorphosed into hornfels. Near the base are layers that contain abundant fish, reptile, invertebrate, and plant fossils.	937.723	41.55
Jo Orange Mountain Basalt Brunswick	Basalt, fine to medium grained	Dark-greenish-gray to greenish-black basalt composed mostly of calcic plagioclase and clinopyroxene (augite and pigeonite); crystals are generally less than 1mm (0.04 in) long. Lower and middle flows are generally massive or have columnar jointing. Uppermost flow has pillow structures and pahoehoe (lava with smooth ropy surface, formed from fluid, fast-moving lava). Tops and bottoms of flow layers are pitted. Maximum thickness is about 182 meters (597 feet).	958.080	42.44
JTrpcq Passaic Formation Quartzite-clast Conglomerate facies Brunswick	Pebble conglomerate, pebbly sandstone, sandstone, medium to coarse grained	Reddish-brown pebble conglomerate, pebbly sandstone, and sandstone in upward-fining sequences 1 to 2 m (3-6 ft) thick. Clasts are subangular to subrounded, quartz and quartzite in sandstone matrix. Sandstone is medium to coarse grained, feldspathic (up to 20 percent feldspar), and locally contains pebble and cobble layers. Conglomerate thickness exceeds 850 m (2,790 ft).	0.160	0.01
Total:			2257.088	100.00
Sources: NJGS, 2007; Drake et al, 1996				

D. Radon

The natural decay of uranium and thorium produces radon gas, a known cause of lung cancer. Radon can accumulate in enclosed spaces, such as homes, reaching unhealthy levels. Due to the potential health risks, both the U.S. Environmental Protection Agency (EPA) and the NJDEP recommend mitigation if radon levels are ≥ 4 pCi/L (picocuries per liter).

The Triassic-Jurassic rocks in the Piedmont Province can contain high levels of radon. Radioactive minerals are more concentrated in granite, near faults, and in lake-bed formations. Cambrian and Ordovician rocks are the primary sources of elevated radon levels in New Jersey, with over 50% of homes exceeding 4 pCi/L. The southern Piedmont Province also experiences elevated radon, with 32% exceeding 4 pCi/L. In contrast, only 6% of homes in the northern Piedmont exceed the recommended radon limit, partly due to glacial materials covering the bedrock. Therefore, the Borough of North Haledon is classified as Tier 2, indicating moderate radon potential (see **Figure III-D**).

E. Surficial Geology

Surficial geology pertains to unconsolidated sediments overlaying bedrock formations and serving as the parent material for soils. In North Haledon, these deposits involve materials left by glaciers, comprising glacial-stream sand and gravel deposits, typically less than 40 feet thick. Additionally, artificial till, alluvial, and swamp deposits of post-glacial age are present, generally less than 20 feet deep.

Glacial and Post-Glacial Deposits

In the last 1.5 million years of the Pleistocene epoch, New Jersey's climate fluctuated from arctic to temperate or subtropical. The region experienced the advance and retreat of continental ice sheets, reaching thicknesses of up to 10,000 feet, in at least three cycles. While the pre-Illinoian (800,000 years ago) and Illinoian (150,000 years ago) glaciers likely covered what is now Passaic County, evidence of these earlier glaciations has been erased by the most recent glaciation, the Wisconsinan, occurring approximately 21,000 years ago.

Glacial deposits in North Haledon consist of two main types: till and stratified sediments. Till is a poorly sorted, non-stratified sediment directly deposited by glacial ice or sediment flows from glacial ice. Stratified sediments are well-sorted and include sand and gravel deposited by glacial melt in river plains, glacial lake deltas, and fans. This category also encompasses silt, clay, and fine sand deposited on the beds of glacial lakes, along with moderately to poorly sorted sand and gravel in ice-walled basins and ponds.

Post-glacial deposits, formed since the retreat of the Wisconsinan glacier approximately 18,000 years ago, are also present. For further details, refer to **Table III-3** and **Figure III-E** for a summary of North Haledon's surficial geology.

Table: III-3: Characteristics of Surficial Geology Found in North Haledon

Abbreviation	Deposit Type	Lithology	Geologic Age*	Notes	Area (Acres)
Qal	Alluvium	Sand, gravel, silt, minor clay and peat; reddish brown, yellowish brown, brown, gray. As much as 20 feet thick.	Holocene and late Pleistocene	Contains variable amounts of organic matter. Deposited in modern floodplains and channels.	48.827
Qwtn	Netcong Till	Silty sand to sandy silt with some to many pebbles and cobbles and some to many boulders; pale brown, yellowish brown, light gray. As much as 200 feet thick, generally less than 30 feet thick.	Late Pleistocene, late Wisconsinan	Deposited directly from glacial ice during the late Wisconsinan glaciation.	58.997
Qwic	Ice-Contact Deposits	Sand, pebble-to-cobble gravel, few to some boulders, minor silt; yellowish brown to reddish brown. As much as 150 feet thick.	Late Pleistocene, late Wisconsinan	Form knolls and ridges higher than adjacent glacial-lake levels or glaciofluvial plains. Deposited in ice-walled basins during the late Wisconsinan glaciation.	10.364
Qst	Postglacial Stream Terrace Deposits	Sand, silt, pebble-to-cobble gravel; yellowish brown to reddish brown. As much as 20 feet thick.	Holocene and late Pleistocene	Form stream terraces with surfaces up to 40 feet above the modern floodplain. Where more than one terrace occurs, the youngest is designated Qst1; the older, higher terrace is Qst2. Laid down after late Wisconsinan glacial deposition ended.	4.299
Qwde	Late Wisconsinan Glacial Delta Deposits	Sand, pebble-to-cobble gravel, minor silt; yellowish brown, reddish brown, light gray. As much as 150 feet thick.	Late Pleistocene, late Wisconsinan	Deposited in deltas and other ice-contact landforms in glacial lakes during the late Wisconsinan glaciation.	7.539
Qwft	Late Wisconsinan Glaciofluvial Terrace Deposits	Sand, pebble-to-cobble gravel, minor silt; yellowish brown to reddish brown. As much as 40 feet thick.	Late Pleistocene, late Wisconsinan	Form terraces deposited by glacial streams during the late Wisconsinan glaciation.	21.315
Qwtr	Rahway Till	Clayey silt to sandy silt with some to many pebbles and cobbles and few boulders; reddish brown, reddish yellow, yellowish brown, brown. As much as 100 feet thick, generally less than 40 feet thick.	Late Pleistocene, late Wisconsinan	Deposited directly from glacial ice during the late Wisconsinan glaciation.	2080.283
Total:					2231.624

*Note on Geologic time periods:

Pleistocene: 2.6 million years ago – 117,000 years

ago Holocene: 117,000 years ago – present

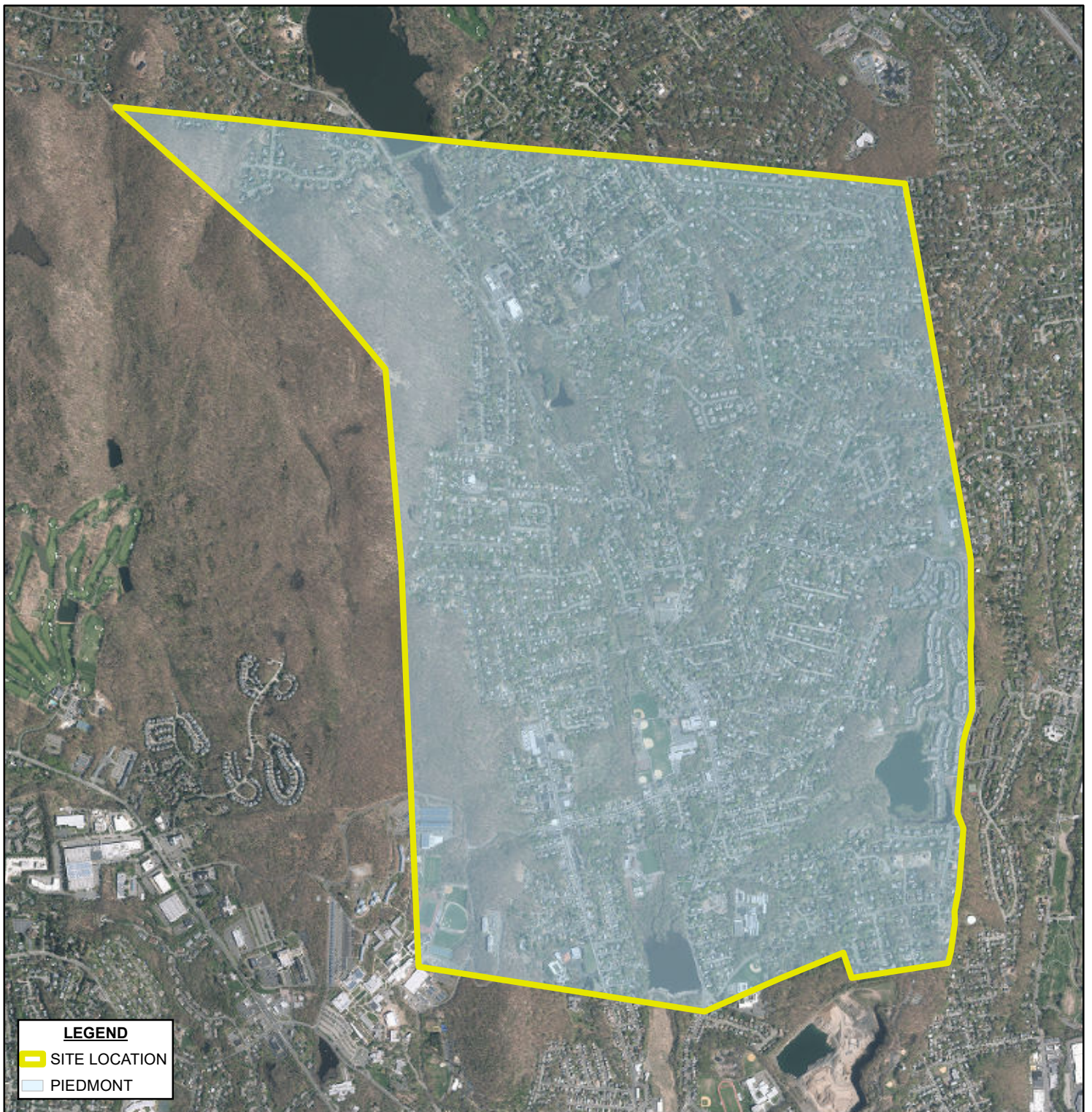
Wisconsinan glaciation: 21,000 years ago

Source: NJGS, 2013



F. Historic Fill

Historic fill, as defined by the NJDEP, refers to non-indigenous material deliberately placed on a site to alter its topographic elevation. These areas of historic fill have been mapped by the NJDEP, in accordance with the Brownfield and Contaminated Site Remediation Act (N.J.S.A. 58:10B-1 et seq.). While urban and suburban areas often contain a layer of excavated indigenous soil mixed with various amounts of non-indigenous material, this material generally does not qualify as historic fill. Additionally, some historic fill areas may not be evident on aerial photography or archival maps, particularly along streams in urban and suburban regions.

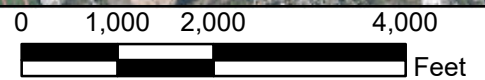
Artificial fill includes a range of materials such as sand, gravel, silt, clay, rock fragments, and man-made items like cinders, ash, brick, concrete, wood, slag, asphalt, metal, glass, and trash. The color of artificial fill varies based on its composition but is typically dark brown, gray, or black. It can reach thicknesses of up to 40 feet but is generally less than 20 feet thick. The locations of historic fill areas in North Haledon are depicted on **Figure III-F**.



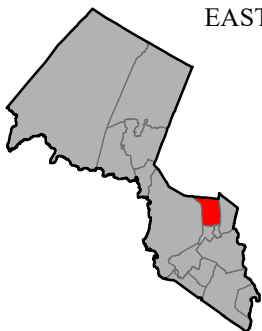
LEGEND

-  SITE LOCATION
-  PIEDMONT

SOURCE: NJDEP PHYSIOGRAPHIC PROVINCES DATA LAYER



NORTHING: 775,652
EASTING: 577,771



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PHYSIOGRAPHIC PROVINCES MAP
NATURAL RESOURCES INVENTORY
BOROUGH OF NORTH HALEDON

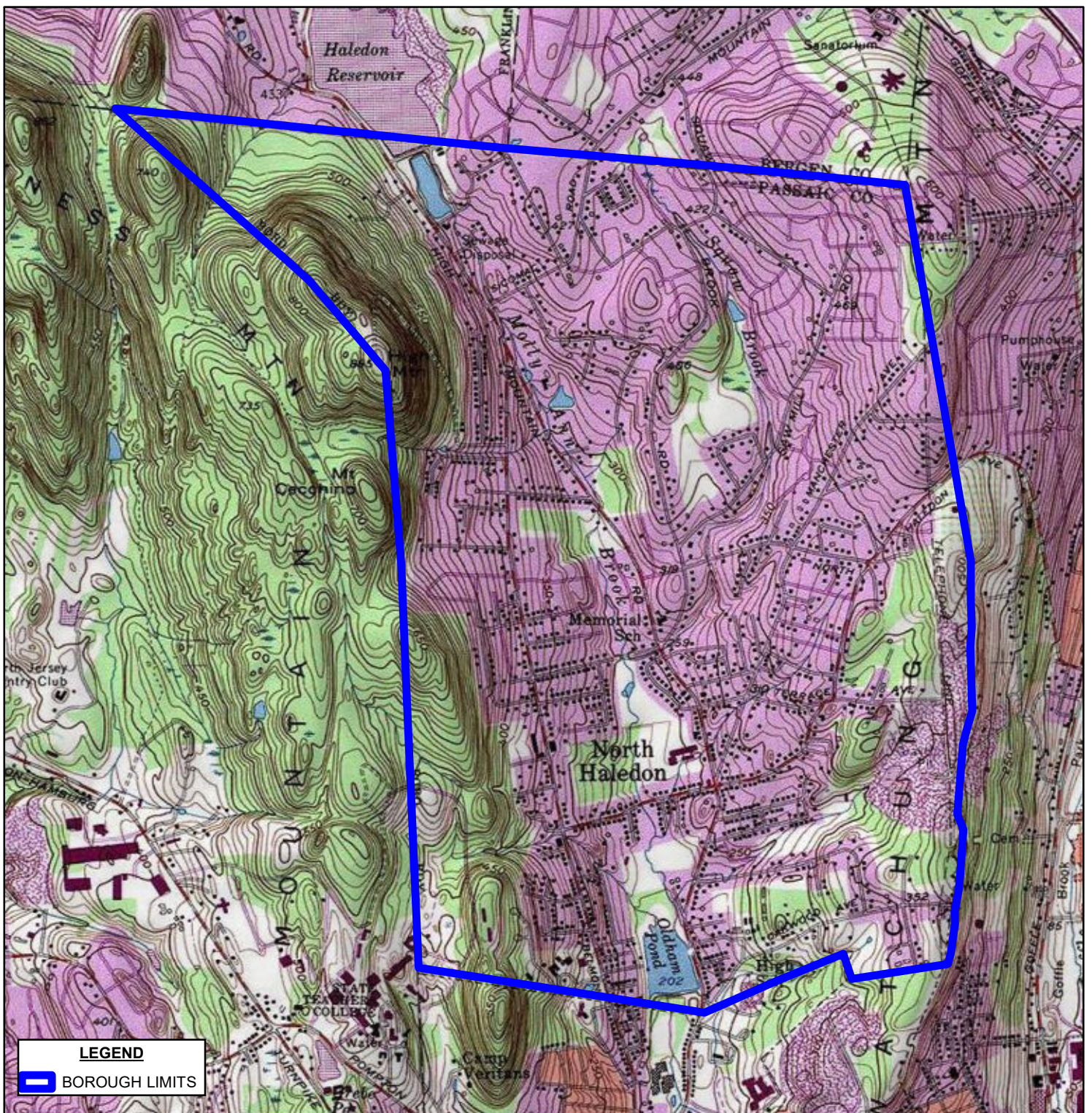
PASSAIC COUNTY

NEW JERSEY

DR. BY: JMW
CKD. BY: FJR

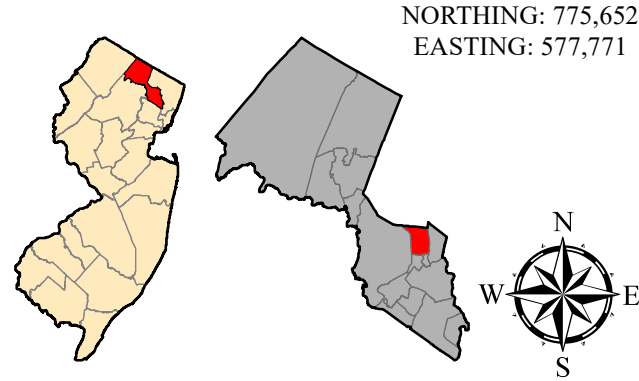
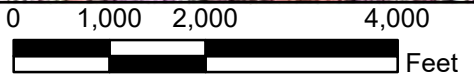
SCALE: 1 IN = 2,000 FT
DATE: NOVEMBER 2023


JOB NO. NH-711
FIGURE III-A

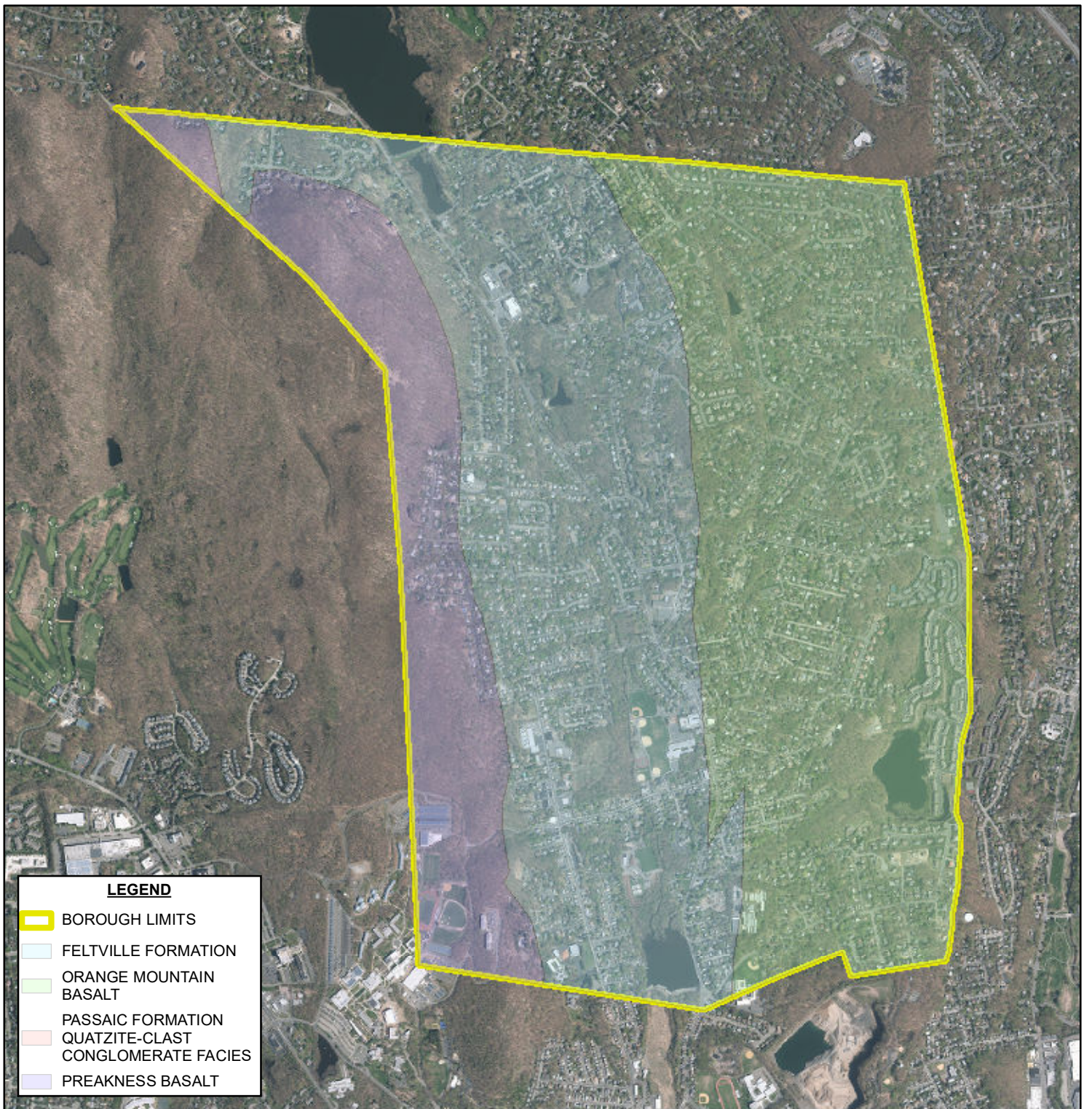


LEGEND
 BOROUGH LIMITS

SOURCE: UNITED STATES GEOLOGICAL SURVEY (USGS)
 PATERSON QUADRANGLE



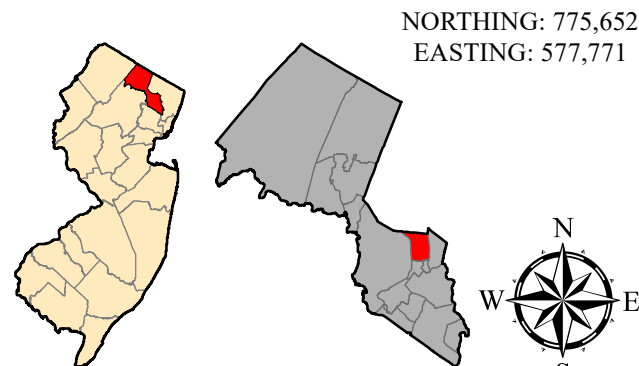
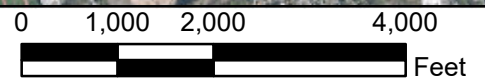
 BOSWELL ENGINEERING 330 PHILLIPS AVE., SOUTH HACKENSACK, N.J. 07606		
USGS TOPOGRAPHIC MAP NATURAL RESOURCES INVENTORY BOROUGH OF NORTH HALEDON		
PASSAIC COUNTY		NEW JERSEY
DR. BY: JMW CKD. BY: FJR	SCALE: 1 IN = 2,000 FT DATE: NOVEMBER 2023	JOB NO. NH-711 FIGURE III-B



LEGEND

- BOROUGH LIMITS
- FELTVILLE FORMATION
- ORANGE MOUNTAIN BASALT
- PASSAIC FORMATION
- QUATZITE-CLAST CONGLOMERATE FACIES
- PREAKNESS BASALT

SOURCE: NJDEP BEDROCK GEOLOGY DATA LAYER



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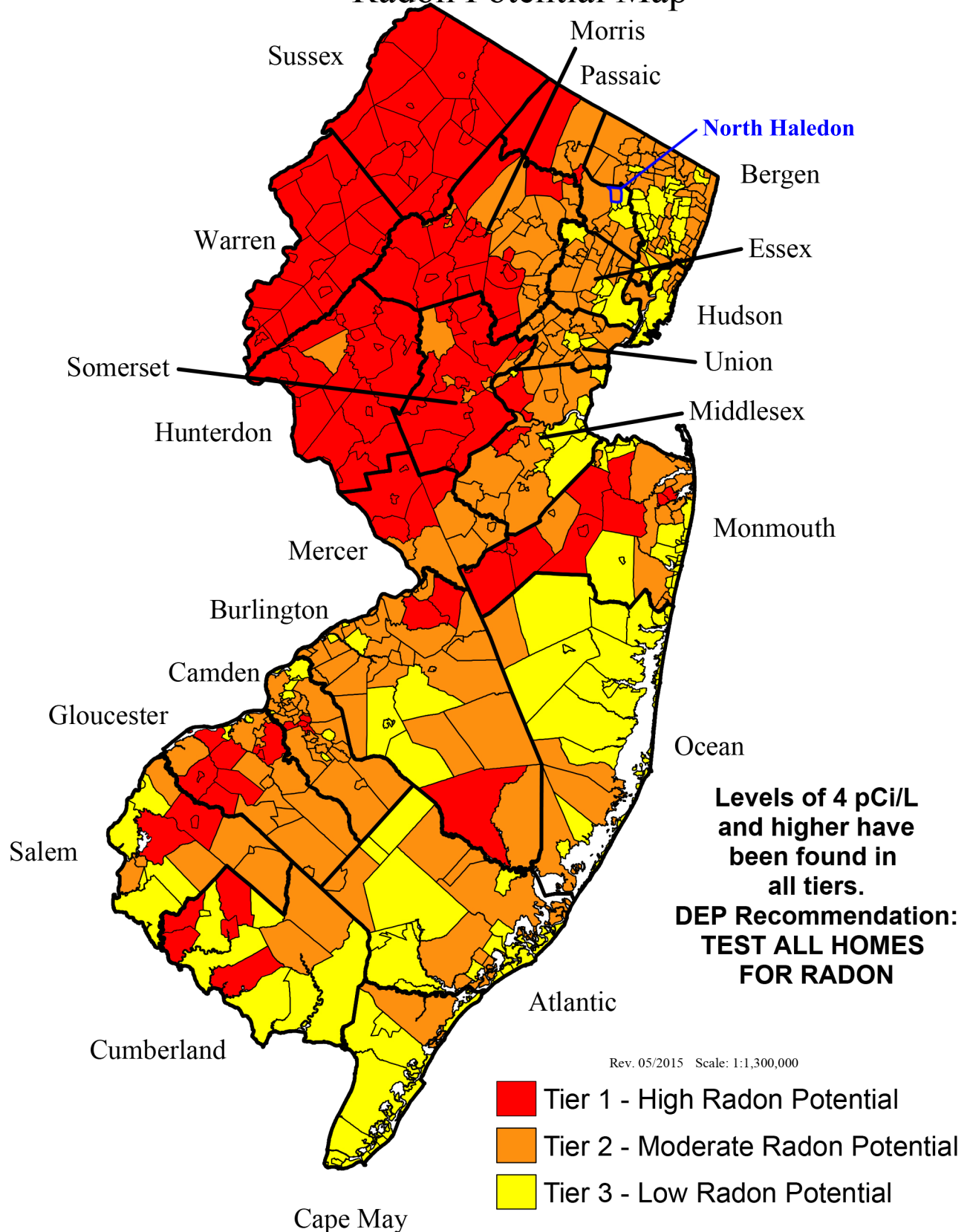
BEDROCK GEOLOGY MAP
NATURAL RESOURCES INVENTORY
 BOROUGH OF NORTH HALEDON

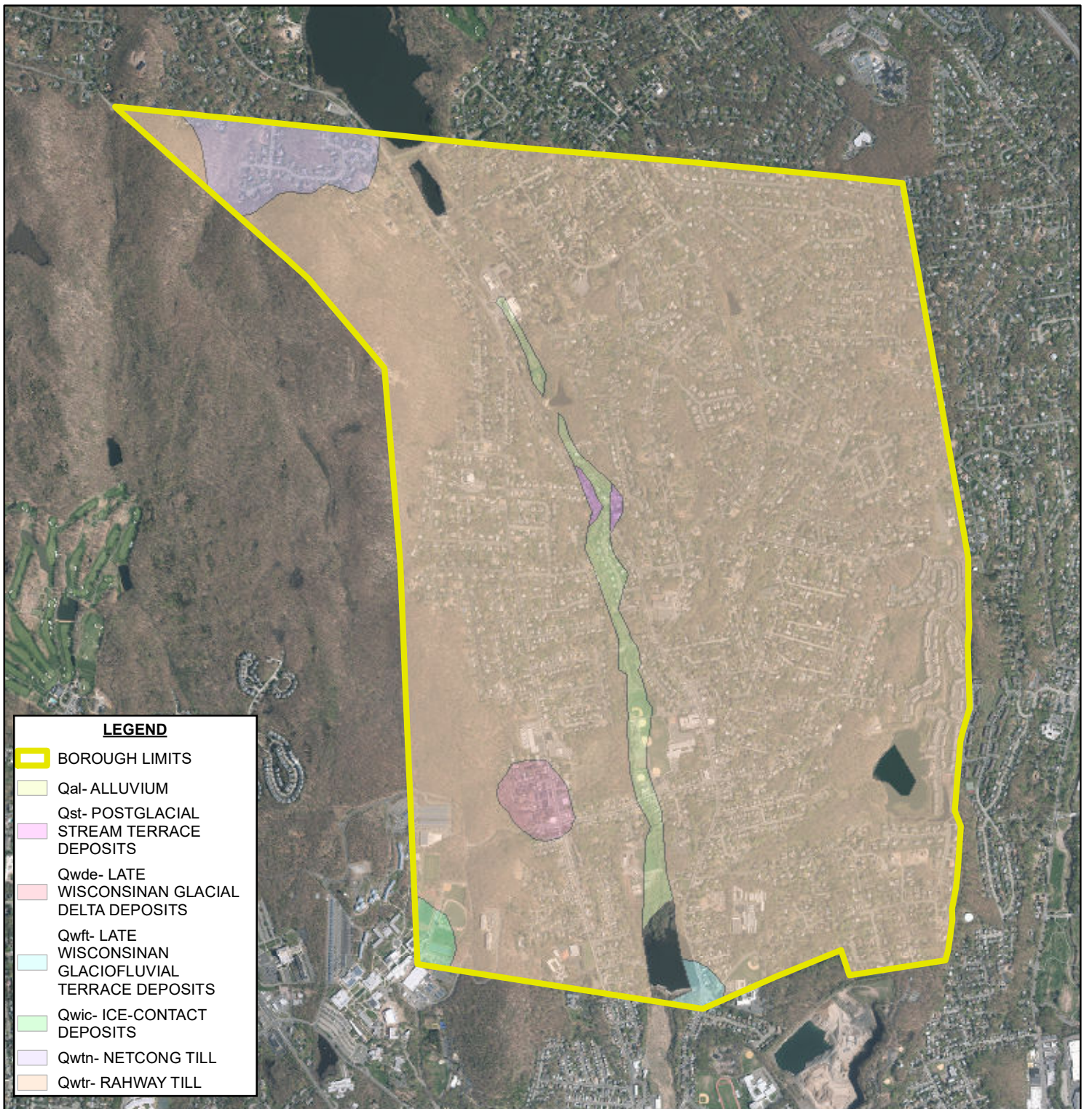
PASSAIC COUNTY NEW JERSEY

DR. BY: JMW CKD. BY: FJR	SCALE: 1 IN = 2,000 FT DATE: NOVEMBER 2023	JOB NO. NH-711 FIGURE III-C
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Figure III-D New Jersey Department of Environmental Protection Radon Potential Map

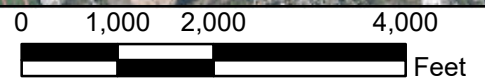




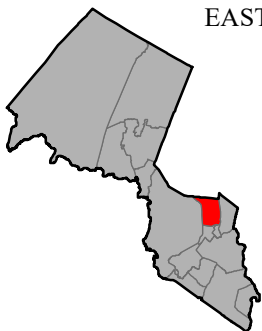
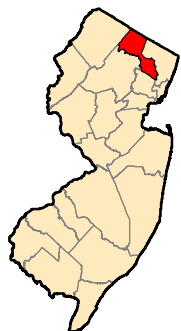
LEGEND

- BOROUGH LIMITS
- Qal- ALLUVIUM
- Qst- POSTGLACIAL STREAM TERRACE DEPOSITS
- Qwde- LATE WISCONSINAN GLACIAL DELTA DEPOSITS
- Qwft- LATE WISCONSINAN GLACIOFLUVIAL TERRACE DEPOSITS
- Qwic- ICE-CONTACT DEPOSITS
- Qwth- NETCONG TILL
- Qwtr- RAHWAY TILL

SOURCE: NJDEP SURFICIAL GEOLOGY DATA LAYER



NORTHING: 775,652
EASTING: 577,771



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**SURFICIAL GEOLOGY MAP
NATURAL RESOURCES INVENTORY
BOROUGH OF NORTH HALEDON**

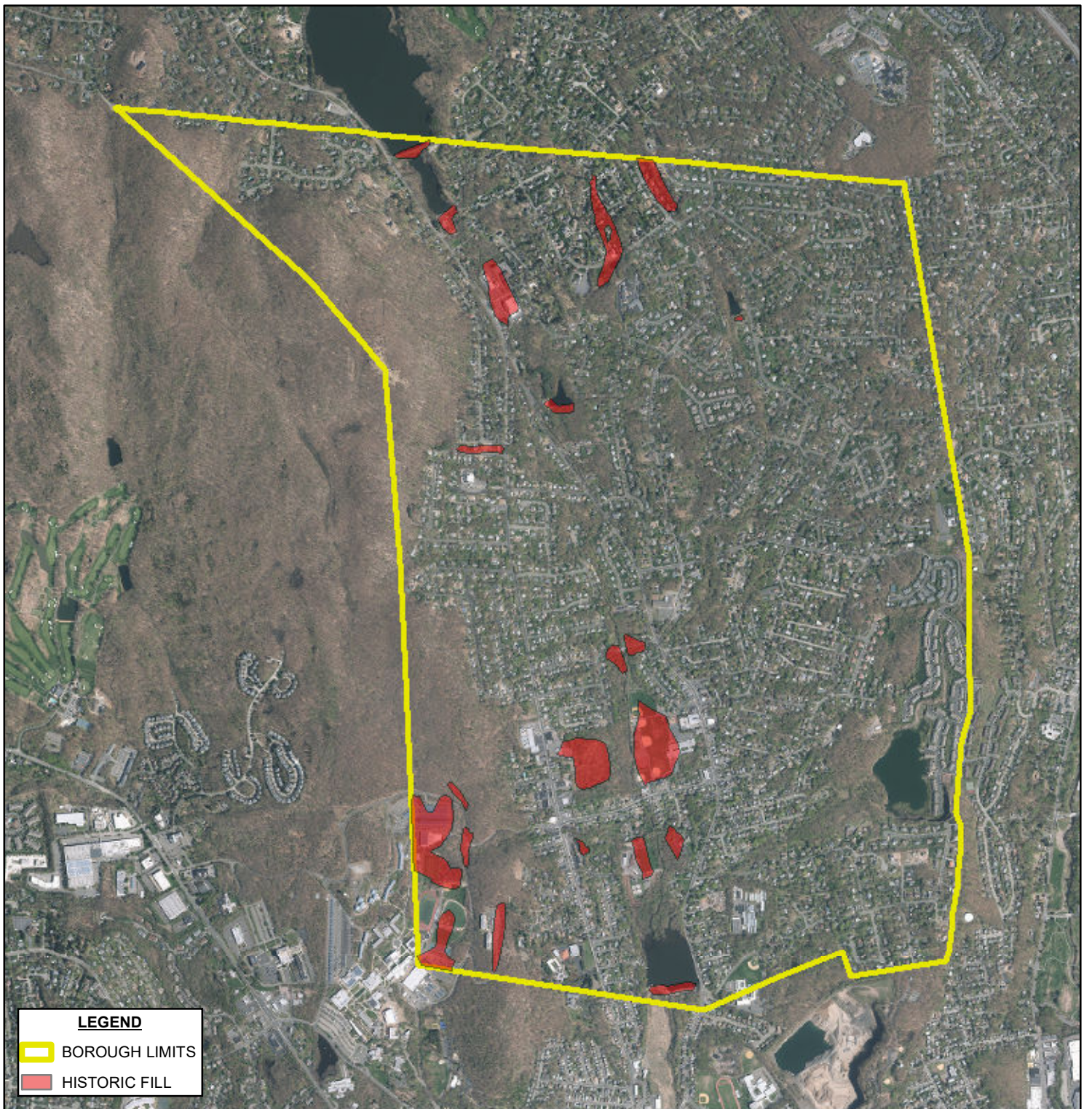
PASSAIC COUNTY

NEW JERSEY

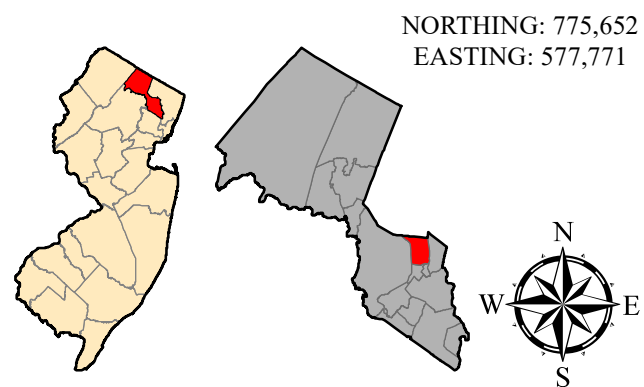
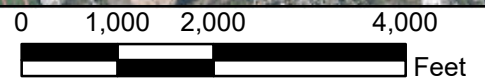
DR. BY: JMW
CKD. BY: FJR

SCALE: 1 IN = 2,000 FT
DATE: NOVEMBER 2023

JOB NO. NH-711
FIGURE III-E



SOURCE: : SSURGO SOIL SURVEY OF PASSAIC COUNTY



BOSWELL ENGINEERING

330 PHILLIPS AVE., SOUTH HACKENSACK, N.J. 07606

HISTORIC FILL MAP
NATURAL RESOURCES INVENTORY
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PASSAIC COUNTY

NEW JERSEY

DR. BY: JMW
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FIGURE III-F

IV. Soils

A. Soil Survey Maps

Soil is the unconsolidated mineral material on the immediate surface of the earth, serving as the medium for the growth of land plants and playing an essential role in collecting and purifying water as it enters the groundwater. The characteristics of different soil types are shaped by various factors, including their parent materials, climate, macroorganisms and microorganisms, and topography.

The USDA Natural Resources Conservation Service (NRCS) offers technical assistance grounded in sound science for the conservation and management of soil, water, and other natural resources. This support is extended to private landowners as well as local, state, and federal agencies and policymakers.

Soil surveys provided by the USDA NRCS involve creating an inventory of soil resources to understand soil characteristics and capabilities. These surveys are instrumental in identifying optimal ways to preserve soil and water quality through conservation practices and determining which areas are suitable for various land uses. The goal of soil mapping is to categorize the landscape into segments with similar use and management requirements. The Soil Survey Geographic Database (SSURGO) information indicates that field investigations and data collection were conducted with sufficient detail to name map units and accurately identify areas of about 5 acres. However, for determining intensive uses and managing farms and wetlands, on-site sampling, testing, and detailed studies of specific sites are essential.

B. Soil Series and Map Units

Soil characteristics, including slope, depth, drainage, and erodibility, play a crucial role in land management. A soil series is a fundamental unit of soil classification, representing soils that are similar but may differ in certain attributes like surface texture, stoniness, or slope. A map unit is an area on a soil map dominated by one major soil type and named according to the classification of the dominant soil(s). However, natural variability exists in soils, and some observed properties may extend beyond defined limits for a class.

The NRCS provides both estimated and measured data on physical and chemical soil properties, offering interpretations for various purposes such as engineering, water management, recreation, agronomy, woodland, range, and wildlife use. In North Haledon, there are 5 soil series and a total of 23 different map units, each described below based on USGS definitions. (**Figure IV-A** provides a visual representation of these map units.)

C. Map Unit Descriptions

BogC - Boonton loam, 8 to 15 percent slopes

Component: Boonton (90%)

The Boonton component makes up 90 percent of the map unit. Slopes are 8 to 15 percent. This component is on ground moraines on till plains. The parent material consists of coarse-loamy basal till derived from basalt. Depth to a root restrictive layer, fragipan, is 20 to 36 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 85 percent. Below this thin organic horizon, the organic matter content is about 3 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Component: Boonton, moderately well drained (5%)

Generated brief soil descriptions are created for major soil components. The Boonton, moderately well drained soil is a minor component.

Component: Haledon (5%)

Generated brief soil descriptions are created for major soil components. The Haledon soil is a minor component.

BohBb - Boonton moderately well drained gravelly loam, 0 to 8 percent slopes, very stony

Map Unit: BohBb—Boonton moderately well drained gravelly loam, 0 to 8 percent slopes, very stony

Component: Boonton, moderately well drained, very stony (85%)

The Boonton, moderately well drained, very stony component makes up 85 percent of the map unit. Slopes are 0 to 8 percent. This component is on ground moraines on till plains. The parent material consists of coarse-loamy basal till derived from basalt. Depth to a root restrictive layer inches, fragipan. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria.

Component: Riverhead (5%)

Generated brief soil descriptions are created for major components. The Riverhead soil is a minor component.

Component: Holyoke (5%)

Generated brief soil descriptions are created for major components. The Holyoke soil is a minor component.

Component: Haledon, very stony (5%)

Generated brief soil descriptions are created for major components. The Haledon soil is a minor component.

BohCb - Boonton moderately well drained gravelly loam, 8 to 15 percent slopes, very stony

Map Unit: BohCb—Boonton moderately well drained gravelly loam, 8 to 15 percent slopes, very stony

Component: Boonton, moderately well drained, very stony (85%)

The Boonton, moderately well drained, very stony component makes up 85 percent of the map unit. Slopes are 8 to 15 percent. This component is on ground moraines on till plains. The parent material consists of coarse-loamy basal till derived from basalt. Depth to a root restrictive layer inches, fragipan. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria.

Component: Riverhead (5%)

Generated brief soil descriptions are created for major components. The Riverhead soil is a minor component.

Component: Holyoke (5%)

Generated brief soil descriptions are created for major components. The Holyoke soil is a minor component.

Component: Haledon, very stony (5%)

Generated brief soil descriptions are created for major components. The Haledon soil is a minor component.

BonBa - Boonton silt loam, 3 to 8 percent slopes, stony

Map Unit: BonBa—Boonton silt loam, 3 to 8 percent slopes, stony

Component: Boonton, stony (85%)

The Boonton, stony component makes up 85 percent of the map unit. Slopes are 3 to 8 percent. This component is on ground moraines on till plains. The parent material consists of coarse-loamy basal till derived from basalt. Depth to a root restrictive layer, fragipan, is 24 to 36 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 30 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 4s. This soil does not meet hydric criteria.

Component: Haledon (10%)

Generated brief soil descriptions are created for major components. The Haledon soil is a minor component.

Component: Holyoke, rocky (5%)

Generated brief soil descriptions are created for major components. The Holyoke soil is a minor component.

BonCa - Boonton silt loam, 8 to 15 percent slopes, stony

Map Unit: BonCa—Boonton silt loam, 8 to 15 percent slopes, stony

Component: Boonton, stony (85%)

The Boonton, stony component makes up 85 percent of the map unit. Slopes are 8 to 15 percent. This component is on ground moraines on till plains. The parent material consists of coarse-loamy basal till derived from basalt. Depth to a root restrictive layer, fragipan, is 24 to 36 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 30 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria.

Component: Haledon (10%)

Generated brief soil descriptions are created for major components. The Haledon soil is a minor component.

Component: Holyoke, rocky (5%)

Generated brief soil descriptions are created for major components. The Holyoke soil is a minor component.

BonDb - Boonton silt loam, 15 to 35 percent slopes, very stony

Map Unit: BonDb—Boonton silt loam, 15 to 35 percent slopes, very stony

Component: Boonton, very stony (85%)

The Boonton, very stony component makes up 85 percent of the map unit. Slopes are 15 to 30 percent. This component is on ground moraines on till plains. The parent material consists of coarse-loamy basal till derived from basalt. Depth to a root restrictive layer, fragipan, is 24 to 36 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 30 inches during January, February, March, April,

May, November, December. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria.

Component: Haledon, very stony (10%)

Generated brief soil descriptions are created for major components. The Haledon soil is a minor component.

Component: Holyoke, rocky (5%)

Generated brief soil descriptions are created for major components. The Holyoke soil is a minor component.

BorE - Boonton moderately well drained-Rock outcrop complex, 25 to 45 percent slopes

Map Unit: BorE—Boonton moderately well drained-Rock outcrop complex, 25 to 45 percent slopes

Component: Boonton, moderately well drained, very stony (55%)

The Boonton, moderately well drained, very stony component makes up 55 percent of the map unit. Slopes are 25 to 35 percent. This component is on ground moraines on till plains. The parent material consists of coarse-loamy till derived from basalt. Depth to a root restrictive layer inches, fragipan. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 24 inches during January, February, March, April, May, November, December. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria.

Component: Rock outcrop (30%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Component: Holyoke, rocky (10%)

Generated brief soil descriptions are created for major components. The Holyoke soil is a minor component.

Component: Haledon, very stony (5%)

Generated brief soil descriptions are created for major components. The Haledon soil is a minor component.

BouB - Boonton-Urban land complex, 0 to 8 percent slopes

Map Unit: BouB—Boonton-Urban land complex, 0 to 8 percent slopes

Component: Boonton (50%)

The Boonton component makes up 50 percent of the map unit. Slopes are 0 to 8 percent. This component is on ground moraines on till plains. The parent material consists of coarse-loamy basal till derived from basalt. Depth to a root restrictive layer, fragipan, is 20 to 36 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 2e. This soil does not meet hydric criteria.

Component: Urban land, Boonton substratum (40%)

Generated brief soil descriptions are created for major soil components. The Urban land is a miscellaneous area.

Component: Udorthents, Boonton substratum (10%)

Generated brief soil descriptions are created for major components. The Udorthents soil is a minor component.

BouC - Boonton-Urban land complex, 8 to 15 percent slopes

Map Unit: BouC—Boonton-Urban land complex, 8 to 15 percent slopes

Component: Boonton (50%)

The Boonton component makes up 50 percent of the map unit. Slopes are 8 to 15 percent. This component is on till plains, ground moraines. The parent material consists of coarse-loamy basal till derived from basalt. Depth to a root restrictive layer, fragipan, is 20 to 36 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60

inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Component: Urban land, Boonton substratum (40%)

Generated brief soil descriptions are created for major soil components. The Urban land is a miscellaneous area.

Component: Udorthents, Boonton substratum (10%)

Generated brief soil descriptions are created for major components. The Udorthents soil is a minor component.

HakBb - Haledon loam, 0 to 8 percent slopes, very stony

Map Unit: HakBb—Haledon loam, 0 to 8 percent slopes, very stony

Component: Haledon, very stony (85%)

The Haledon, very stony component makes up 85 percent of the map unit. Slopes are 3 to 8 percent. This component is on ground moraines on till plains. The parent material consists of coarse-loamy basal till derived from basalt. Depth to a root restrictive layer, fragipan, is 24 to 36 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 12 inches during January, February, March, April. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria.

Component: Hasbrouck, very stony (5%)

Generated brief soil descriptions are created for major components. The Hasbrouck soil is a minor component.

Component: Pompton (5%)

Generated brief soil descriptions are created for major components. The Pompton soil is a minor component.

Component: Boonton, moderately well drained, very stony (5%)

Generated brief soil descriptions are created for major components. The Boonton soil is a minor component.

HakCb - Haledon loam, 8 to 15 percent slopes, very stony

Map Unit: HakCb—Haledon loam, 8 to 15 percent slopes, very stony

Component: Haledon, very stony (85%)

The Haledon, very stony component makes up 85 percent of the map unit. Slopes are 8 to 15 percent. This component is on ground moraines on till plains. The parent material consists of coarse-loamy basal till derived from basalt. Depth to a root restrictive layer, fragipan, is 24 to 36 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 12 inches during January, February, March, April. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria.

Component: Boonton, moderately well drained, very stony (5%)

Generated brief soil descriptions are created for major components. The Boonton soil is a minor component.

Component: Pompton (5%)

Generated brief soil descriptions are created for major components. The Pompton soil is a minor component.

Component: Holyoke (5%)

Generated brief soil descriptions are created for major components. The Holyoke soil is a minor component.

HamBb - Haledon gravelly loam, 0 to 8 percent slopes, very stony

Map Unit: HamBb—Haledon gravelly loam, 0 to 8 percent slopes, very stony

Component: Haledon, very stony (95%)

The Haledon, very stony component makes up 95 percent of the map unit. Slopes are 3 to 8 percent. This component is on ground moraines on till plains. The parent material consists of coarse-loamy basal till derived from basalt. Depth to a root restrictive layer, fragipan, is 24 to 36 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 12 inches during January, February, March, April. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria.

Component: Hasbrouck, very stony (5%)

Generated brief soil descriptions are created for major components. The Hasbrouck soil is a minor component.

HanB - Haledon silt loam, 3 to 8 percent slopes

Map Unit: HanB—Haledon silt loam, 3 to 8 percent slopes

Component: Haledon (85%)

The Haledon component makes up 85 percent of the map unit. Slopes are 3 to 8 percent. This component is on ground moraines on till plains. The parent material consists of coarse-loamy basal till derived from basalt. Depth to a root restrictive layer, fragipan, is 24 to 36 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 8 inches (depth from the mineral surface is 6 inches) during January, February, March, April, May, December. Organic matter content in the surface horizon is about 81 percent. Below this thin organic horizon, the organic matter content is about 3 percent. Nonirrigated land capability classification is 3w. This soil does not meet hydric criteria.

Component: Boonton, moderately well drained (10%)

Generated brief soil descriptions are created for major components. The Boonton soil is a minor component.

Component: Boonton (5%)

Generated brief soil descriptions are created for major components. The Boonton soil is a minor component.

HasB - Haledon-Urban land complex, 3 to 8 percent slopes

Map Unit: HasB—Haledon-Urban land complex, 3 to 8 percent slopes

Component: Haledon (60%)

The Haledon component makes up 60 percent of the map unit. Slopes are 3 to 8 percent. This component is on ground moraines on till plains. The parent material consists of coarse-loamy basal till derived from basalt. Depth to a root restrictive layer, fragipan, is 24 to 36 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 8 inches during January, February, March, April, May, December. Organic matter content in the surface horizon is about 81 percent. Below this thin organic horizon, the organic matter content is about 3 percent. Nonirrigated land capability classification is 3w. This soil does not meet hydric criteria.

Component: Urban land, Haledon substratum (30%)

Generated brief soil descriptions are created for major soil components. The Urban land is a miscellaneous area.

Component: Udorthents, Haledon substratum (10%)

Generated brief soil descriptions are created for major components. The Udorthents soil is a minor component.

HcsAb - Hasbrouck loam, 0 to 3 percent slopes, very stony

Map Unit: HcsAb—Hasbrouck loam, 0 to 3 percent slopes, very stony

Component: Hasbrouck, extremely stony (85%)

The Hasbrouck, extremely stony component makes up 85 percent of the map unit. Slopes are 0 to 3 percent. This component is on depressions on till plains. The parent material consists of fine-loamy eroded and

redeposited glacial material over glacial till. Depth to a root restrictive layer, fragipan, is 16 to 34 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is occasionally ponded. A seasonal zone of water saturation is at 5 inches during January, February, March, April, May, June, October, November, December. Organic matter content in the surface horizon is about 81 percent. Below this thin organic horizon, the organic matter content is about 4 percent. Nonirrigated land capability classification is 7s. This soil meets hydric criteria.

Component: Natchaug (10%)

Generated brief soil descriptions are created for major components. The Natchaug soil is a minor component.

Component: Haledon, extremely stony (5%)

Generated brief soil descriptions are created for major components. The Haledon soil is a minor component.

HctBb - Hasbrouck silt loam, 0 to 8 percent slopes, very stony

Map Unit: HctBb—Hasbrouck silt loam, 0 to 8 percent slopes, very stony

Component: Hasbrouck, very stony (80%)

The Hasbrouck, very stony component makes up 80 percent of the map unit. Slopes are 0 to 8 percent. This component is on depressions on till plains. The parent material consists of reworked colluvium over till. Depth to a root restrictive layer, fragipan, is 20 to 30 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 6 inches during January, February, March, April, May, June, November, December. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 6w. This soil meets hydric criteria.

Component: Preakness, poorly drained (5%)

Generated brief soil descriptions are created for major components. The Preakness soil is a minor component.

Component: Holyoke (5%)

Generated brief soil descriptions are created for major components. The Holyoke soil is a minor component.

Component: Boonton, moderately well drained, extremely stony (5%)

Generated brief soil descriptions are created for major components. The Boonton soil is a minor component.

Component: Haledon (5%)

Generated brief soil descriptions are created for major components. The Haledon soil is a minor component.

HomC - Holyoke-rock outcrop complex, 3 to 15 percent slopes

Map Unit: HomC—Holyoke-Rock outcrop complex, 3 to 15 percent slopes

Component: Holyoke (80%)

The Holyoke component makes up 80 percent of the map unit. Slopes are 3 to 15 percent. This component is on ridges, till plains, ground moraines, hills. The parent material consists of loamy till derived from basalt. Depth to a root restrictive layer, bedrock, lithic, is 10 to 20 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 80 percent. Below this thin organic horizon, the organic matter content is about 3 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria.

Component: Rock outcrop (15%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Component: Yalesville, extremely stony (5%)

Generated brief soil descriptions are created for major components. The Yalesville soil is a minor component.

QY – Quarries

Map Unit: QY—Quarries

Component: Pits, quarry (95%)

Generated brief soil descriptions are created for major soil components. The Pits, quarry is a miscellaneous area.

Component: Water (5%)

Generated brief soil descriptions are created for major soil components. The Water soil is a minor component.

RNHE - Rock outcrop-Holyoke complex, 15 to 45 percent slopes

Map Unit: RNHE—Rock outcrop-Holyoke complex, 15 to 45 percent slopes

Component: Rock outcrop (60%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Component: Holyoke (40%)

The Holyoke component makes up 40 percent of the map unit. Slopes are 15 to 45 percent. This component is on bedrock-controlled hills on till plains. The parent material consists of loamy till derived from basalt and/or diabase. Depth to a root restrictive layer, bedrock, lithic, is 16 to 20 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches (or restricted depth) is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

USBONB - Urban land-Boonton complex, 0 to 8 percent slopes

Map Unit: USBONB—Urban land-Boonton complex, 0 to 8 percent slopes

Component: Urban land, Boonton substratum (60%)

Generated brief soil descriptions are created for major soil components. The Urban land is a miscellaneous area.

Component: Boonton (30%)

The Boonton component makes up 30 percent of the map unit. Slopes are 3 to 8 percent. This component is on ground moraines on till plains. The parent material consists of red coarse-loamy till derived from sedimentary rock. Depth to a root restrictive layer, fragipan, is 20 to 39 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches (or restricted depth) is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 28 inches (depth from the mineral surface is 26 inches) during January, February, March, April, November, December. Organic matter content in the surface horizon is about 77 percent. Below this thin organic horizon, the organic matter content is about 2 percent. Nonirrigated land capability classification is 2s. This soil does not meet hydric criteria.

Component: Udorthents, Boonton substratum (10%)

Generated brief soil descriptions are created for major soil components. The Udorthents soil is a minor component.

USBONC - Urban land-Boonton complex, 8 to 15 percent slopes

Map Unit: USBONC—Urban land-Boonton complex, 8 to 15 percent slopes

Component: Urban land, Boonton substratum (60%)

Generated brief soil descriptions are created for major soil components. The Urban land is a miscellaneous area.

Component: Boonton (30%)

The Boonton component makes up 30 percent of the map unit. Slopes are 8 to 15 percent. This component is on ground moraines on till plains. The parent material consists of red coarse-loamy till derived from sedimentary rock. Depth to a root restrictive layer, fragipan, is 20 to 39 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches (or restricted depth) is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 28 inches (depth from the mineral surface is 26 inches)

during January, February, March, April, November, December. Organic matter content in the surface horizon is about 77 percent. Below this thin organic horizon, the organic matter content is about 2 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Component: Udorthents, Boonton substratum (10%)

Generated brief soil descriptions are created for major soil components. The Udorthents soil is a minor component.

USRHVB - Urban land-Riverhead complex, 3 to 8 percent slopes

Map Unit: USRHVB—Urban land-Riverhead complex, 3 to 8 percent slopes

Component: Urban land (60%)

Generated brief soil descriptions are created for major soil components. The Urban land is a miscellaneous area.

Component: Riverhead (40%)

The Riverhead component makes up 40 percent of the map unit. Slopes are 3 to 8 percent. This component is on outwash fans on outwash plains. The parent material consists of glaciofluvial deposits derived from granite and gneiss. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 2s. This soil does not meet hydric criteria.

WATER – Water

Map Unit: WATER—Water

Component: Water (100%)

Generated brief soil descriptions are created for major soil components. The Water is a miscellaneous area.

D. Soil Quality

Soils are composed of horizontal layers called horizons, and their natural capacity to function varies. Soil quality is defined as a soil type's ability to sustain plant and animal productivity, maintain or enhance water and air quality, and support human health and habitation. Inherent soil qualities are unalterable and determined by factors like climate, parent material, topography, time, and biota. On the other hand, dynamic soil qualities, including physical, chemical, and biological properties, can be influenced by human use. Evaluating soil quality involves comparing soils to a reference condition that represents the full capacity for a specific function or to a baseline for management-dependent soil properties.

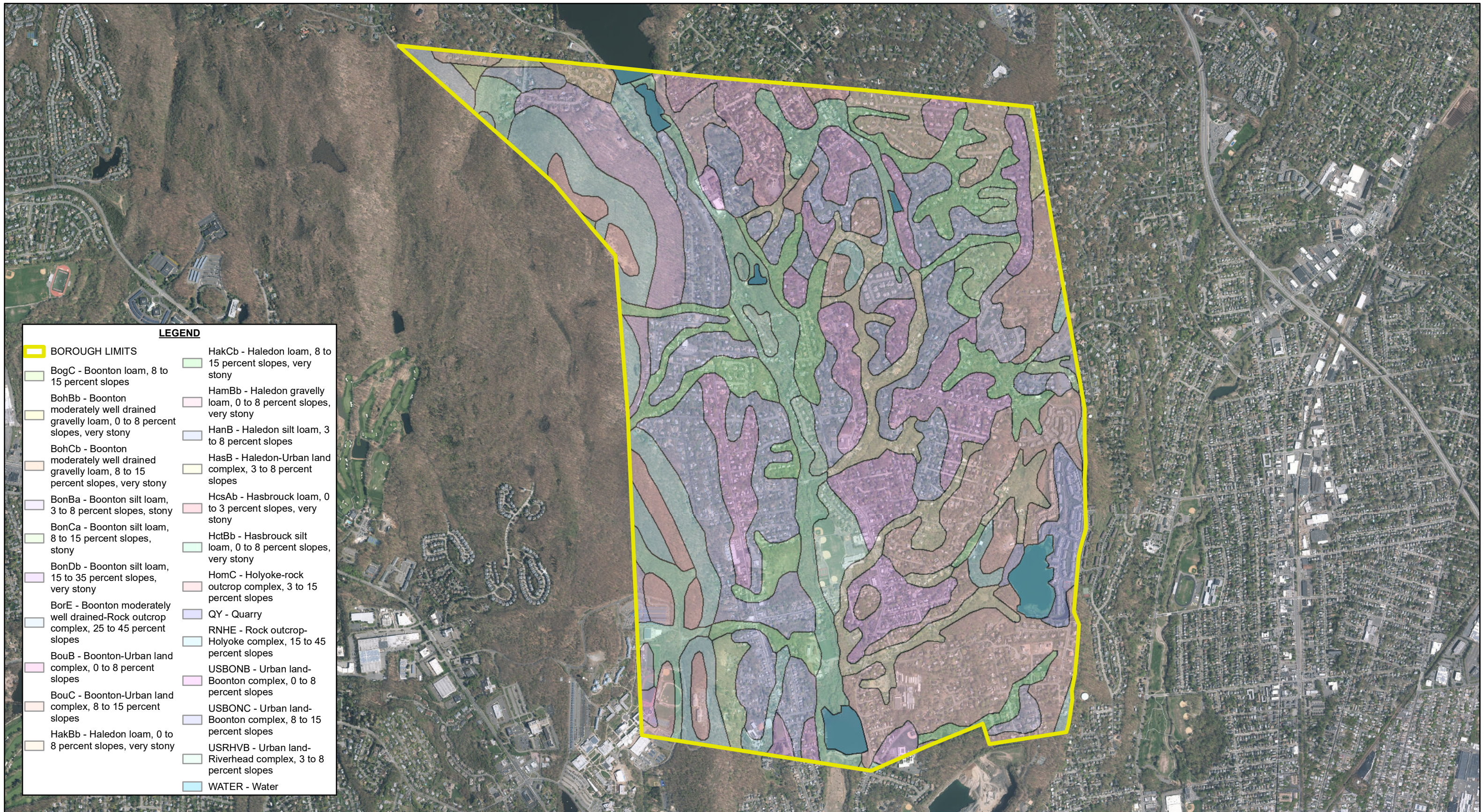
E. Hydrologic Soil Group

Hydrologic soil grouping categorizes soils with similar runoff potential under similar storm and cover conditions. Most of North Haledon has slow or very slow infiltration rates (see **Figure IV-B**). The definitions of the hydrologic soil groups are shown in **Table IV-1**.

Table IV-1: Hydrologic Soil Grouping

Class	Definition
A	High infiltration rates. Soils are deep, to excessively drained sands and gravels.
B	Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils that have moderately coarse textures.
C	Slow infiltration rates. Soils with layers impeding downward movement of water, or soils that have moderately fine or fine textures.
D	Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

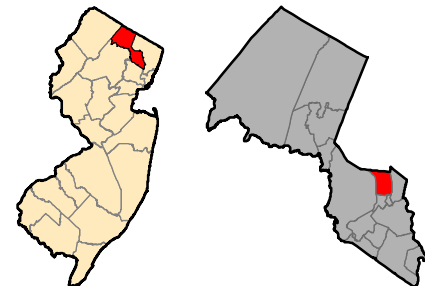
Source: USDA NRCS, Part 630 Hydrology, National Engineering Handbook, 2007



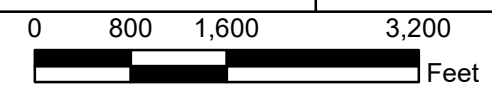
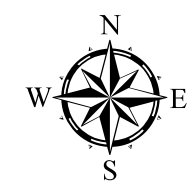
LEGEND

- BOROUGH LIMITS
- BogC - Boonton loam, 8 to 15 percent slopes
- BohBb - Boonton moderately well drained gravelly loam, 0 to 8 percent slopes, very stony
- BohCb - Boonton moderately well drained gravelly loam, 8 to 15 percent slopes, very stony
- BonBa - Boonton silt loam, 3 to 8 percent slopes, stony
- BonCa - Boonton silt loam, 8 to 15 percent slopes, stony
- BonDb - Boonton silt loam, 15 to 35 percent slopes, very stony
- BorE - Boonton moderately well drained-Rock outcrop complex, 25 to 45 percent slopes
- BouB - Boonton-Urban land complex, 0 to 8 percent slopes
- BouC - Boonton-Urban land complex, 8 to 15 percent slopes
- HakBb - Haledon loam, 0 to 8 percent slopes, very stony
- HakCb - Haledon loam, 8 to 15 percent slopes, very stony
- HamBb - Haledon gravelly loam, 0 to 8 percent slopes, very stony
- HanB - Haledon silt loam, 3 to 8 percent slopes
- HasB - Haledon-Urban land complex, 3 to 8 percent slopes
- HcsAb - Hasbrouck loam, 0 to 3 percent slopes, very stony
- HctBb - Hasbrouck silt loam, 0 to 8 percent slopes, very stony
- HomC - Holyoke-rock outcrop complex, 3 to 15 percent slopes
- QY - Quarry
- RNHE - Rock outcrop-Holyoke complex, 15 to 45 percent slopes
- USBONB - Urban land-Boonton complex, 0 to 8 percent slopes
- USBONC - Urban land-Boonton complex, 8 to 15 percent slopes
- USRHVB - Urban land-Riverhead complex, 3 to 8 percent slopes
- WATER - Water

SOURCE: SSURGO SOIL SURVEY OF PASSAIC COUNTY



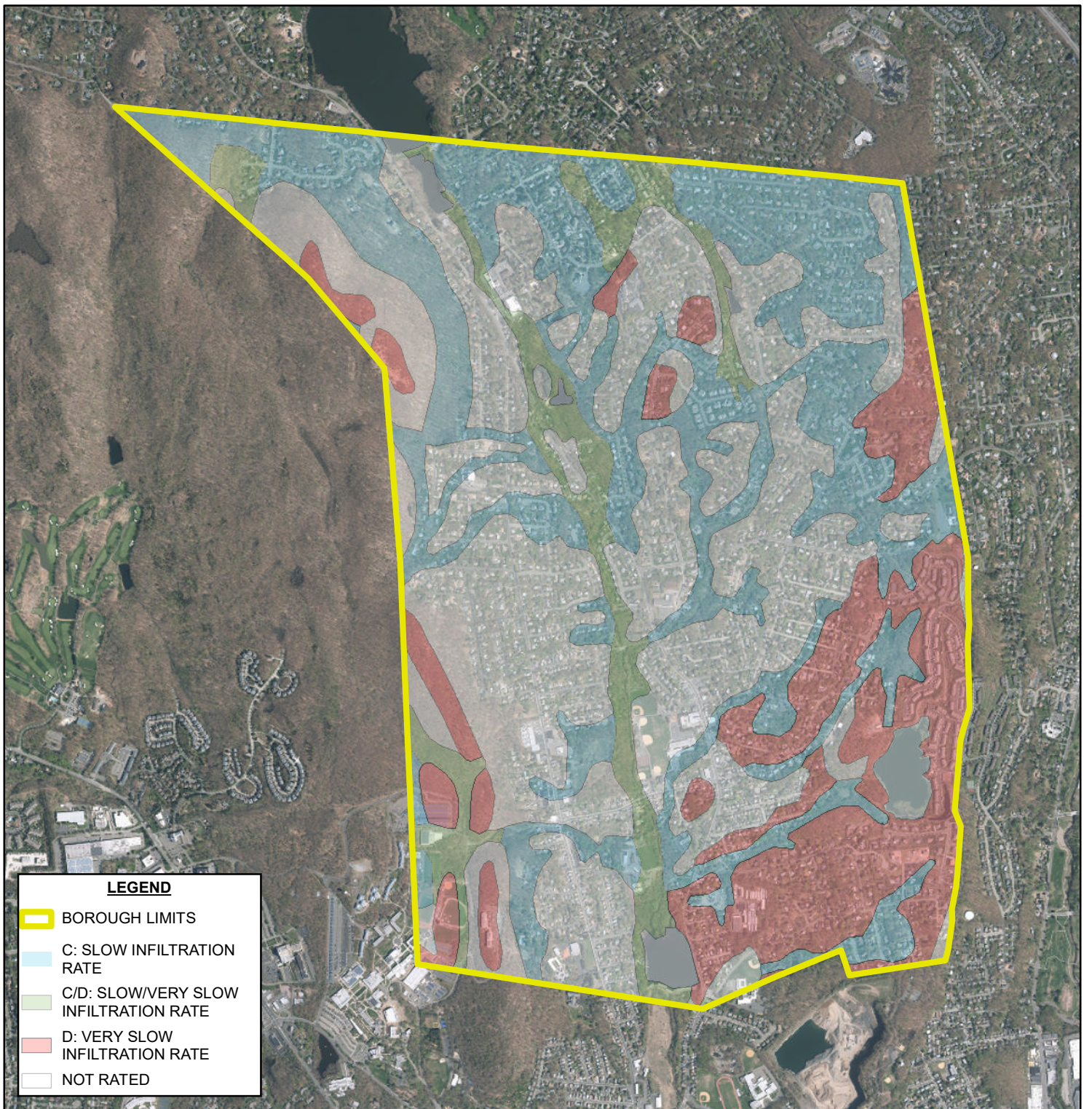
NORTHING: 775,652
EASTING: 577,771



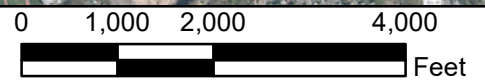
SOILS MAP
NATURAL RESOURCES INVENTORY
BOROUGH OF NORTH HALEDON

PASSAIC COUNTY NEW JERSEY

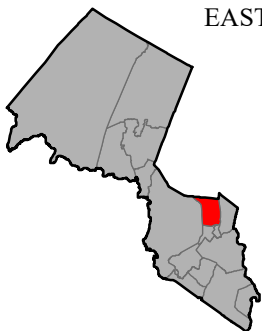
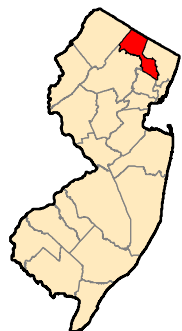
DR. BY: JMW SCALE: 1 IN = 1,600 FT JOB NO. NH-711
CKD. BY: FJR DATE: NOVEMBER 2023 FIGURE IV-A



SOURCE: : USGS WEB SOIL SURVEY



NORTHING: 775,652
EASTING: 577,771



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HYDROLOGIC SOIL GROUP MAP
NATURAL RESOURCES INVENTORY
BOROUGH OF NORTH HALEDON

PASSAIC COUNTY

NEW JERSEY

DR. BY: JMW
CKD. BY: FJR

SCALE: 1 IN = 2,000 FT
DATE: NOVEMBER 2023

JOB NO. NH-711
FIGURE IV-B

V. Ground Water and Drinking Water

A. Ground Water

Groundwater is the portion of water beneath the land surface within the zone of saturation. An aquifer is a water-bearing rock or rock formation where water is present in usable quantities. Groundwater originates from any precipitation that percolates into the soil. A fraction of this water infiltrates deeply enough to recharge the saturated zone of the fractured bedrock, known as the aquifer, from which most wells draw water.

As water percolates into the soil, natural soil processes can cleanse it of many pollutants. However, if pollutants resist breakdown or do not remain in contact with the soil long enough, they can spread underground and contaminate sources of drinking water. Although the Borough of North Haledon does not solely depend on water from public and individual wells, the water is still part of the natural water cycle and is susceptible to human impacts, climate influences, and geological factors.

B. Aquifers

Approximately 50% of New Jersey's drinking water is sourced from groundwater. In the northern region of the state, aquifer boundaries align closely with physiographic province boundaries, as detailed in **Section III.A** and depicted in **Figure III-A**. The hydrogeological attributes of an aquifer are intricately tied to the bedrock type, with all the groundwater in the area primarily deriving from local precipitation. Understanding these hydrogeological characteristics is essential for effective water resource management.

The concentration of housing and impervious surfaces (refer to **Figure V-A**) can have consequences for aquifers, potentially leading to diminished recharge, decreased well yields, heightened interference, and a decline in groundwater quality. In any aquifer, when the rate of water extraction surpasses the recharge rate, the yields from wells are likely to decrease. Additionally, these alterations can impact the dynamics of stream flow, causing increased flows following storm events and reduced flows in between such occurrences. Understanding and managing these factors is crucial for preserving the health of aquifers and associated water resources.

The Borough of North Haledon has two types of aquifers beneath it: surficial (glacial sediment) and bedrock. Glacial sediment aquifers are situated above the bedrock, resulting in spatial cover percentages exceeding 100% as they overlay the bedrock aquifers.

North Haledon is situated within the Piedmont physiographic geologic province.

Consequently, the bedrock aquifers in the area comprise two distinct types of bedrock, namely igneous and sedimentary. Specifically, 58.42% of the Borough is underlain by igneous-metamorphic rocks, while 41.58% is characterized by sedimentary rocks identified as the Basalt and Brunswick aquifers.

The Borough of North Haledon features glacial aquifers of till covering 5.65% of the area, with sand and gravel constituting a smaller percentage at 0.04%. Comprehensive details about these aquifers, including their characteristics, can be found in Table V-1, and visual representations are provided in Figures V-B and V-C.

Bedrock Aquifers

Basalt (bs)

Basalt, as an aquifer, is considered one of the less productive types. Groundwater primarily occurs in fractures, with some presence in vesicular zones. These vesicular zones are predominantly located at the bases of the basalt flows where they come into contact with the Brunswick Formation, as well as in the upper portions of the sheets. In instances where the basalt was formed in multiple flows, vesicular zones may be present between each sheet. The interaction of weathering and groundwater movement at the contact zones between basalt and the Brunswick Formation can lead to the enlargement of fractures or increased interconnection of vesicles.

Within North Haledon, three basalt sheets are situated between the layers of the Brunswick Formation, forming the crests of the First and Second Watchung Mountains and Packanack Mountain. Each basalt sheet comprises a sequence of lava flows deposited during the assembly of the Brunswick Formation, typically featuring vesicular zones at their tops and bases..

Brunswick Aquifer (ba) and Brunswick Aquifer Conglomerate (bac)

The Brunswick Formation, dating back to the Triassic period, serves as a crucial aquifer in the southeastern portion of Passaic County, including North Haledon. This formation is characterized by alternating beds of reddish-brown sandstone and mudstone. Groundwater is primarily stored and transmitted within fractures, with the water-bearing units comprising fissile shale and siltstone, while the confining units consist of massive siltstone. The groundwater is typically fresh, slightly alkaline, non-corrosive, and hard. Interconnected fractures that carry water are present from the land surface down to approximately 500 feet in depth.

Geographically, the Brunswick Formation shapes broad valleys between the Watchung Mountains and forms gently rolling lowlands to the east of the First Watchung Mountain. Conglomerates, located just below the base of the basalt flow beneath the First Watchung Mountain and locally along the northwestern border of the outcrop area, are notable. These conglomerates are composed of pebbles derived from Precambrian gneiss and Paleozoic rocks, reflecting the geological history during Triassic times.

Table V-1: Characteristics of North Haledon Aquifers

Aquifer Unit	Aquifer Rank	Characteristics	Common Range		Percent of North Haledon
			Depth (ft)	Yield (gpm)	
FRACTURED-ROCK AQUIFERS					
Brunswick aquifer (ba)	C	Sandstone, siltstone, and shale of the Newark Group. Ground water stored and transmitted in fractures. Unconfined to partially confined in upper 200 ft; confined at greater depth. Water is normally fresh, slightly alkaline, non-corrosive and hard; may have large concentrations of iron and sulfate. Calcium-bicarbonate type waters dominate. Subordinate calcium-sulfate waters are associated with high total dissolved solids. Includes conglomerate facies (bac) along the northwest margin of the basin.	30-1,500	10-500	41.55
Brunswick aquifer conglomerate (bac)	C				0.03
Basalt (bs)	D	Hard, dense, and highly-fractured igneous rocks. Ground water stored and transmitted in fractures. Few high capacity wells. Water is normally fresh, slightly to highly alkaline, moderately hard, and of the calcium-bicarbonate type.			58.42
GLACIAL AQUIFERS AND CONFINING UNITS					
Sand and Gravel (sg)	B	Glacial deposits of boulders, gravel, sand, silt, and clay, where thicker than 50 ft. Generally unconfined except where overlain by lake silt and clay or till. Aquifers composed of stratified sand and gravel [Rank B] are confined in the subsurface by lake-bottom silt and clay (E), till [D], and morainic deposits [D]. Sand and gravel includes glacial fans or deltas, fluvial outwash, and ice-contact deposits. Till and morainic deposits locally form aquifers where thick and sandy. Aquifers have primary intergranular porosity and permeability. Ground water quality varies with the sedimentary texture and mineral content. Water is fresh, slightly alkaline, moderately-hard to hard, and of the calcium-bicarbonate type.	10-300	100-1,000	0.04
Till (t)	D				5.65
<p>• Aquifer Rank is best viewed on a relative basis, with A yielding the most water and E the least. Median High Capacity Wells Yield (in gpm):</p> <ul style="list-style-type: none"> • A: > 500 • B: 251 to 500 • C: 101 to 250 • D: 25 to 100 • E: <25 					
Sources: USGS, 1976; NJBGT 1966					

Sole-Source Aquifers

The Safe Drinking Water Act of 1974, specifically in Section 1424(e), includes a provision for designating aquifers that serve as the sole or primary source of drinking water for an area. These aquifers, known as sole-source aquifers (SSA), contribute more than 50% of the drinking water to a specific region, and their water would be irreplaceable if the aquifer became contaminated. Once designated as an SSA, no Federal financial assistance can be approved for projects that might lead to aquifer contamination through a recharge zone.

Under this provision, the Environmental Protection Agency (EPA) is required to review any federally funded project in an area that could impact groundwater in a sole-source aquifer, encompassing both the aquifer's recharge zone and its stream-flow source zone. This safeguard aims to prevent activities that might jeopardize the purity of essential drinking water resources..

The aquifers beneath North Haledon do not fulfill the technical criteria for designation as a Sole-Source Aquifer (SSA). The classification of this region is illustrated in **Figure V-D**.

C. Recharge

Groundwater recharge refers to the addition of water to an aquifer. A groundwater recharge area is the land where precipitation can infiltrate into the saturated zone. These areas are typically at higher elevations, with discharge points at lower elevations, often at streams or other water bodies. Generally, groundwater divides align with or are slightly offset from surface water divides. While most groundwater moves through the shallow layers of soil and weathered bedrock to the nearest stream, a smaller percentage penetrates deeper to recharge aquifers.

New Jersey receives an average annual precipitation of about 40 to 51 inches, yet there's considerable variation in estimates regarding how much of this contributes to aquifer recharge. Unlike precipitation, recharge doesn't have a direct measurement and is influenced by factors such as climate, soil, surficial geology, and vegetation. Groundwater recharge exhibits seasonal variations. During the growing season, precipitation is intercepted by plants and released back into the atmosphere through transpiration. Simultaneously, evaporation rates are higher in warmer months. Consequently, the majority of recharge occurs in late fall, winter, and early spring when plants are dormant, and evaporation is minimal. In terms of land use, recharge rates are significantly higher in forests compared to urban areas due to the increased prevalence of impervious surfaces.

D. Ground Water Quality

Groundwater can be susceptible to pollution from various sources, including nitrates, bacteria, metals, pesticides, antibiotics, and other contaminants. The entry points for these pollutants include non-point sources (diffuse origins), point sources (localized origins), and precipitation through rain. The New Jersey Comparative Risk Project has highlighted potential human health risks associated with drinking water, pinpointing concerns related to lead, radon, arsenic, methyl tertiary-butyl ether (MTBE), nitrates, and waterborne pathogens. Moreover, radioactive substances from natural origins are commonly detected in New Jersey's groundwater.

Public Water Wells

As discussed in **Section II. C** of this report, North Haledon is serviced by a combination of water provided by the Manchester Utilities Authority (Haledon Water), Public Community Water Supply wells, and private homeowner wells. Holland Christian Home owns both of the Public Water Supply wells present within the Borough (**Figure II-A**). These wells are sourced by the Basalt aquifer.

Private Wells

The New Jersey Private Well Testing Act (N.J.S.A. 58:12A-26 et seq.) became effective in September 2002, mandating private well testing upon the sale of a house. The number of wells tested in a municipality reflects the number of real estate transactions involving homes with private wells. There are approximately 374 permitted private wells within the Borough of North Haledon. However, wells in Passaic County are not required to test for gross alpha particle activity.

E. Ground Water Quality Standards

The New Jersey Ground Water Quality Standards at N.J.A.C. 7:9C, last amended June 1, 2020, provide a basis for the protection of ambient ground water quality, through the establishment of constituent standards for ground water pollutants. These standards are applied to ground water remediation or discharges that may cause pollutants to enter the ground waters of the State, including non-point and diffuse sources.

Ground water within the watersheds of FW1 surface waters, State-owned Natural Areas, and the major aquifers of the Pinelands Area are designated Class I. Class I ground waters can be utilized primarily for the maintenance of special ecological resources, with secondary uses being potable, agricultural, and industrial water. Class II waters are those not specifically designated Class I or Class III. The designated use of Class II ground waters is to provide potable water using conventional treatment. Class III ground waters can be utilized for any purpose other than to be used as potable water.

It should not be assumed that ground water quality meets the criteria of its classification area in view of natural variability and the possibility of localized pollution. In fact, NJDEP has designated 3 areas within the Borough where ground water contamination has been identified (High Mountain Citgo, Shell Service Station #138369, and North Haledon Mobil; see **Section V. F** and **Figure V-E**).

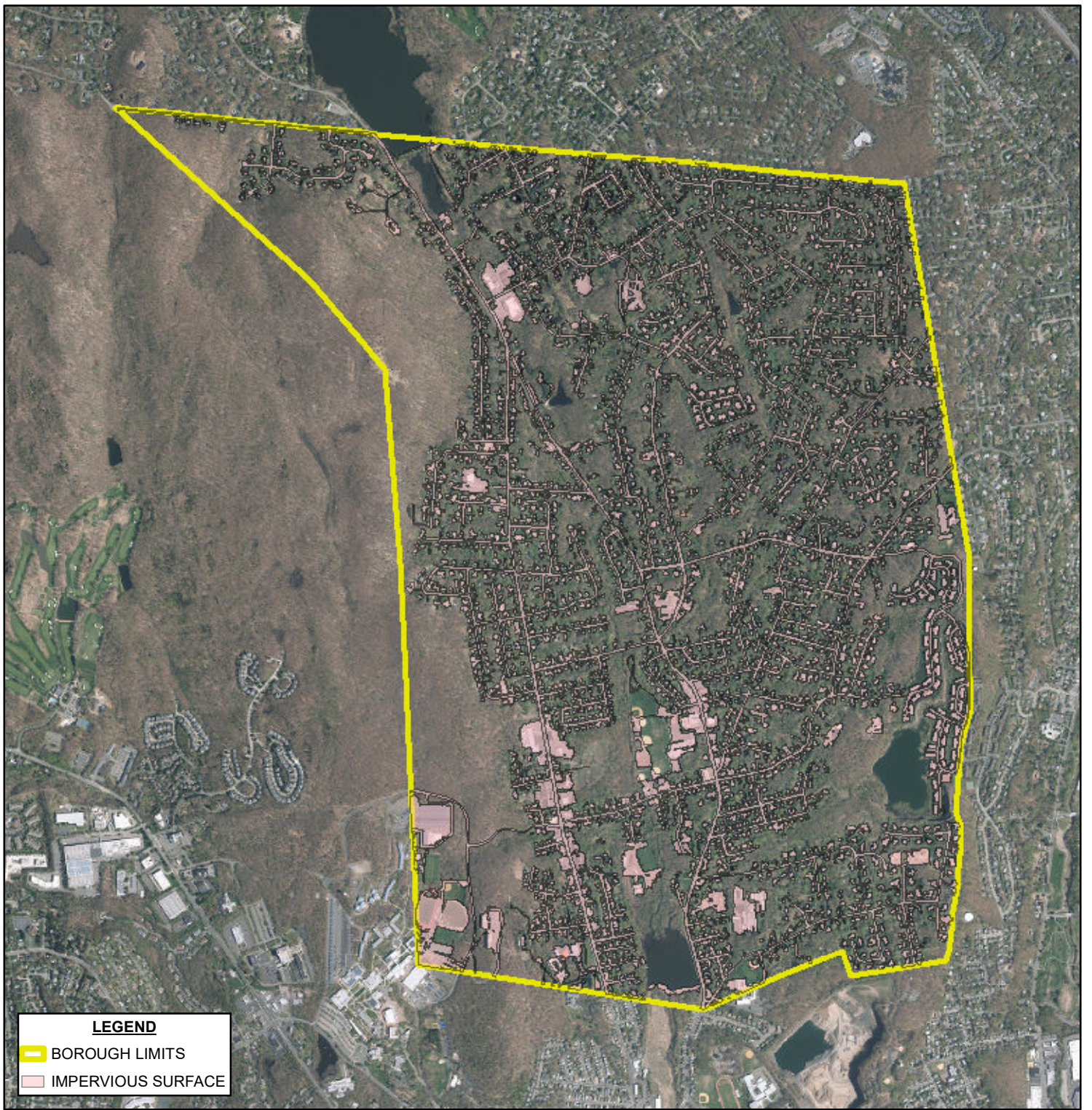
F. Known Contaminated Sites List (KCSL)

The NJDEP Site Remediation Program compiles a list of Known Contaminated Sites (KCS). The Known Contaminated Sites List (KCSL) (non-homeowner) for New Jersey contains sites and properties where contamination of soil or ground water has been confirmed at levels equal to or greater than applicable standards. Sites identified in the KCSL can be subject to a variety of activities ranging from relatively simple soil removals to highly complex remediation efforts. It is important to note that the list may include sites where remediation is either ongoing, required but not yet initiated, or has been completed. In addition, new contaminated sites may be identified after the creation of this list.

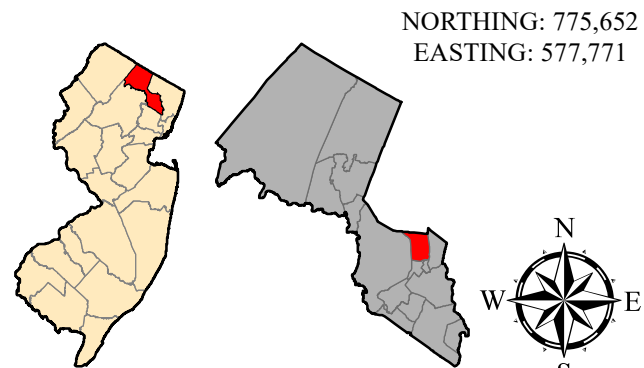
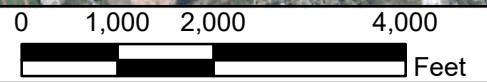
Within the Borough of North Haledon, there are 10 KCSs (see **Table V-2** and **Figure V-F**). None of these sites are currently on the National Priorities (Superfund) List. This does not account for potential homeowner sites as they generally involve small heating oil discharges from leaking underground storage tanks (USTs) and are often resolved relatively quickly.

Table V-2: Contaminated Sites in North Haledon

Site Id. #	PI#	Name	Address	Status*
Known Contaminated Sites (KCS)				
24620	5101	HOFER MACHINE & TOOL CO	126 LINDA VIS AVE	Active
2523	9272	NORTH HALEDON MOBIL	171 HALEDON AVE N	Active - RAP
2531	6510	HIGH MOUNTAIN CITGO	1052 HIGH MOUNTAIN RD	Active
2532	1358	SHELL SERVICE STATION 138369	214 HIGH MOUNTAIN RD	Active - RAP
165710	217718	879 HIGH MOUNTAIN ROAD	879 HIGH MOUNTAIN RD	Active
501407	631656	1133 HIGH MOUNTAIN ROAD	1133 HIGH MOUNTAIN RD	Active
362388	711589	920 BELMONT AVENUE	920 BELMONT AVE	Active
457494	576929	WAYNE CT & PASSAIC AVENUE GROUND WATER CONTAM	PASSAIC AVE & WAYNE AVE	Active
444342	558660	339 SAW MILL ROAD	339 SAW MILL RD	Active
594517	746876	895 BELMONT AVENUE LLC	895 BELMONT AVE	Active - RAP
Source: NJDEP Data Miner, August 2020				



SOURCE: NJDEP IMPERVIOUS SURFACE 2015 DATA LAYER



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330 PHILLIPS AVE., SOUTH HACKENSACK, N.J. 07606

IMPERVIOUS SURFACE MAP
NATURAL RESOURCES INVENTORY
 BOROUGH OF NORTH HALEDON

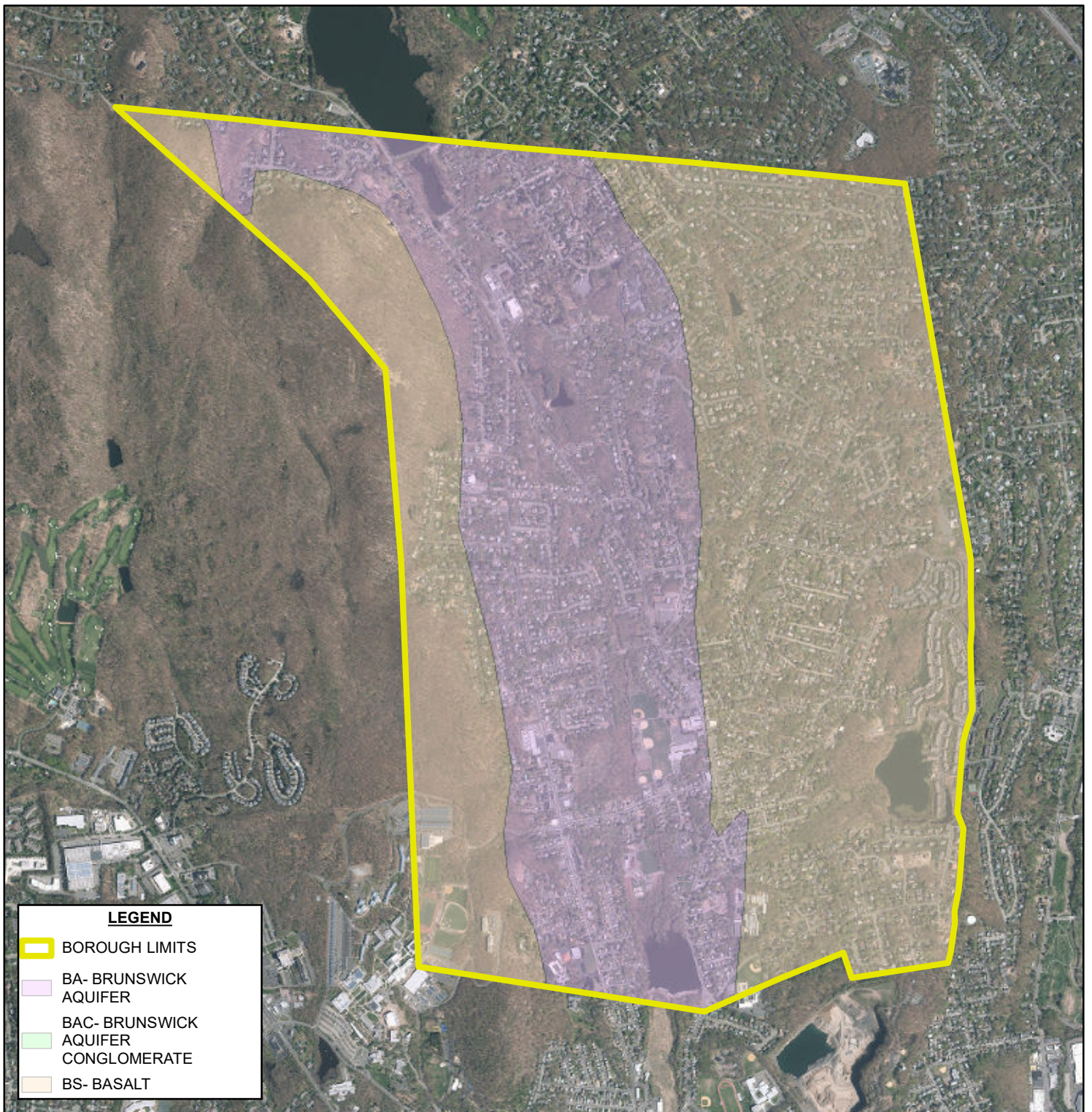
PASSAIC COUNTY

NEW JERSEY

DR. BY: JMW
 CKD. BY: FJR

SCALE: 1 IN = 2,000 FT
 DATE: NOVEMBER 2023

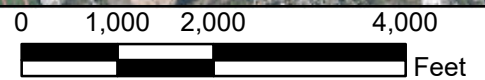
JOB NO. NH-711
 FIGURE V-A



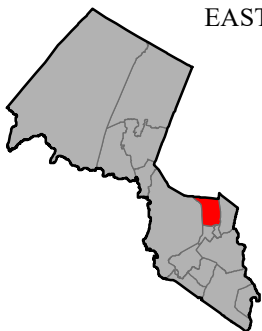
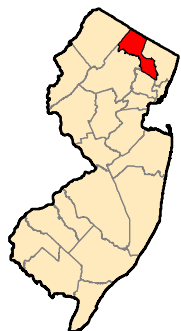
LEGEND

- BOROUGH LIMITS
- BA- BRUNSWICK
AQUIFER
- BAC- BRUNSWICK
AQUIFER
CONGLOMERATE
- BS- BASALT

SOURCE: NJDEP BEDROCK AQUIFERS DATA LAYER



NORTHING: 775,652
EASTING: 577,771



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330 PHILLIPS AVE., SOUTH HACKENSACK, N.J. 07606

BEDROCK AQUIFER MAP
NATURAL RESOURCES INVENTORY
BOROUGH OF NORTH HALEDON

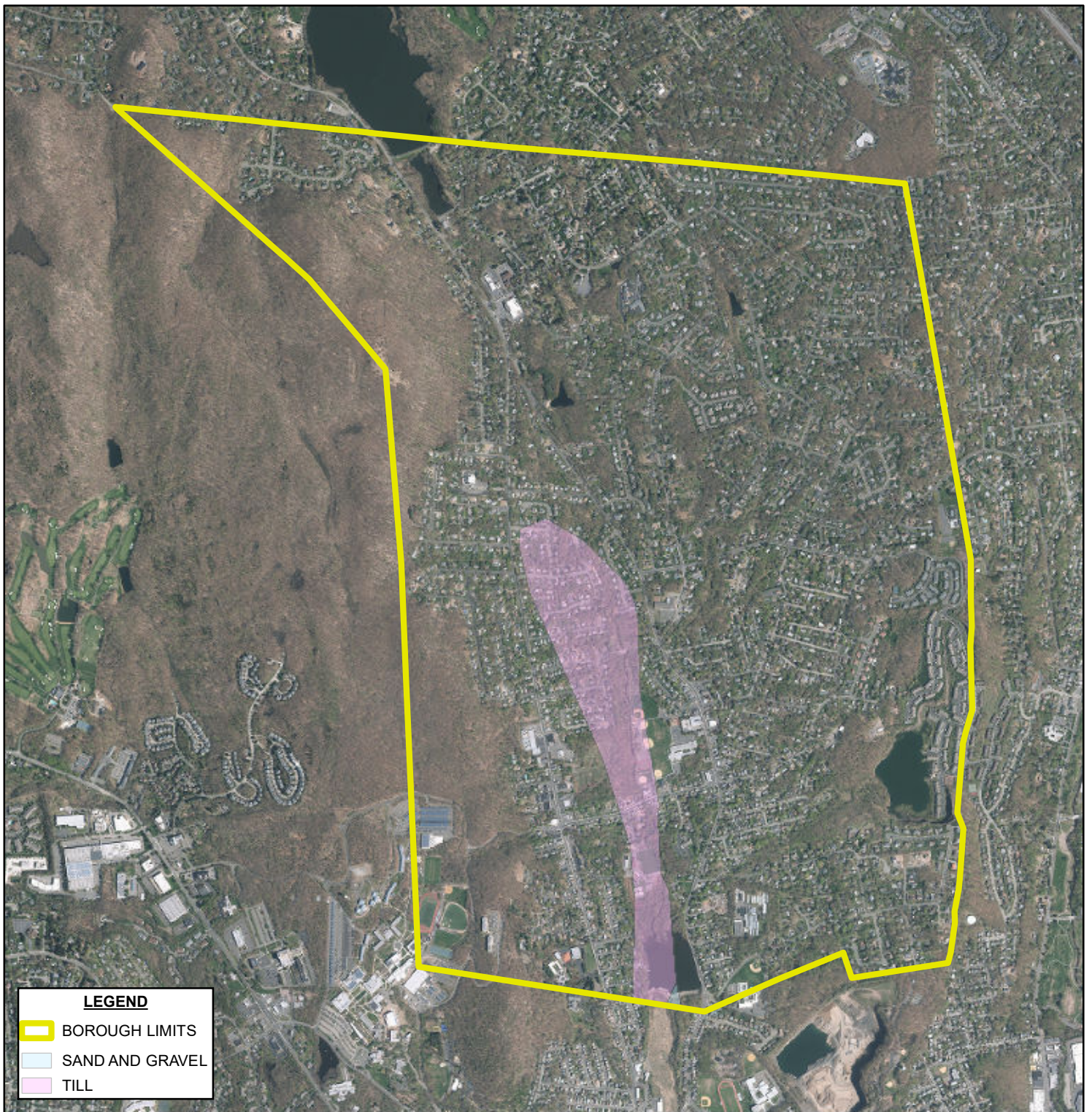
PASSAIC COUNTY

NEW JERSEY

DR. BY: JMW
CKD. BY: FJR

SCALE: 1 IN = 2,000 FT
DATE: NOVEMBER 2023

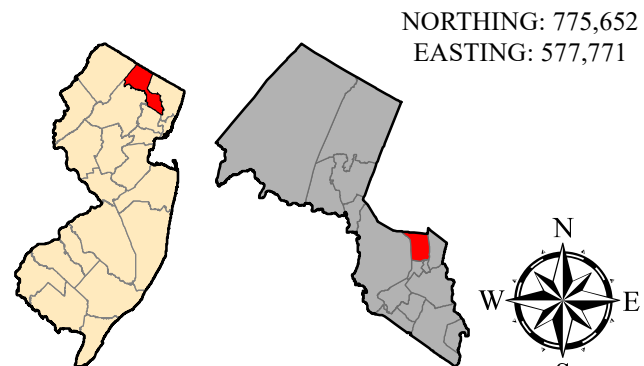
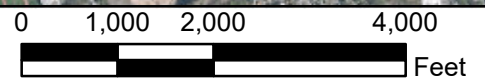
JOB NO. NH-711
FIGURE V-B



LEGEND

- BOROUGH LIMITS
- SAND AND GRAVEL
- TILL

SOURCE: NJDEP SURFICIAL AQUIFERS DATA LAYER



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SURFICIAL AQUIFER MAP
NATURAL RESOURCES INVENTORY
BOROUGH OF NORTH HALEDON

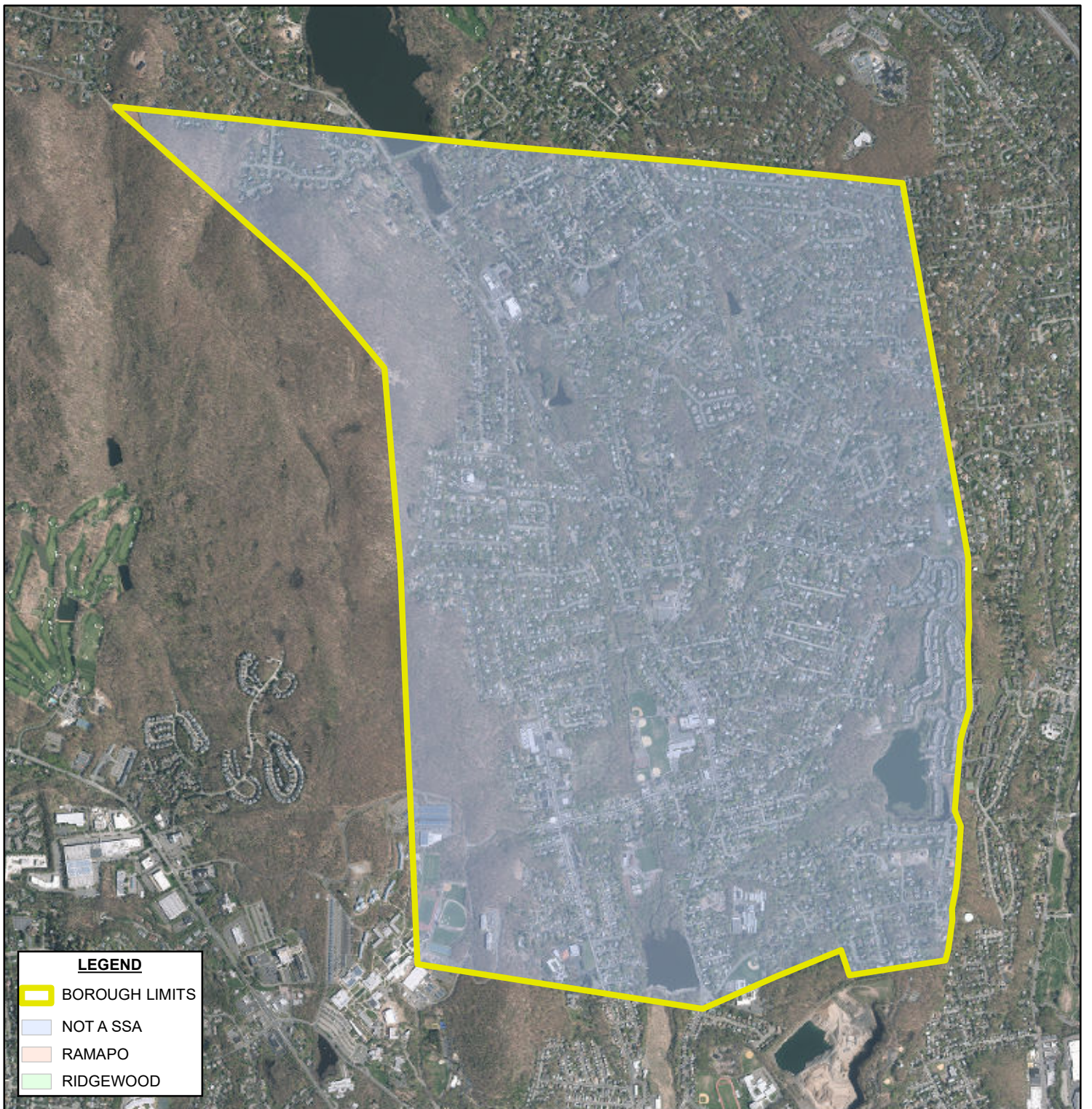
PASSAIC COUNTY

NEW JERSEY

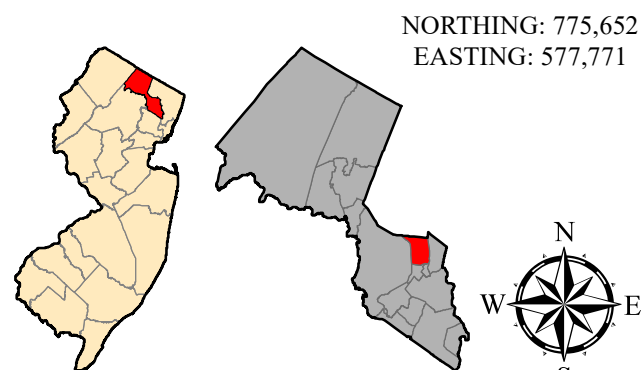
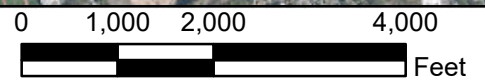
DR. BY: JMW
CKD. BY: FJR

SCALE: 1 IN = 2,000 FT
DATE: NOVEMBER 2023

JOB NO. NH-711
FIGURE V-C



SOURCE: NJDEP SOLE-SOURCE AQUIFERS DATA LAYER



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SOLE-SOURCE AQUIFER MAP
NATURAL RESOURCES INVENTORY
BOROUGH OF NORTH HALEDON

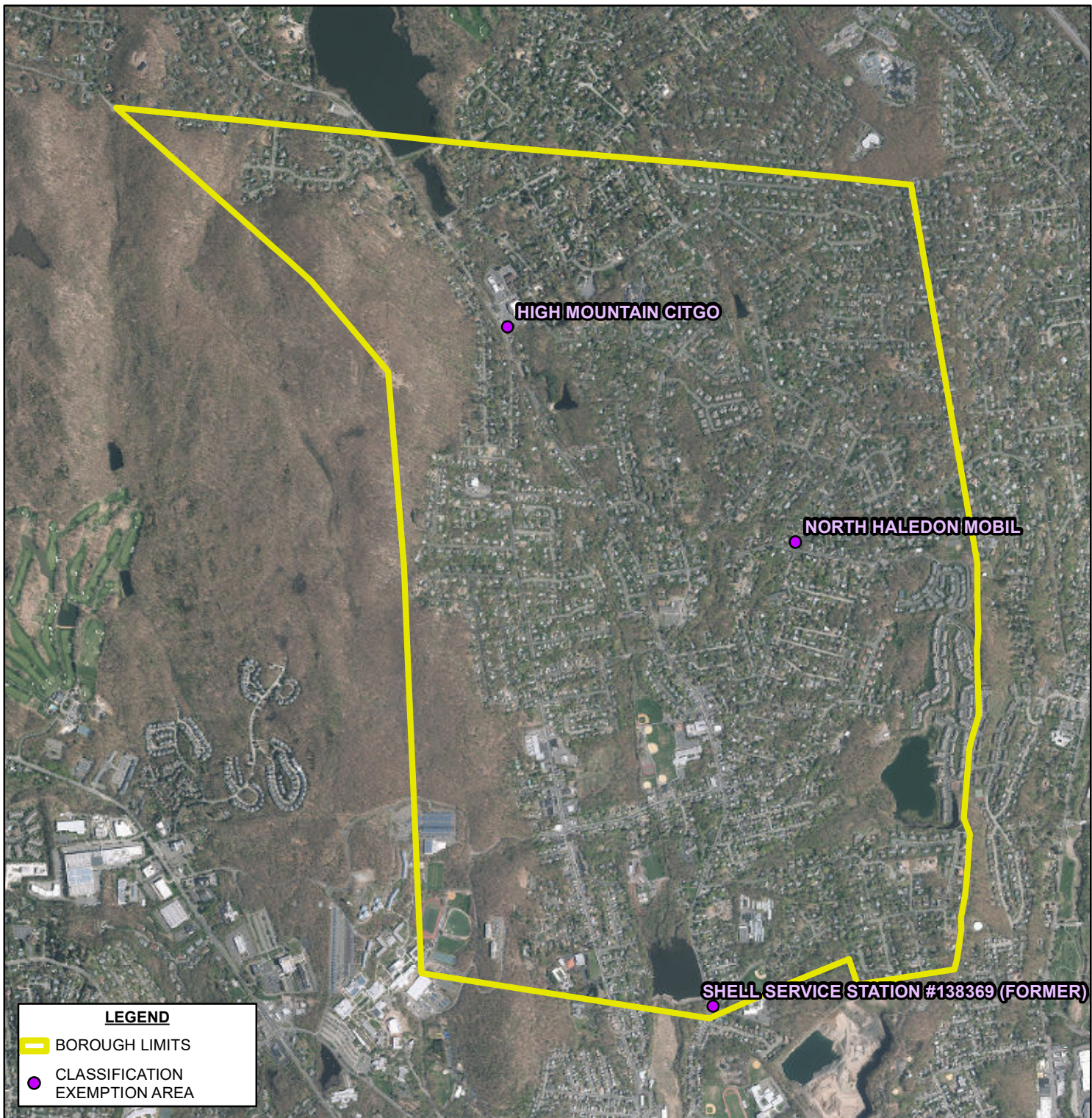
PASSAIC COUNTY

NEW JERSEY

DR. BY: JMW
CKD. BY: FJR

SCALE: 1 IN = 2,000 FT
DATE: NOVEMBER 2023

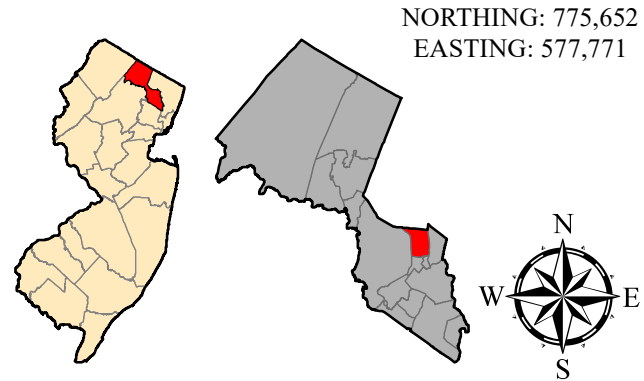
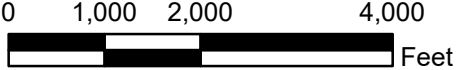
JOB NO. NH-711
FIGURE V-D



LEGEND

- BOROUGH LIMITS
- CLASSIFICATION EXEMPTION AREA

SOURCE: NJDEP CLASSIFICATION EXEMPTION AREAS-WELL RESTRICTION AREA DATA LAYER

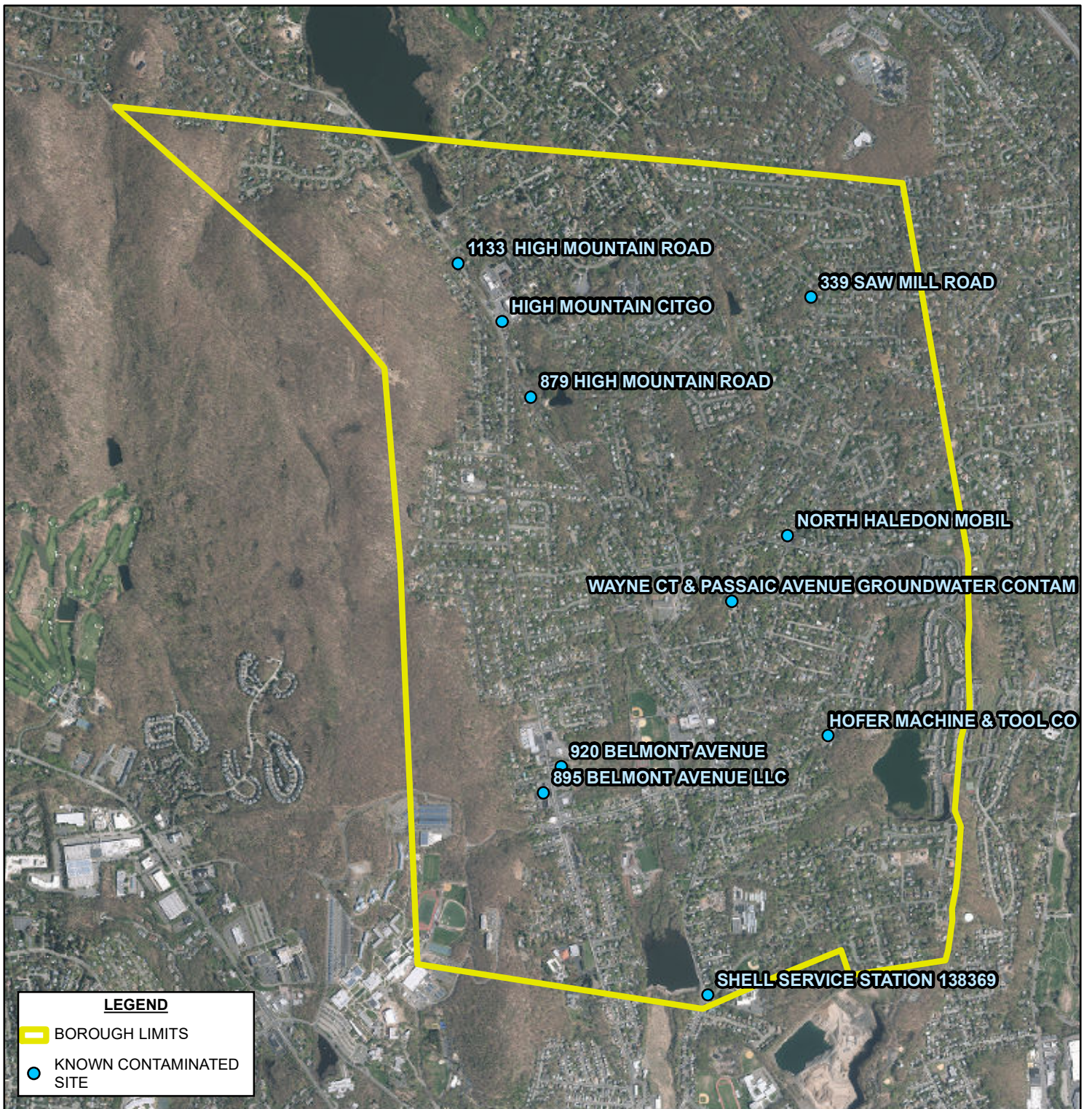


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330 PHILLIPS AVE., SOUTH HACKENSACK, N.J. 07606

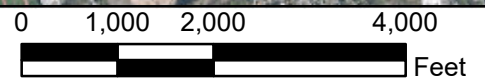
CLASSIFICATION EXEMPTION AREA MAP
NATURAL RESOURCES INVENTORY
BOROUGH OF NORTH HALEDON

PASSAIC COUNTY NEW JERSEY

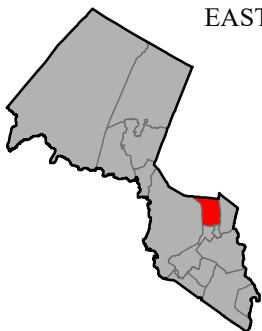
DR. BY: JMW CKD. BY: FJR	SCALE: 1 IN = 2,000 FT DATE: NOVEMBER 2023	JOB NO. NH-711 FIGURE V-E
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SOURCE: NJDEP KNOWN CONTAMINATED SITE LIST DATALAYER



NORTHING: 775,652
EASTING: 577,771



BOSWELL ENGINEERING

330 PHILLIPS AVE., SOUTH HACKENSACK, N.J. 07606

KNOWN CONTAMINATED SITES MAP
NATURAL RESOURCES INVENTORY
BOROUGH OF NORTH HALEDON

PASSAIC COUNTY

NEW JERSEY

DR. BY: JMW
CKD. BY: FJR

SCALE: 1 IN = 2,000 FT
DATE: NOVEMBER 2023

JOB NO. NH-711
FIGURES V-F

VI. Surface Water

A. Watersheds

A watershed is defined as the land area enclosed by a drainage divide, where all surface runoff converges into a specific river, river system, or body of water. North Haledon is situated within the Passaic River watershed, an expansive region encompassing the northeastern part of New Jersey. This watershed spans around 935 square miles (598,400 acres) and extends across eight counties, namely Hudson, Bergen, Passaic, Sussex, Morris, Somerset, Union, and Essex counties.

The Passaic River watershed consists of various smaller watersheds, among them being the Ramapo River and Passaic River Lower (Saddle to Pompton), both of which encompass North Haledon. To provide additional detail, North Haledon falls within three sub-watersheds belonging to these two smaller watersheds: Molly Ann Brook, Crystal Lake/Pond Brook, and Goffle Brook.

Watershed Management Areas

The NJDEP acknowledges the significance of watersheds as natural boundaries and has implemented a watershed management approach. This strategy involves the comprehensive management and protection of water resources within a specific watershed, moving away from a site-specific approach. The watershed management approach is built on three fundamental elements: 1) a geographic focus, 2) ongoing improvement guided by sound scientific principles, and 3) active involvement of partnerships and stakeholders.

Moreover, the NJDEP has divided the State's watersheds into 20 Watershed Management Areas (WMAs). The Passaic River basin is divided into three WMAs. North Haledon falls within WMA 04: Lower Passaic and Saddle.

Hydrologic Unit Codes (HUC)

The NJDEP utilizes a classification system that assigns a 14-digit Hydrologic Unit Code (HUC14) to each sub-watershed. This code follows a hierarchical structure, with the first 2 digits representing the USGS Water Resources Region. The initial 4 digits (HUC4) identify the major drainage basin or sub-region. For example, a HUC2 of "02" corresponds to the Mid-Atlantic Region, and a HUC4 of "0203" is associated with the Lower Hudson-Long Island major drainage basin.

The Passaic River basin is assigned a HUC8 of "02030103," and every sub-watershed within this basin has a HUC that starts with "02030103."

North Haledon is within both the Ramapo River watershed (HUC11: 02030103100) and the Passaic River Lower (Saddle to Pompton) (HUC11: 02030103120). HUC14 sub-watersheds within the Borough of North Haledon are shown in **Figure VI-A** and listed in **Table VI-1**.

Table VI-1: Hydrologic Unit Codes for North Haledon's Sub-Watersheds

14-Digit Hydrologic Unit Code (HUC14)	Sub-watershed Name	Watershed Name
02030103120050	Goffle Brook	Passaic River Lower (Saddle to Pompton)
02030103120040	Molly Ann Brook	Passaic River Lower (Saddle to Pompton)
02030103100060	Crystal Lake/Pond Brook	Ramapo River

Source: NJDEP, August 2020

Watercourse Descriptions

Molly Ann Brook

The Molly Ann Brook, originating from the northern ranges of the Watchung Mountains, flows southward through Franklin Lakes. It merges with two smaller tributaries to create Haledon Reservoir. In North Haledon, Molly Ann Brook converges with its major tributary, Squaw Brook, along with numerous smaller tributaries before reaching Oldham Pond. The brook eventually joins the Passaic River in Paterson, continuing its course until it ultimately empties into the Atlantic Ocean.

Tributaries of Molly Ann Brook

All of the waters within North Haledon drain to Molly Ann Brook. These tributaries include Squaw Brook, Falls Brook, and Glen Place Brook, as well as three unnamed tributaries.

B. Floodplains

A floodplain is the land, along a watercourse that is subject to periodic flooding. As per the Flood Disaster Protection Act of 1973, the Federal Emergency Management Administration (FEMA) is responsible for delineating floodplains. FEMA defines flood zones as geographic areas based on studies of flood risk.

FEMA publishes Flood Insurance Rate Maps (FIRMs) that show flood zone boundaries. FIRMs are vital to floodplain management, mitigation, and insurance activities for the National Flood Insurance Program (NFIP).

Special Flood Hazard Areas (SFHAs) are defined as areas subject to inundation by a flood having, on average, about 1 in 100 chance in any given year, also referred to as the 1% annual chance flood. Below are brief definitions of the FEMA flood zones that occur within North Haledon.

As shown in **Figure VI-B**, most of North Haledon falls within Zone X, which has low to moderate risk of flooding and is not in the SFHAs. Zone X corresponds with areas outside of the 1% annual chance or 100-year floodplain, areas of 1% annual chance sheet flow flooding where average depths are less than 1 foot, areas of 1% annual chance stream flooding, or where the contributing drainage area is less than 1 square mile. No Base Flood Elevations or depths are shown within this zone and insurance purchase is not required for property owners.

The zones within the Borough of North Haledon at a high-risk of flooding fall within Zone A and Zone AE. Zone A corresponds to the 1% annual chance floodplains that are determined by approximate methods of analysis (i.e. not with Base Flood Elevations). Zone AE corresponds to the 1% annual chance floodplains that are determined by detailed methods of analysis, which includes detailed hydraulic analyses to determine Base Flood Elevations. The 1% annual chance flood is also referred to as the base flood or 100-year flood. These areas are limited to the area in the immediate vicinity of Molly Ann Brook and its tributaries.

Areas with a 0.2% annual chance of flooding, or 500-year flood, are not considered high risk, but are susceptible to periodic flooding.

Floodplain management is the operation of a community program of corrective and preventative measures for reducing damage caused by flooding. These measures may include zoning, subdivision, building requirements, or floodplain ordinances. Riparian buffers and wetland protection regulations and ordinances have the potential reduce flood damage through the protection of the areas most susceptible to flooding and providing natural flood control.

C. Wetlands

Wetlands serve as transitional zones between aquatic and terrestrial ecosystems. These areas are defined by their inundation or saturation with surface water or groundwater at intervals and durations that sustain, and typically do sustain, predominantly hydrophytic vegetation adapted to saturated soil conditions. The delineation of wetlands entails the assessment of vegetation, soils, and hydrology. Additionally, a transition area, commonly known as a buffer, is a land area bordering a freshwater wetland designed to minimize negative impacts on the wetland or function as an essential component of the wetland ecosystem.

The NJDEP recognizes eighteen types of wetlands, encompassing various ecosystems such as saline marshes (low and high marsh), freshwater tidal marshes, vegetated dune communities, phragmites-dominated coastal wetlands, deciduous wooded wetlands, coniferous wooded wetlands, Atlantic white cedar wetlands, deciduous scrub/shrub wetlands, coniferous scrub/shrub wetlands, mixed scrub/shrub wetlands (deciduous-dominated), mixed scrub/shrub wetlands (coniferous-dominated), herbaceous wetlands, phragmites-dominated interior wetlands, mixed wooded wetlands (deciduous-dominated), mixed wooded wetlands (coniferous-dominated), unvegetated flats, and severely burned wetland vegetation. Additionally, the NJDEP acknowledges the presence of vernal pools, defined as wetlands or open water areas in a confined basin or depression without a permanent flowing outlet.

New Jersey protects wetlands under the 1987 New Jersey Freshwater Wetlands Protection Act (N.J.S.A. 13:9B) and Rules (N.J.A.C. 7:7A). Utilizing these regulations, the NJDEP regulates activities proposed within and the resource value of wetland and transition areas.

The NJDEP categorizes wetlands into three different resource values: ordinary, intermediate, and exceptional. Ordinary value wetlands, such as man-made drainage ditches and swales, are not given a transition area. Intermediate value wetlands, which includes wetlands not

considered to be of Ordinary or Exceptional value, are assigned a 50-foot transition area. Exceptional value wetlands require a 150-foot transition area. Exceptional value wetlands include wetlands that provide habitat for endangered and threatened species and those contiguous with FW-1 and FW-2 Trout Production waters and their tributaries and Category 1 classified streams.

There is one potential vernal pool and approximately 55 acres of wetlands within North Haledon, or 2.5% of the Borough's land area (**Figures VI-C and VI-D**). There are several types of freshwater wetlands in North Haledon, such as deciduous wooded wetlands, deciduous scrub/shrub wetlands, and agricultural wetlands (see **Figure VII-A and Table VII-1**).

D. Surface Water Quality Standards

N.J.A.C. 7:9B, Surface Water Quality Standards (SWQS), sets forth designated uses, use classifications, and water quality criteria for the protection of the State's waters. These regulations are based upon the uses and the NJDEP's policies concerning these uses, classifications, and criteria. The SWQS are in conformance with the Clean Water Act at 33USC 1313(c) and the Federal Water Quality Standards Regulation at 40 CFR 131.

The SWQS are used by several NJDEP programs, including the New Jersey Pollutant Discharge Elimination System Program, Site Remediation Program, Land Use Regulation Program, and Total Maximum Daily Loads (TMDLs, see **Section VI. E**).

Table VI-2 describes the definitions of the surface water classifications. In **Figure VI-E**, "category" is shown, which is a compendium of all surface water classification designations for a given water body. Category describes a stream's surface water classification in terms of its general surface water class, its trout water status, and its antidegradation status. The surface waters within North Haledon are categorized as follows:

- FW2-NT:
 - Molly Ann Brook
 - Molly Ann Brook UNTs
 - Squaw Brook
 - Glenn Place Brook
 - Falls Brook
 - Oldham Pond
 - Haledon Reservoir
 - Yahn's Pond

Table VI-2: Surface Water Quality Standards Classification

Category	Definition
Freshwater General Surface Water Class	
FW1	FW1 means 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, unique ecological significance, exceptional recreational significance, exceptional water supply significance or exceptional fisheries resource(s).
FW2	FW2 means the general surface water classification applied to those fresh waters that are not designated as FW1 or Pinelands Waters. In all FW2 waters the designated uses are: 1. Maintenance, migration and propagation of the natural and established biota; 2. Primary contact recreation; 3. Industrial and agricultural water supply; 4. Public potable water supply after conventional filtration treatment (a series of processes including filtration, flocculation, coagulation, and sedimentation, resulting in substantial particulate removal but no consistent removal of chemical constituents) and disinfection; and 5. Any other reasonable uses.
Trout Water Status - this is for information only and does not affect the water quality criteria for those waters.	
TP	Trout production means waters designated at N.J.A.C. 7:9B-1.15I through (i) for use by trout for spawning or nursery purposes during their first summer.
TM	Trout maintenance means waters designated at N.J.A.C. 7:9B-1.15I through (i) for the support of trout throughout the year.
NT	Nontrout waters means fresh waters that have not been designated in N.J.A.C. 7:9B-1.15I through (h) as trout production or trout maintenance. These waters are generally not suitable for trout because of their physical, chemical, or biological characteristics, but are suitable for a wide variety of other fish species.
Antidegradation	
ONRW	Outstanding National Resource Waters means high quality waters that constitute an outstanding national resource (for example, waters of National/State Parks and Wildlife Refuges and waters of exceptional recreational or ecological significance). Waters classified as FW1 waters and Pinelands waters are Outstanding National Resource Waters.
FW1/Non-degradation	Nondegradation waters means those waters set aside for posterity because of their clarity, color, scenic setting, other characteristic of aesthetic value, unique ecological significance, exceptional recreational significance, or exceptional water supply significance. These waters include all waters designated as FW1.
C1	Category one waters means those waters designated in the tables in N.J.A.C. 7:9B-1.15(c) through (i), for purposes of implementing the antidegradation policies set forth at N.J.A.C. 7:9B-1.5(d), for protection from measurable changes in water quality based on exceptional ecological significance, exceptional recreational significance, exceptional water supply significance or exceptional fisheries resource(s) to protect their aesthetic value (color, clarity, scenic setting) and ecological integrity (habitat, water quality and biological functions).
C2	Category two waters means those waters not designated as Outstanding National Resource Waters or Category One at N.J.A.C. 7:9B-1.15 for purposes of implementing the antidegradation policies set forth at N.J.A.C. 7:9B-1.5(d).
Source: NJDEP Land Use Management, N.J.A.C. 7:9B Surface Water Quality Standards, April 6, 2020	

E. Total Maximum Daily Loads

As per Section 303(d) of the Clean Water Act, in circumstances where surface waters do not meet the SWQS, Total Maximum Daily Loads (TMDLs) must be developed (US Federal Water Pollution Control Act, January 4, 2011). A TMDL identifies a contributor's impacts to surface water quality and sets goals for load reductions for specific pollutants to meet the SWQS. Regulations concerning TMDLs are contained in EPA's Water Quality Planning and Management Regulations.

The development of TMDLs includes balancing the impacts from point and nonpoint sources as well as the natural background levels of a specific pollutant. The TMDL then quantifies the amount of a pollutant a water body can assimilate without violating the State's Water Quality Standards and allocates that load capacity to known point and nonpoint sources in the form of waste load allocations for point and nonpoint sources plus a margin of safety. Load allocations for nonpoint sources consist of identifying categories that contribute to the parameters of concern and provides recommendations for implementing measures for load reductions. North Haledon's TMDLs are outlined in **Table VI-3**.

Table VI-3: TMDLs

TMDL	Watercourse/Waterbody
Applicable Stream TMDL(s)	
Fecal Coliform	Goffle Brook
Fecal Coliform	Ramapo River near Mahwah between Pompton Lake and NY
Mercury (Air Deposition)	Crystal Lake/Pond Brook
Total Phosphorus	Crystal Lake/Pond Brook
Total Phosphorus	Goffle Brook
Total Phosphorus	Molly Ann Brook
Applicable Lake TMDL(s)	
Fecal Coliform	Crystal Lake
Total Phosphorus	Pompton Lake
Applicable Shellfish TMDL(s)	
None	
Source: NJDEP, Bureau of Nonpoint Pollution Control, August 2020	

F. Point Source Pollution

Point source pollution, according to N.J.A.C. 7:9B Surface Water Quality Standards, refers to a discernible, confined, and discrete conveyance. This can include pipes, ditches, channels, tunnels, conduits, wells, discrete fissures, containers, rolling stock, concentrated animal feeding operations, landfill leachate collection systems, vessels, or other floating crafts that may discharge pollutants. Return flows from irrigated agriculture are excluded from this definition. NJDEP regulates point source discharges under the New Jersey Pollutant Discharge Elimination System (NJPDES).

G. Nonpoint Source Pollution

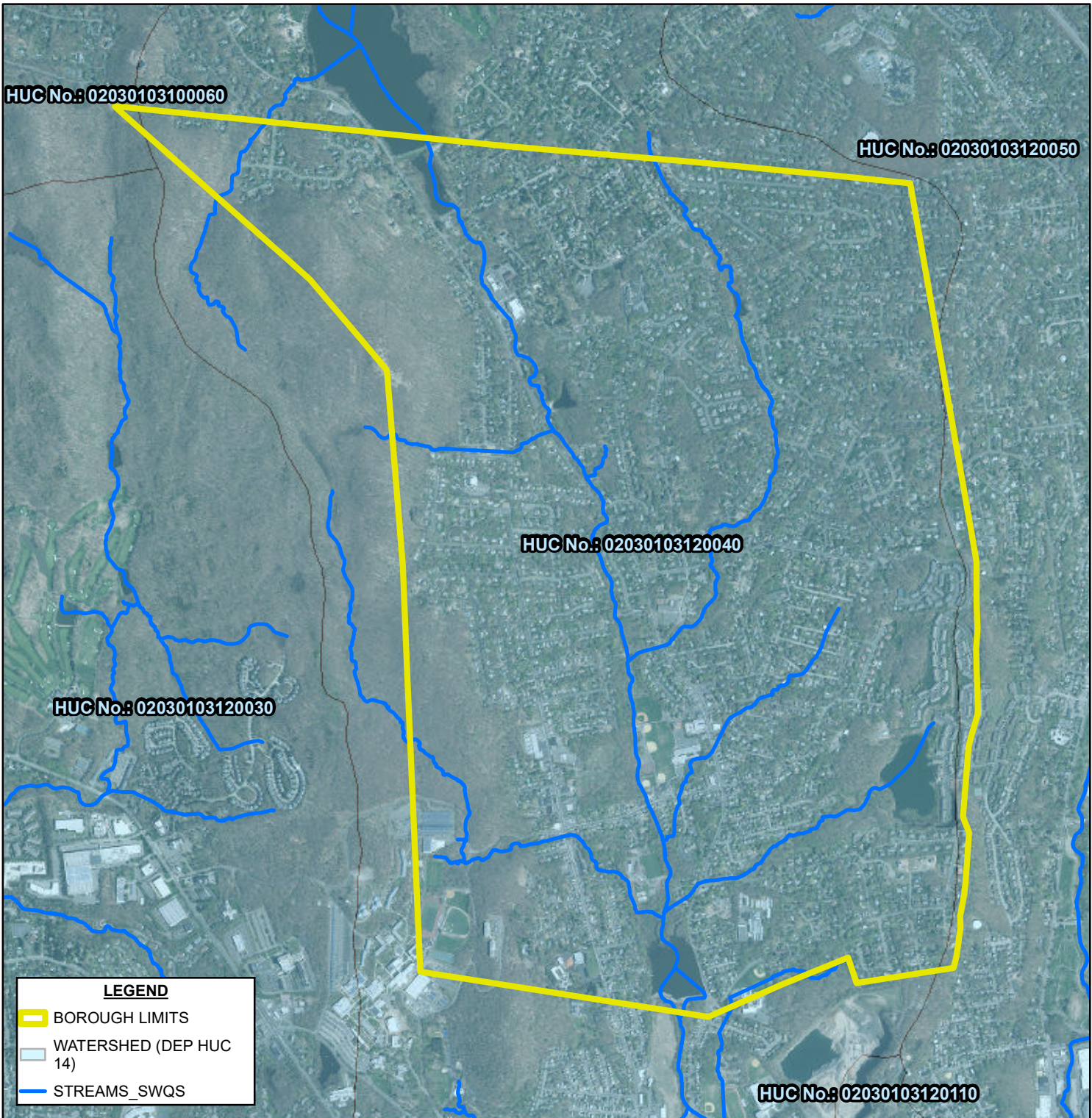
Nonpoint source pollution refers to any man-made or induced activity, factor, or condition, excluding point sources, from which pollutants are or may be discharged. This form of pollution can lead to temporary or permanent changes in the chemical, physical, biological, or radiological characteristics of water, deviating from its natural, pristine condition.

Impervious surfaces are materials that hinder the penetration of water into the soil. The creation of impervious surfaces disrupts the natural water cycle and stands out as one of the major landscape impacts associated with urbanization. The runoff water from impervious surfaces, termed stormwater, eventually flows into streams and rivers, potentially leading to more frequent and severe flood events.

New Jersey's Stormwater Management Rule (N.J.A.C. 7:8) is designed to mitigate runoff, flooding, erosion, and non-point pollution, promoting public safety, as well as ecological and biological integrity. The rule encompasses stipulations for implementing stormwater management measures and developing regional and municipal stormwater management plans.

The Municipal Stormwater Regulation Program is instituted to establish a uniform approach to stormwater management across the state, aiming to streamline processes for regulated entities, minimize costs, and facilitate straightforward authorization requests. Each municipality in the state is categorized under either Tier A or Tier B designation as part of this program.

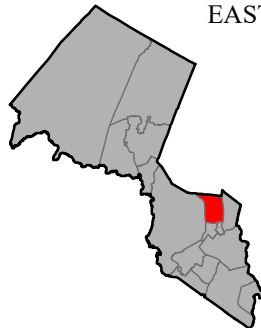
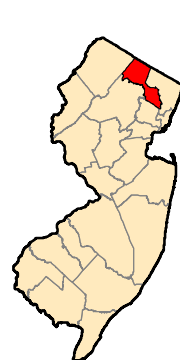
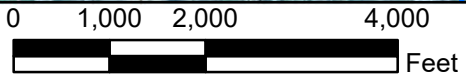
The permits within the Municipal Stormwater Regulation Program are designed to tackle stormwater quality issues associated with both new and existing development and redevelopment. They mandate the creation of a stormwater program and adherence to specific permit requirements. The Tier B Permit places emphasis on new development, redevelopment projects, and public education. Meanwhile, the Tier A Permit includes additional requirements focused on managing stormwater pollutants from existing development. These additional measures encompass public education, waste disposal, controls for solids and floatables, maintenance yard operations, and employee training.



LEGEND

- █ BOROUGH LIMITS
- █ WATERSHED (DEP HUC 14)
- █ STREAMS_SWQS

SOURCE: NJDEP WATERSHED MANAGEMENT AREA DATA LAYER



NORTHING: 775,652
EASTING: 577,771



BOSWELL ENGINEERING
330 PHILLIPS AVE., SOUTH HACKENSACK, N.J. 07606

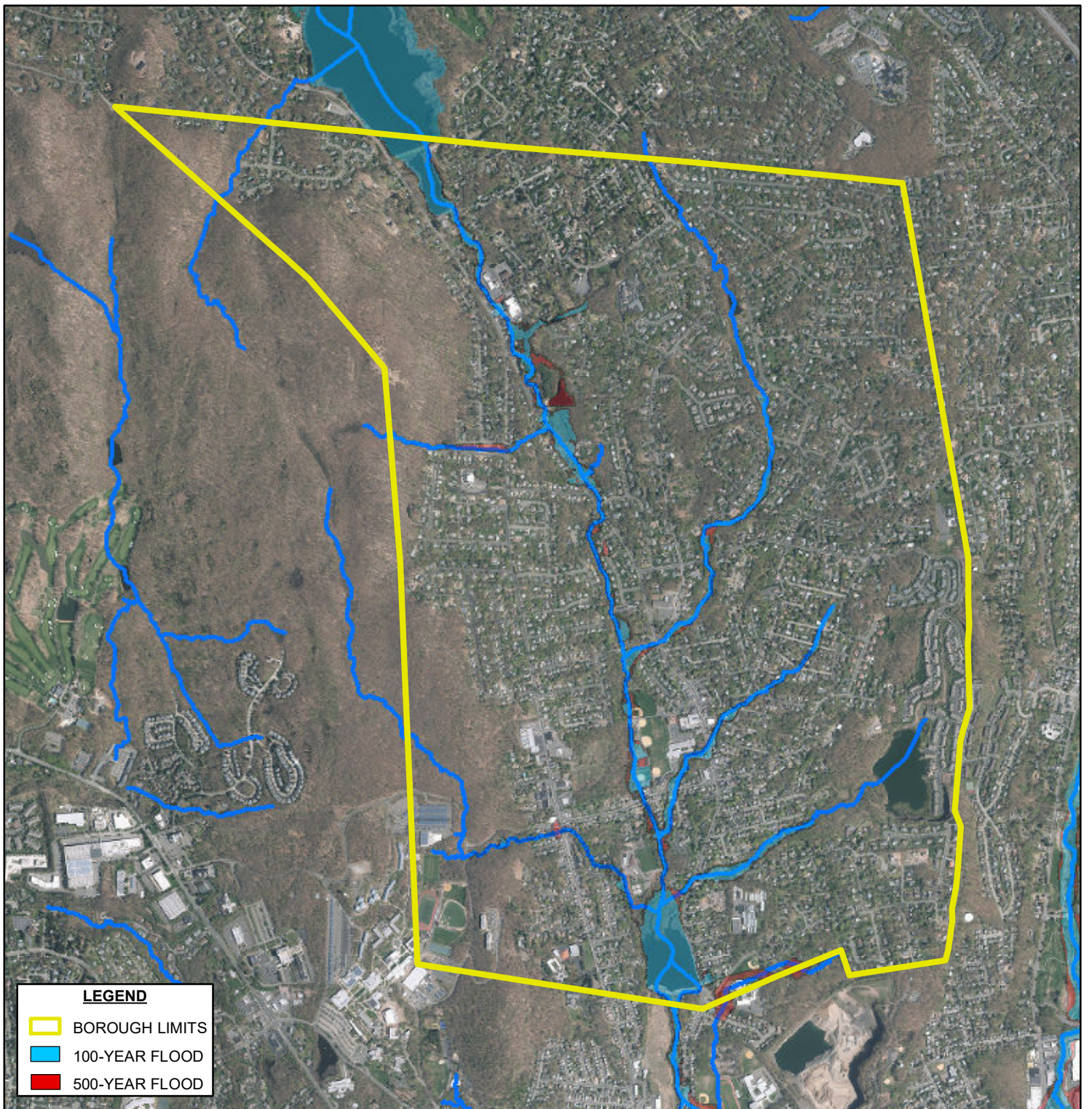
WATERSHED MAP
NATURAL RESOURCES INVENTORY
BOROUGH OF NORTH HALEDON

PASSAIC COUNTY NEW JERSEY

DR. BY: JMW
CKD. BY: FJR

SCALE: 1 IN = 2,000 FT
DATE: NOVEMBER 2023

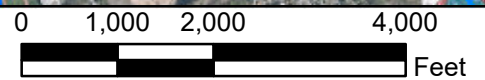
JOB NO. NH-711
FIGURE VI-A



LEGEND

- BOROUGH LIMITS
- 100-YEAR FLOOD
- 500-YEAR FLOOD

SOURCE: PASSAIC COUNTY FEMA FLOOD DATA LAYER



NORTHING: 775,652
EASTING: 577,771



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330 PHILLIPS AVE., SOUTH HACKENSACK, N.J. 07606

FEMA FLOOD MAP
NATURAL RESOURCES INVENTORY
BOROUGH OF NORTH HALEDON

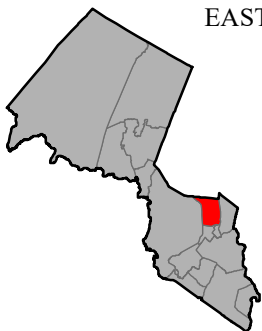
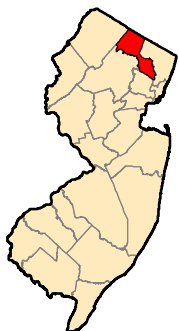
PASSAIC COUNTY

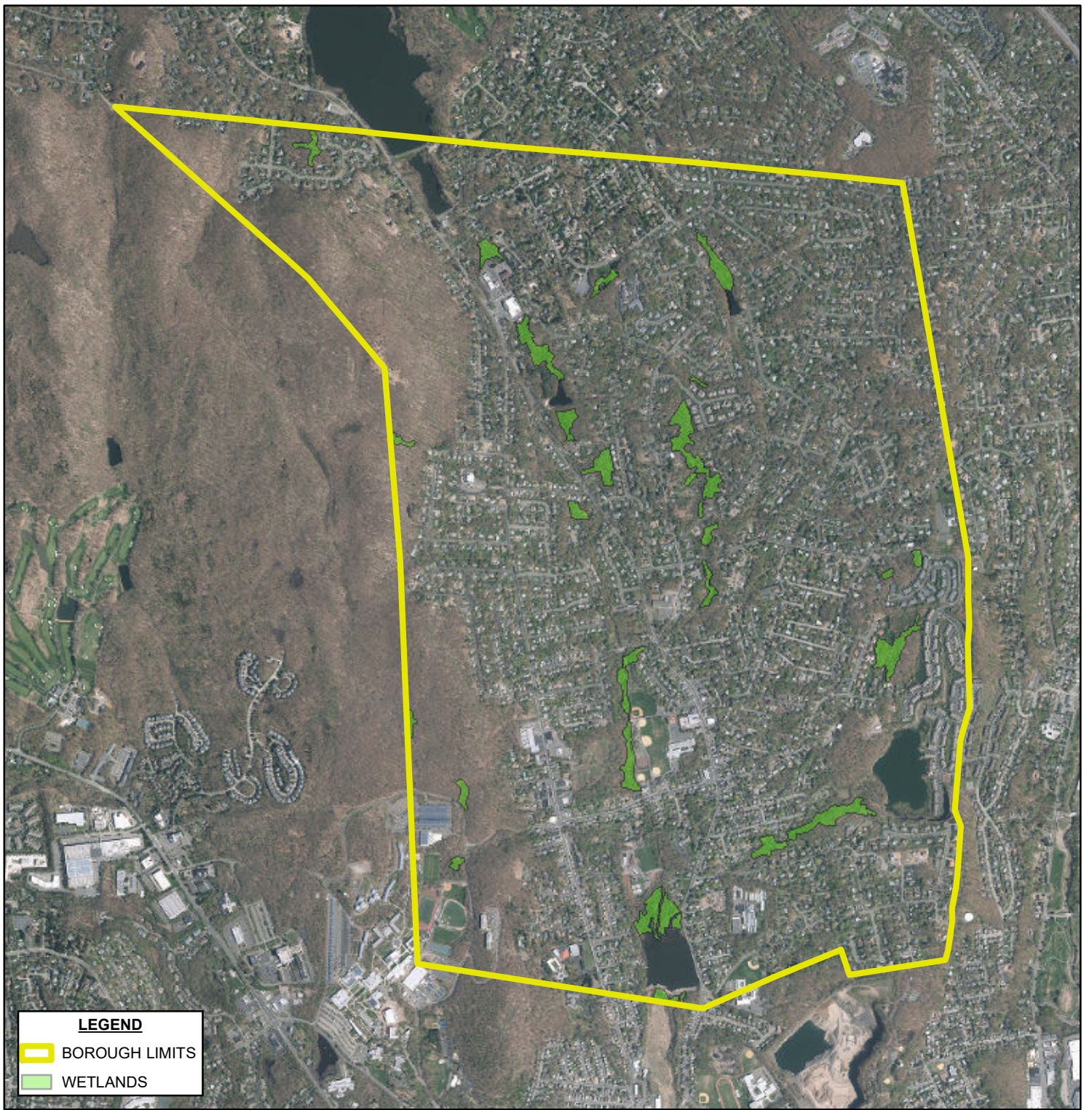
NEW JERSEY

DR. BY: JMW
CKD. BY: FJR

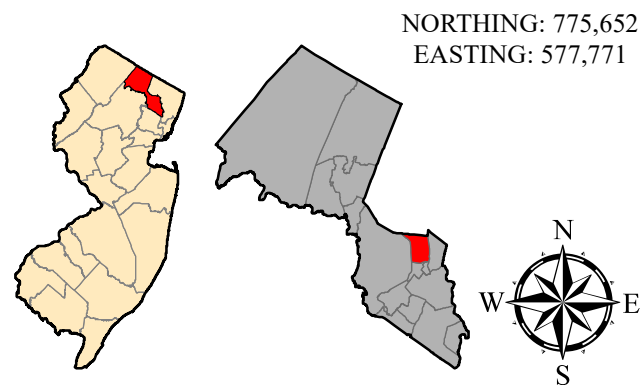
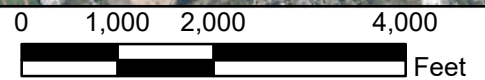
SCALE: 1 IN = 2,000 FT
DATE: NOVEMBER 2023

JOB NO. NH-711
FIGURE VI-B





SOURCE: NJDEP FRESHWATER WETLANDS DATALAYER



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FRESHWATER WETLAND MAP
NATURAL RESOURCES INVENTORY
 BOROUGH OF NORTH HALEDON

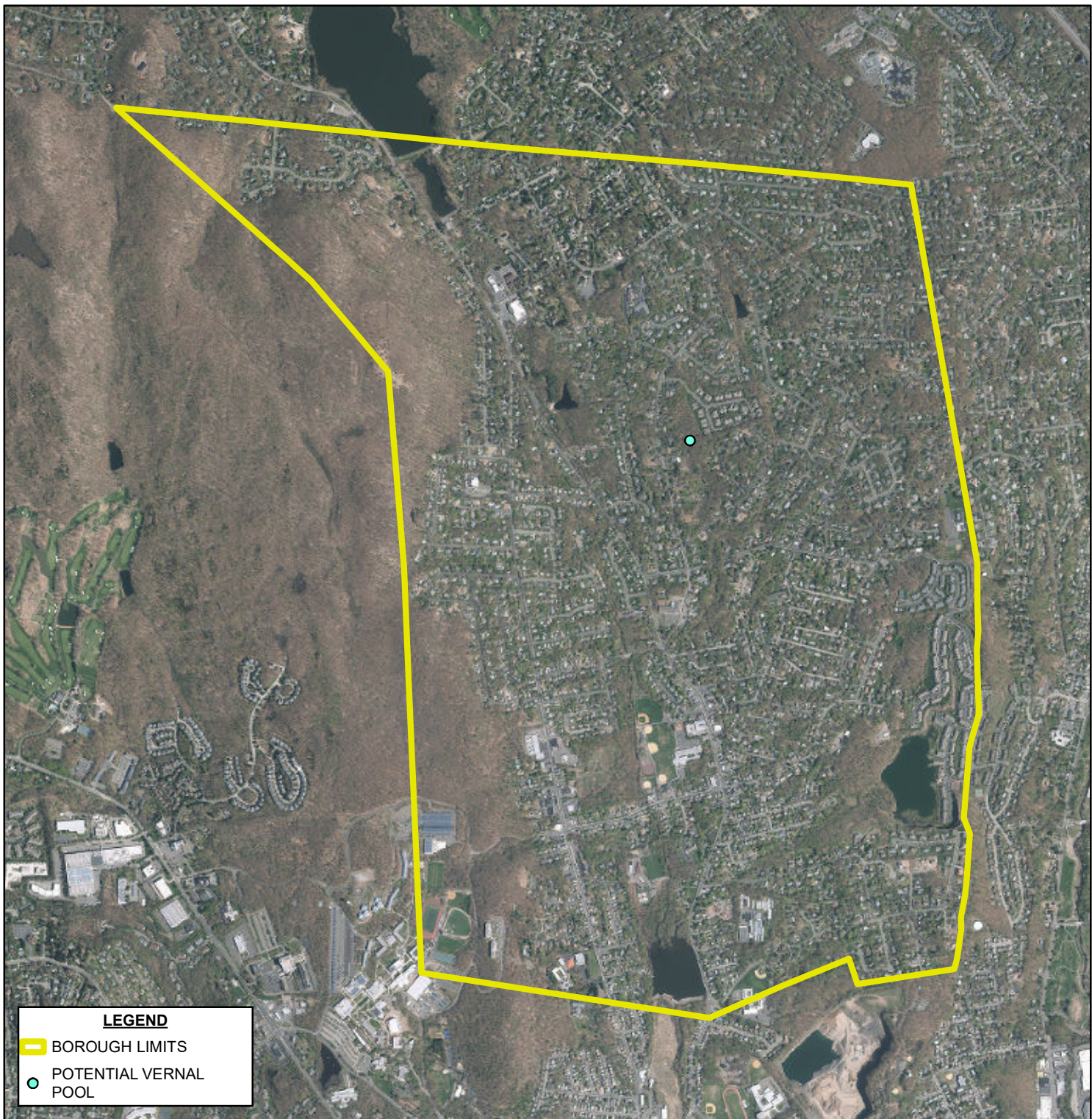
PASSAIC COUNTY

NEW JERSEY



DR. BY: JMW
CKD. BY: FJR

SCALE: 1 IN = 2,000 FT
DATE: NOVEMBER 2023

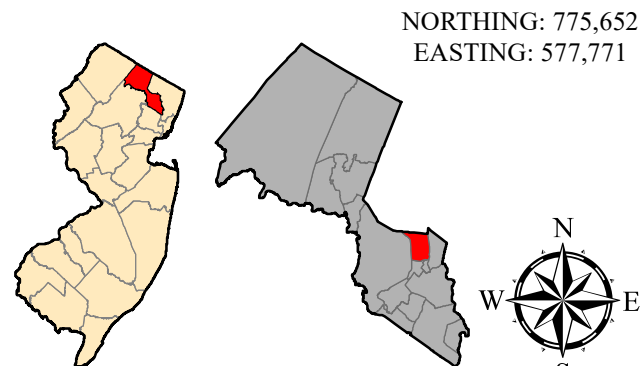
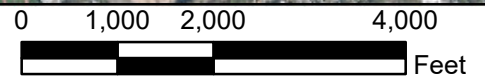
JOB NO. NH-711
FIGURE VI-C



LEGEND

-  BOROUGH LIMITS
-  POTENTIAL VERNAL POOL

SOURCE: NJ NATURAL HERITAGE DATABASE, VERNAL POOLS (VERSION 3.3)



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VERNAL POOL MAP
NATURAL RESOURCES INVENTORY
BOROUGH OF NORTH HALEDON

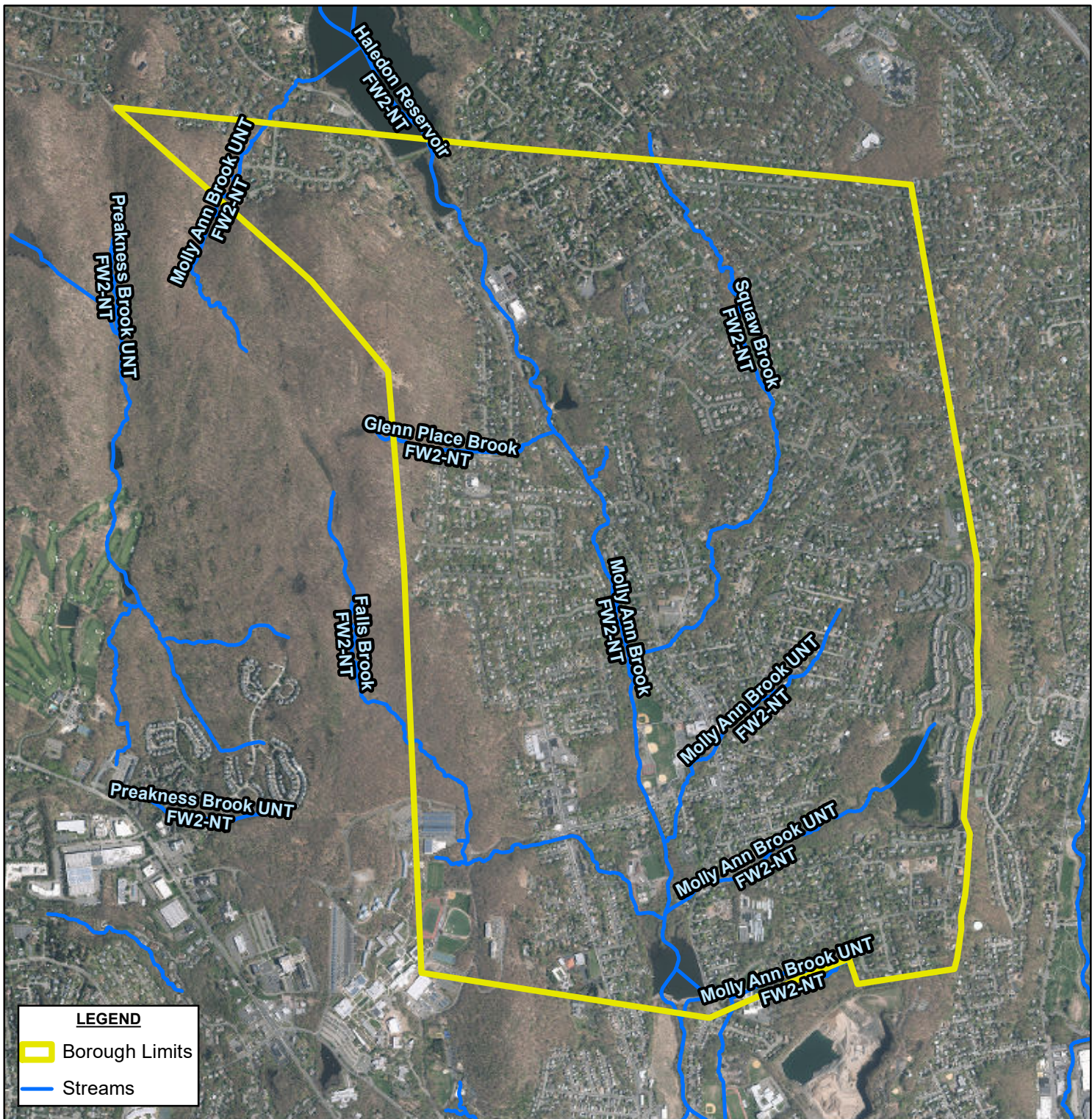
PASSAIC COUNTY

NEW JERSEY

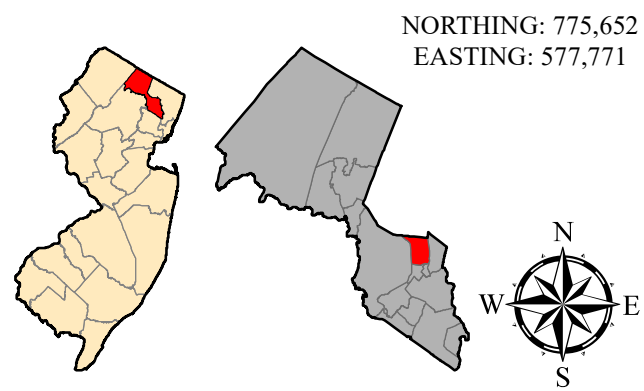
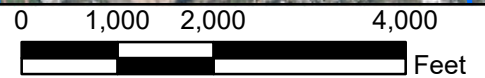
DR. BY: JMW
CKD. BY: FJR


SCALE: 1 IN = 2,000 FT
DATE: NOVEMBER 2023

JOB NO. NH-711
FIGURE VI-D



SOURCE: NJDEP SURFACE WATER QUALITY STANDARDS DATA LAYER



 BOSWELL ENGINEERING 330 PHILLIPS AVE., SOUTH HACKENSACK, N.J. 07606		
SURFACE WATER QUALITY STANDARDS MAP NATURAL RESOURCES INVENTORY BOROUGH OF NORTH HALEDON		
PASSAIC COUNTY		NEW JERSEY
DR. BY: JMW CKD. BY: FJR	SCALE: 1 IN = 2,000 FT DATE: NOVEMBER 2023	JOB NO. NH-711 FIGURE VI-E

VII. Biological Resources

A. Land Cover/Land Use

Habitat fragmentation and loss are identified as significant stressors to statewide ecological quality according to the New Jersey Comparative Risk Project. This issue particularly affects species that rely on large, contiguous habitats. Other factors contributing to ecological health concerns include the introduction of invasive species, the spread of exotic diseases, overpopulation of deer and geese, and pollution. Addressing these challenges is crucial for maintaining a healthy and diverse ecological environment.

The 2015 Land Use/Land Cover data layer was issued by the NJDEP to represent area classification based on infrared and aerial imagery. The land cover classifications are depicted in **Figure VII-A**. The number of acres of each classification within North Haledon is noted in **Table VII-1**.

The majority of the North Haledon falls within the category of Urban Land with the largest portion of the Borough classified as Residential, single unit, low density (32.89%) followed by Residential, Single Unit, Medium Density (23.13%).

Table VII-1: Land Use/Land Cover in North Haledon

Description	Acres	Percent
Urban Land Use Type:		
Residential, high density or multiple dwelling	68.753	3.04
Residential, single unit, medium density	522.010	23.13
Residential, single unit, low density	742.442	32.89
Residential, rural, single unit	57.168	2.53
Commercial/Services	106.88	4.74
Industrial	12.212	0.54
Transportation/Communication/Utilities	11.962	0.53
Stormwater Basin	1.351	0.06
Mixed Urban or Built-Up Land	1.265	0.06
Other Urban or Built-up Land	32.095	1.42
Recreational Land	30.691	1.36
Athletic Fields (schools)	30.11	1.33
Total of all Urban Land Uses (excludes urban wetlands):	1616.939	71.64
Agriculture Land Use Type:		
Orchards/Vineyards/Nurseries/Horticultural Areas	7.923	0.35
Other Agriculture	2.634	0.12
Total of all Agriculture Land Uses (excludes agricultural wetlands):	10.557	0.47
Forest Land Use Type:		
Deciduous Forest (10-50% Crown Closure)	10.079	0.45
Deciduous Forest (>50% Crown Closure)	497.139	22.03
Mixed Forest (>50% Coniferous with >50% Crown Closure)	0.121	0.01
Mixed Forest (>50% Deciduous with >50% Crown Closure)	3.000	0.13

Description	Acres	Percent
Old Field (<25% Brush Covered)	3.160	0.14
Deciduous Brush/Shrubland	3.984	0.18
Mixed Deciduous/Coniferous Brush/Shrubland	1.678	0.07
Total of all Forested Land Uses:	519.161	23.00
Water Land Use Type:		
Streams and Canals	1.217	0.05
Artificial Lakes	42.645	1.89
Total of all Water Land Uses:	43.862	1.94
Wetland Land Use Type:		
Agricultural Wetlands (modified)	0.414	0.02
Deciduous Wooded Wetlands	53.535	2.37
Deciduous Scrub/Shrub Wetlands	1.606	0.07
Total of all Wetland Land Uses:	55.555	2.46
Barren Land Use Type:		
Altered Lands	11.058	0.49
Total of all Barren Land Uses:	11.058	0.49
TOTAL for all Land Use Types:	2257.132	100
Source: NJDEP, January 2019		

B. Wildlife

According to the NJDEP, New Jersey boasts a rich biodiversity, hosting approximately 450 terrestrial wildlife species and over 420 freshwater and marine fish species. This diversity is attributed to the state's unique geographic position, where northern and southern ecosystems converge. New Jersey's varied landscapes, including mountains, valleys, rolling hills, wetlands, pinelands, beaches, estuaries, and rivers, contribute to the abundance of habitats supporting a wide array of species.

The NJDEP website offers checklists for many of the birds, mammals, reptiles, and amphibians of New Jersey. Lists of mammals, reptiles, amphibians, and fish are not available specifically for either Passaic County or the Borough.

Wildlife of Vernal Pools

Vernal pools are confined depressions, either natural or man-made, that maintain ponded water for part of the year, have no permanent outflow, and are devoid of breeding fish populations. These temporary wetlands provide habitats for many species of amphibians, insects, reptiles, plants, and other wildlife. Certification of a vernal pool may be achieved by documenting breeding activity of obligate vernal pool species (see **Table VII-2**).

There is one potential vernal pool within North Haledon (see **Figure VI-D**).

Table VII-2: Obligate and Facultative Fauna Species Found in Vernal Habitats

Obligate Vernal Pool Breeding Species	Facultative Vernal Pool Breeding Amphibians	Reptiles that Inhabit Vernal Pools on a Seasonal Basis
Eastern tiger salamander <i>ENDANGERED</i>	Green frog	Wood turtle <i>THREATENED</i>
Marbled salamander <i>Special Concern</i>	Bullfrog	Spotted turtle <i>Special Concern</i>
Spotted salamander	Pickerel frog	Mud turtle
Jefferson salamander <i>Special Concern</i>	Southern leopard frog	Eastern painted turtle
Blue-spotted salamander <i>ENDANGERED</i>	Carpenter frog <i>Special Concern</i>	Common snapping turtle
Jefferson x Blue-spotted salamander <i>ENDANGERED</i>	Northern spring peeper	
Wood frog	Northern cricket frog	
Eastern spadefoot toad	New Jersey chorus frog	
Fairy shrimp (order Anostraca)	Upland chorus frog	
	Northern gray treefrog	
	Southern gray treefrog <i>ENDANGERED</i>	
	Pine barrens treefrog <i>ENDANGERED</i>	
	Four-toed salamander	
	Long-tailed salamander <i>THREATENED</i>	
Source: NJDEP, Division of Fish & Wildlife, August 2020		

C. Endangered, Threatened, and Special Concern Species

The decline or disappearance of animal or plant species may indicate habitat deterioration. Preserving endangered and threatened species is crucial for human health and quality of life, as it helps protect watersheds, preserve land in its natural state, and restore wildlife habitat.

The NJ Endangered Species Conservation Act, enacted on December 14, 1973 (N.J.S.A. 23:2A-1 - 15), plays a vital role in safeguarding and restoring the state's endangered and threatened wildlife. This legislation addresses the threats faced by these species, including habitat loss, over-exploitation, pollution, and other impacts.

Table VII-3 outlines the definitions used by the NJDEP to describe the status of species. The NJDEP solicits information from the public concerning sightings of endangered, threatened, and special concern species. Appropriate reporting forms should be utilized for submission (see **Appendix D. 3** and **D.4**).

Table VII-3: Definitions of Species Status

STATE STATUS	STATE STATUS DEFINITIONS
<p>Animals: Two animal lists provide state status codes after the Endangered and Nongame Species Conservation Act of 1973 (N.J.S.A. 23:2A-13 et. seq.): the list of endangered species (N.J.A.C. 7:25-4.13) and the list defining status of indigenous, nongame wildlife species of New Jersey (N.J.A.C. 7:25-4.17(a)). The status of animal species is determined by the Endangered and Nongame Species Program (ENSP), with the review and approval of the Endangered and Nongame Species Advisory Committee. Status for animals separated by a slash(/) indicate a dual status. First status refers to the state breeding population, and the second status refers to the migratory or winter population.</p>	
E	<p>An endangered species is one whose prospects for survival within the state are in immediate danger due to one or many factors - a loss of habitat, over exploitation, predation, competition, disease. An endangered species requires immediate assistance or extinction will probably follow.</p>
T	<p>A threatened species is a species that may become endangered if conditions surrounding the species begin to or continue to deteriorate.</p>
SC	<p>The term Special Concern applies to animal species that warrant special attention because of some evidence of decline, inherent vulnerability to environmental deterioration, or habitat modification that would result in their becoming a Threatened species. This category would also be applied to species that meet the foregoing criteria and for which there is little understanding of their current population status in the state.</p>
S	<p>A stable species is one whose population is not undergoing any long-term increase/decrease within its natural cycle.</p>
U	<p>An undetermined species is one about which there is not enough information available to determine the status.</p>
<p>Plants: Plant taxa listed as endangered are from New Jersey's official Endangered Plant Species List (N.J.A.C. 7:5C-5.1).</p>	
E	<p>Native New Jersey plant species whose survival in the State or nation is in jeopardy.</p>
FEDERAL STATUS	FEDERAL STATUS DEFINITIONS
LE	<p>Taxa formally listed as endangered.</p>
LT	<p>Taxa formally listed as threatened.</p>
REGIONAL STATUS	REGIONAL STATUS CODES FOR PLANTS AND ECOLOGICAL COMMUNITIES
LP	<p>Indicates taxa listed by the Pinelands Commission as endangered or threatened within their legal jurisdiction. Not all species currently tracked by the Pinelands Commission are tracked by the Natural Heritage Program. A complete list of endangered and threatened Pineland species is included in the NJ Pinelands Comprehensive Management Plan.</p>
HL	<p>Indicates taxa or ecological communities protected by the Highlands Water Protection and Planning Act within the jurisdiction of the Highlands Preservation Area.</p>
GLOBAL & STATE CODE	<p>The Nature Conservancy developed a ranking system for use in identifying elements (rare species and ecological communities) of natural diversity most endangered with extinction. Each element is ranked according to its global, national, and state (or subnational in other countries) rarity. These ranks are used to prioritize conservation work so that the most endangered elements receive attention first. Definitions for element ranks are after The Nature Conservancy (1982: Chapter 4, 4.1-1 through 4.4.1.3-3).</p>

GLOBAL CODE	GLOBAL ELEMENT RANK DEFINITIONS
G1	Critically imperiled globally because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extinction.
G2	Imperiled globally because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extinction throughout its range.
G3	Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range (e.g., a single western state, a physiographic region in the East) or because of other factors making it vulnerable to extinction throughout its range; with the number of occurrences in the range of 21 to 100.
G4	Apparently secure globally ; although it may be quite rare in parts of its range, especially at the periphery.
G5	Demonstrably secure globally ; although it may be quite rare in parts of its range, especially at the periphery.
GH	Of historical occurrence throughout its range i.e., formerly part of the established biota, with the expectation that it may be rediscovered.
STATE CODE	STATE ELEMENT RANK DEFINITIONS
S1	Critically imperiled in New Jersey because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres). Elements so ranked are often restricted to very specialized conditions or habitats and/or restricted to an extremely small geographical area of the state. Also included are elements which were formerly more abundant, but because of habitat destruction or some other critical factor of its biology, they have been demonstrably reduced in abundance. In essence, these are elements for which, even with intensive searching, sizable additional occurrences are unlikely to be discovered.
S2	Imperiled in New Jersey because of rarity (6 to 20 occurrences). Historically many of these elements may have been more frequent but are now known from very few extant occurrences, primarily because of habitat destruction. Diligent searching may yield additional occurrences.
S3	Rare in state with 21 to 100 occurrences (plant species and ecological communities in this category have only 21 to 50 occurrences). Includes elements which are widely distributed in the state but with small populations/acreage or elements with restricted distribution, but locally abundant. Not yet imperiled in state but may soon be if current trends continue. Searching often yields additional occurrences.
S4	Apparently secure in the state, with many occurrences.
S5	Demonstrably secure in state and essentially ineradicable under present conditions.
SH	Elements of historical occurrence in New Jersey. Despite some searching of historical occurrences and/or potential habitat, no extant occurrences are known. Since not all of the historical occurrences have been field surveyed, and unsearched potential habitat remains, historically ranked taxa are considered possibly extant, and remain a conservation priority for continued field work with the expectation they may be rediscovered.
B	Refers to the breeding population of the element in the state.
N	Refers to the non-breeding population of the element in the state.

Note: To express *uncertainty*, the most likely rank is assigned and a question mark added (e.g., G2?). A range is indicated by combining two ranks (e.g., G1G2, S1S3).

Source: NJDEP Division of Parks and Forestry, March 2010

Endangered, Threatened, and Special Concern Animals

The NJDEP Division of Fish and Wildlife, Endangered, and Nongame Species Program is responsible for the protection and management of New Jersey's wildlife, including 50 endangered, 36 threatened and 100 species currently listed as special concern. For state-wide species lists, see **Appendix C.1, C.2, and C.3**.

Though the Natural Heritage Database has no records of Federally-listed endangered or threatened species in North Haledon, the NJDEP Division of Parks and Forestry Natural Heritage Database sites that North Haledon is home to 2 State Endangered, 1 State Threatened, and 4 Special Concern species (see **Table VII-3** for code definitions and **Table VII-4** for list).

Table VII-4: Natural Heritage Database Animal Species in Oakland

Class	Common Name	Scientific Name	Feature Type	LP Rank	State Protection	Global Rank	State Rank
Aves	Bald Eagle*	<i>Haliaeetus leucocephalus</i>	Foraging	4	State Endangered	G5	S1B,S2N
	Barred Owl*	<i>Strix varia</i>	Breeding Sighting	3	State Threatened	G5	S2B,S2N
	Hooded Warbler	<i>Wilsonia citrina</i>	Breeding Sighting	2	Special Concern	G5	S3B
	Red-shouldered Hawk*	<i>Buteo lineatus</i>	Non-breeding Sighting	2	Special Concern	G4	S1B,S3N
	Wood Thrush	<i>Hylocichla mustelina</i>	Breeding Sighting	2	Special Concern	G5	S3B
Mammalia	Bobcat*	<i>Lynx rufus</i>	Live Individual Sighting	4	State Endangered	G5	S1
Reptilia	Eastern Box Turtle	<i>Terrapene Carolina Carolina</i>	Occupied Habitat	2	Special Concern	G5T5	S3

Source: NJDEP, Natural Heritage Program, August 2020

Rare Plant Species

No formal listing of rare plant species exists for the Borough of North Haledon, however the NJDEP has compiled a listing of rare plant species and ecological communities within the NJ Natural Heritage Database. A complete listing for the County of Passaic can be found in **Appendix D. 1**.

D. Protecting Endangered, Threatened, and Special Concern Species

The Landscape Project

The NJDEP, Division of Fish and Wildlife, Endangered and Nongame Species Program leads the State's Landscape Project. The project is a proactive, ecosystem level approach to the long-term protection of rare species and their important habitats in New Jersey with the goal of protect New Jersey's biological diversity by maintaining and enhancing rare wildlife populations within healthy, functioning ecosystems.

The project provides data that identifies, delineates, and ranks critical habitats defined in **Table VII-5**. Each habitat patch is coded for the number of special concern, state threatened, state endangered, and federally listed species present. North Haledon contains swaths of Rank 1, 2, and 4 habitats (see **Figure VII-B**).

Table VII-5: Landscape Project Habitat Rank Definitions

Rank	Definition
1	Suitable Habitat - Rank 1 is assigned to patches that meet habitat-specific suitability requirements such as minimum size criteria for endangered, threatened or priority wildlife species, but that do not intersect with any confirmed occurrences of such species.
2	Special Concern - Rank 2 is assigned to patches containing one or more occurrences of species considered to be species of special concern
3	State Threatened - Rank 3 is assigned to patches containing one or more occurrences of State threatened species.
4	State Endangered - Rank 4 is assigned to patches with one or more occurrences of State endangered species.
5	Federally Listed - Rank 5 is assigned to patches containing one or more occurrences of wildlife listed as endangered and threatened pursuant to the Federal Endangered Species Act of 1973.
Source: NJDEP Division of Fish and Wildlife, 2017	

E. Invasive Nonindigenous Species

Invasive nonindigenous species are those that have been introduced, either intentionally or unintentionally, outside of their natural geographic range due to human activities. The introduction of these non-native species to an ecosystem can lead to, or is likely to cause, economic or environmental harm, as well as harm to human health. Common negative impacts include the displacement of native species, changes to community structure, and disruption of ecosystem processes.

While there is no official invasive species list for New Jersey, An Overview of Nonindigenous Plant Species in New Jersey profiles 29 nonindigenous plant species that aggressively invade natural plant communities in New Jersey, these are summarized in **Table VII-6**.

Table VII-6: Invasive Nonindigenous Plants

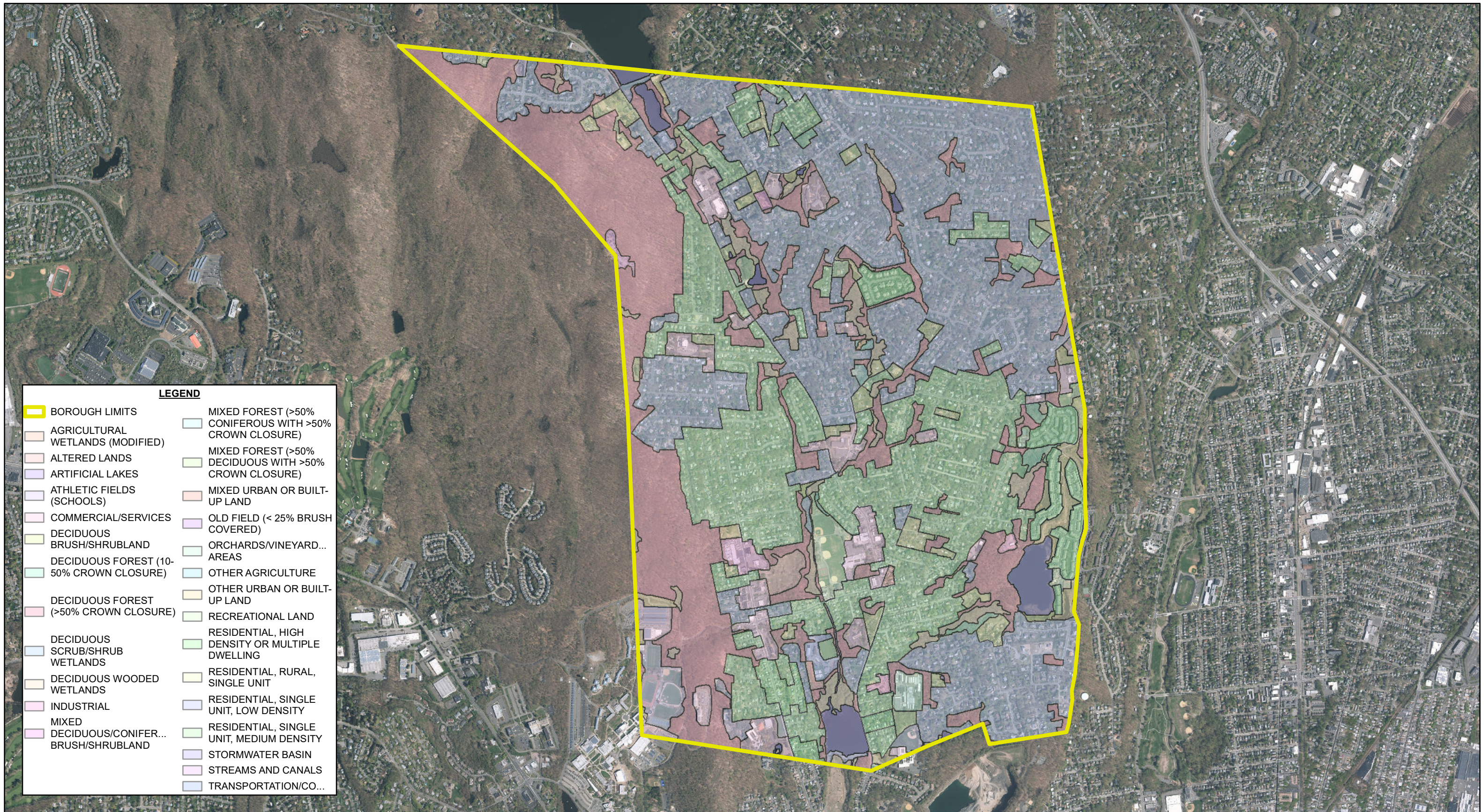
Scientific Name	Common Name	Threats
<i>Acer platanoides</i>	Norway Maple	<ul style="list-style-type: none"> • Aggressive colonizer • Able to survive under a range of habitat conditions • Canopy produces dense shade resulting in decreased understory plant diversity
<i>Ailanthus altissima</i>	Tree of Heaven	<ul style="list-style-type: none"> • Able to propagate rapidly due to prolific seed production with a single tree capable of producing 325,000 seeds in a year • Long taproot allows the species to outcompete indigenous plants for underground resources • Produces a toxin which accumulated in the soil preventing native vegetation from establishing • Quickly and significantly alters plant community structure • Causes disruption to the process of natural plant succession
<i>Alliaria petiolata</i>	Garlic Mustard	<ul style="list-style-type: none"> • Can dominate forested understories and result in a decline in indigenous herb diversity which alters habitat suitability for birds and other animals • May have allelopathic effects, preventing plants from growing near it
<i>Ampelopsis brevipedunculata</i>	Porcelain Berry	<ul style="list-style-type: none"> • Forms thick mats (blanketing the ground and trees and shrubs on forest edges) • Reduces the ability for the establishment of indigenous plant species • Increases vulnerability, of the trees that it covers, to wind and ice damage
<i>Berberis thunbergii</i>	Japanese Barberry	<ul style="list-style-type: none"> • Can grow in sun or shade and in many soil types • Branches touching the ground can root, and new shoots can develop from underground roots. • Shades out indigenous understory plants, decreasing biodiversity in the understory of open forests and limiting resources for birds and other animals dependent on native plants • Affects soil properties, specifically pH, which can impact plant establishment • Severe infestations can result in the formation of nearly impenetrable thorny thickets that impact the recreational value of natural lands
<i>Carex kobomugi</i>	Japanese Sedge	<ul style="list-style-type: none"> • Stems form dense mats that crowd out indigenous dune species • Leaves dunes vulnerable to shifting sands and blowouts, with the potential to change dune profiles dramatically • In areas dense monocultures form, 10 to 20 meters across, effectively excluding most native species
<i>Celastrus orbiculatus</i>	Asian Bittersweet	<ul style="list-style-type: none"> • Produces twining branches that constrict the trunks and branches of trees and shrubs • Prolific vegetative growth can over-top and out shade native species resulting in increased susceptibility to damage by wind, snow, and ice storms • Forms pure stands over some areas • Threatens dune areas by altering erosion patterns and outcompeting native dune vegetation

<i>Centaurea biebersteinii</i>	Spotted Knapweed	<ul style="list-style-type: none"> • Resistant to herbivores • Outcompetes and replaces indigenous plant species • High concentrations of leachates inhibit the germination of grass and conifer seedlings • Increases erosion by displacing native root systems with its taproot • May contain a carcinogen that causes tumors in humans • Invades rare natural plant communities, replacing native plant species and significantly altering plant community structure
<i>Cirsium arvense</i>	Canada Thistle	<ul style="list-style-type: none"> • Significant economic impact on agriculture • Competes with and displaces native vegetation, changing the structure and composition of some habitats • Primarily threatens non-forested plant communities, such as savannas, glades, sand dunes, fields, and meadows
<i>Dipsacus fullonum</i> ssp. <i>sylvestris</i>	Wild Teasel	<ul style="list-style-type: none"> • Prolific seed production with a mature plant capable of producing over 2,000 seeds • Seeds remain viable in the soil for up to two years • Though seeds are not widely dispersed, they can produce a monoculture • Highway mowing equipment and discarded dried teasel heads from flower arrangements can lead to the establishment of new colonies • The large rosette leaves prevent native species from persisting or establishing • Significantly alter the structure of rare natural plant communities and reduce plant diversity
<i>Dipsacus laciniatus</i>	Cut-Leaf Teasel	
<i>Elaeagnus umbellata</i> var. <i>parvifolia</i>	Autumn Olive	<ul style="list-style-type: none"> • Affect the nitrogen cycle of native communities on poor soils • Grows rapidly, resprouts when cut, and is a strong competitor • Produces dense shade, suppressing plants that require sunlight • Can form dense monocultures that alter the structure of natural plant communities and reduces plant diversity
<i>Euonymus alatus</i>	Winged Spindletree	<ul style="list-style-type: none"> • Replaces native shrubs in some woodland habitats and alters the structure of natural plant communities • Open woodlands and flood plain forests are particularly vulnerable, but upland forests are also invaded
<i>Lespedeza cuneata</i>	Chinese Bush-Clover	<ul style="list-style-type: none"> • Threat to open areas including meadows, open woodlands, and wetland borders • Forms dense stands that prevent establishment of indigenous species • Develops an extensive seed bank in the soil that allows it to persist for many years • Disrupts patterns of natural succession and displaces shade intolerant early successional species • High tannin content in the leaves makes it inedible for native wildlife

<i>Lonicera japonica</i>	Japanese Honeysuckle	<ul style="list-style-type: none"> • Spreads rapidly and is a strong competitor, for both above and below-ground resources • Root competition decreases the growth of native trees and vines • Engulfs small trees and shrubs, causing them to collapse under the weight of the vines, altering forest structure • Forms a dense ground cover that prevents native trees, shrubs, and herbs from reestablishing • Occupies habitats of rare plants contributes to their decline • Leafy very early in the spring, inhibiting flowering by spring ephemerals
<i>Lonicera morrowii</i>	Morrow's Bush Honeysuckle	<ul style="list-style-type: none"> • Rapidly forms a dense shrub layer, altering light availability to understory plants and depleting soil moisture and nutrients • Fruit and vegetative parts may have allelopathic effects • Competes with indigenous plants for pollinators, reducing distribution of indigenous plants
<i>Lonicera tatarica</i>	Twinsisters or Tartarian Honeysuckle	
<i>Lythrum salicaria</i>	Purple Loosestrife	<ul style="list-style-type: none"> • Displaces native vegetation through rapid growth and heavy seed production • Forms near monocultures that alter the structure of natural plant communities and reduce biological diversity • Dense stands can change drainage patterns by restricting the flow of water • Wildlife can be affected by the displacement of indigenous plants
<i>Melilotus officinalis</i>	Yellow Sweetclover	<ul style="list-style-type: none"> • Threatens plants species that depend on open areas such as stream edges, fens, floodplains, and dunes • Forms dense stands that prevent or reduce the establishment of indigenous species • Significantly alters the structure of natural plant communities and disrupts the process of natural plant succession • Produces a large number of seeds that remain viable in the seed bank for several years
<i>Microstegium vimineum</i>	Japanese Stiltgrass	<ul style="list-style-type: none"> • Alters the structure of natural plant communities and reduces biodiversity by displacing indigenous herbaceous vegetation • Rapidly forms monocultures that are sometimes acres in extent • Alters light, moisture regimes, and seed germination as a result of rapid and dense growth • Raises pH and reduces the organic horizons in soils

<i>Myriophyllum spicatum</i>	Eurasian Water-Milfoil	<ul style="list-style-type: none"> • Begins growing earlier in spring than most indigenous aquatic plants • Rapidly forms a dense canopy that overtops, outshades, and outcompetes surrounding vegetation resulting in the decline of indigenous plant diversity and abundance • Significantly spread by recreational activities, such as swimming and boating • Affects waterfowl due to lower food value than native plants • Supports a lower abundance and diversity of invertebrates, affecting fish populations • Dense cover allows for higher survival rates of young fish but limits the foraging space of larger and predatory fish • Lowers water quality and dissolved oxygen levels due to the decay of the thick vegetation • Reduces the amount of light reaching lower growing aquatic plant species
<i>Polygonum cuspidatum</i>	Japanese Knotweed	<ul style="list-style-type: none"> • Dense growth begins in early spring, preventing indigenous species from establishing, reducing species diversity, and wildlife habitat • Favors damp growing environments putting riparian corridors at a high invasion risk • Increases flooding risk by decreasing water flow through stream channels • Extremely persistent
<i>Polygonum perfoliatum</i>	Mile-a-Minute	<ul style="list-style-type: none"> • Overtakes native vegetation, smothering seedlings, and outcompeting mature plants due to rapid and dense growth • Significantly alters the structure of natural plant communities and reduces biodiversity • Concern in wet meadows that may harbor rare wetland plants
<i>Potamogeton crispus</i>	Curly Leaf Pondweed	<ul style="list-style-type: none"> • Begins to grow earlier in spring than most other aquatic species, and forms dense beds that can outshade and outcompete native aquatics • Forms dense mats that disrupt boating, swimming, and fishing
<i>Ranunculus ficaria</i>	Lesser Celadine	<ul style="list-style-type: none"> • Forms near monocultures of extensive acreage in the early spring • Poses a serious threat to indigenous spring ephemerals due to early emergence and aggressive growth • Significantly alters the structure of natural plant communities
<i>Rhamnus cathartica</i>	Common Buckthorn	<ul style="list-style-type: none"> • Poses a serious threat to indigenous vegetation due to long growing season and rapid growth rate • Rapidly forms dense thickets that outcompete indigenous plants for light and other resources • All parts of the plant are poisonous to humans if ingested • Act as an alternate host for the fungus that causes oat rust.

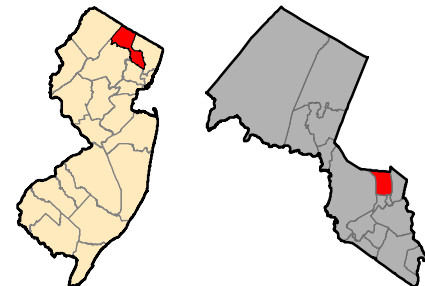
<i>Robinia pseudoacacia</i>	Black Locust	<ul style="list-style-type: none"> • Forms dense stands in open habitats such as old fields and grasslands • Alters the process of natural succession and displaces indigenous plant species • In riparian habitats, especially floodplain forests, it can become dominant in the overstory • Changes the available soil nutrients in plant communities as a nitrogen fixing plant • The seeds, leaves, and bark are toxic to humans and livestock
<i>Rosa multiflora</i>	Multiflora Rose	<ul style="list-style-type: none"> • Produces dense, impenetrable monocultures that exclude indigenous plants and restrict the movement of some animals • Strong competitor for below-ground resources, inhibiting the growth of indigenous plant species and also commercial crops in adjacent agricultural fields • Tolerant of some shade and of a range of moisture conditions, enabling it to invade a variety of natural plant communities • Significantly alters natural plant community structures and reduces biodiversity
<i>Rubus phoenicolasius</i>	Wineberry	<ul style="list-style-type: none"> • Forms extensive, nearly impenetrable understory layers in favorable locations such as moist soils in forests over dolomite, marble, shale, diabase, and traprock • Alters the structure of natural plant communities, outcompetes rare or declining plant species, and contributes to the loss of biodiversity
Source: NJDEP, An Overview of Nonindigenous Plant Species in New Jersey, February 2004		



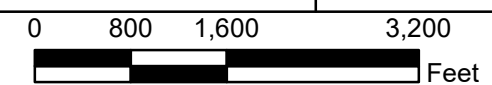
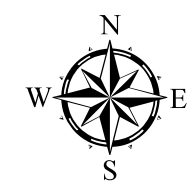
LEGEND

- BOROUGH LIMITS
- AGRICULTURAL WETLANDS (MODIFIED)
- ALTERED LANDS
- ARTIFICIAL LAKES
- ATHLETIC FIELDS (SCHOOLS)
- COMMERCIAL/SERVICES
- DECIDUOUS BRUSH/SHRUBLAND
- DECIDUOUS FOREST (10-50% CROWN CLOSURE)
- DECIDUOUS FOREST (>50% CROWN CLOSURE)
- DECIDUOUS SCRUB/SHRUB WETLANDS
- DECIDUOUS WOODED WETLANDS
- INDUSTRIAL
- MIXED DECIDUOUS/CONIFER... BRUSH/SHRUBLAND
- MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)
- MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)
- MIXED URBAN OR BUILT-UP LAND
- OLD FIELD (< 25% BRUSH COVERED)
- ORCHARDS/VINEYARD... AREAS
- OTHER AGRICULTURE
- OTHER URBAN OR BUILT-UP LAND
- RECREATIONAL LAND
- RESIDENTIAL, HIGH DENSITY OR MULTIPLE DWELLING
- RESIDENTIAL, RURAL, SINGLE UNIT
- RESIDENTIAL, SINGLE UNIT, LOW DENSITY
- RESIDENTIAL, SINGLE UNIT, MEDIUM DENSITY
- STORMWATER BASIN
- STREAMS AND CANALS
- TRANSPORTATION/CO...

SOURCE: NJDEP LAND USE/ LAND COVER 2015 DATA LAYER



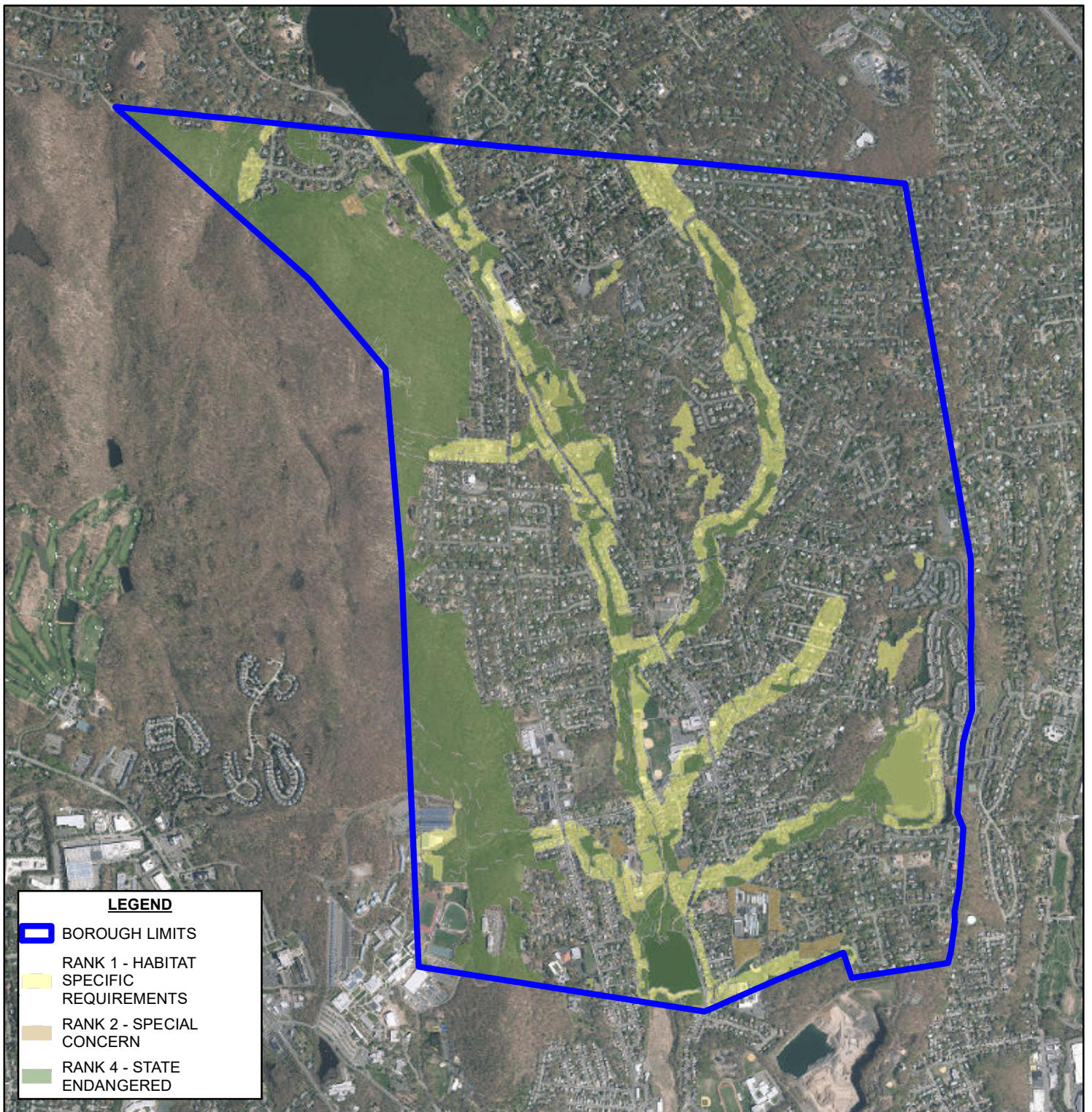
NORTHING: 775,652
EASTING: 577,771



LANDUSE LABEL MAP
NATURAL RESOURCES INVENTORY
BOROUGH OF NORTH HALEDON

PASSAIC COUNTY NEW JERSEY

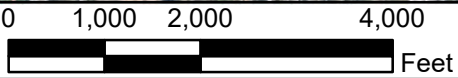
DR. BY: JMW SCALE: 1 IN = 1,600 FT JOB NO. NH-711
CKD. BY: FJR DATE: NOVEMBER 2023 FIGURE VII-A



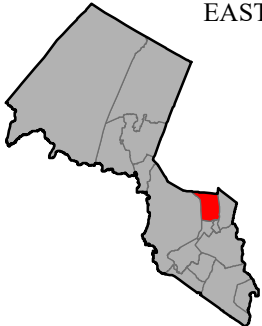
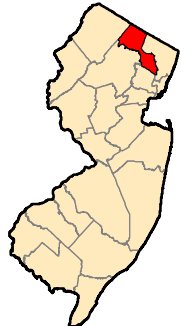
LEGEND

- BOROUGH LIMITS
- RANK 1 - HABITAT SPECIFIC REQUIREMENTS
- RANK 2 - SPECIAL CONCERN
- RANK 4 - STATE ENDANGERED

SOURCE: NJ NATURAL HERITAGE DATABASE, THREATENED AND ENDANGERED SPECIES (VERSION 3.3)



NORTHING: 775,652
EASTING: 577,771



BOSWELL ENGINEERING
330 PHILLIPS AVE., SOUTH HACKENSACK, N.J. 07606

**THREATENED AND ENDANGERED SPECIES
NATURAL RESOURCES INVENTORY
BOROUGH OF NORTH HALEDON**

PASSAIC COUNTY

NEW JERSEY

DR. BY: JMW
CKD. BY: FJR

SCALE: 1 IN = 2,000 FT
DATE: NOVEMBER 2023

JOB NO. NH-711
FIGURE VII-B

VIII. Open Space and Recreation

A. Purposes and Funding

The objectives of open space preservation include:

- Ensuring sufficient opportunities for both active and passive recreation;
- Providing recreational and open space options that are accessible to all citizens.;
- Safeguarding water quality and groundwater recharge areas.;
- Preserving sensitive environmental features;
- Protecting historic areas;
- Maintaining biodiversity;
- Minimize erosion or damage from flooding; and
- Preserving the rural character of the area.

Open space preservation is financed through a range of channels, encompassing municipal, county, state, and federal government allocations, as well as contributions from private land trusts. Private land trusts, typically non-profit organizations, often exhibit agility and creativity in real estate transactions, outpacing established government agencies. Landowners can realize tax advantages by making charitable donations to a land trust. Successful open space initiatives frequently leverage a combination of funding sources and strategies.

B. Open Space and Recreation

An updated inventory of the preserved open space and recreation properties within the Borough is presented in **Table VIII-1** and **Figure VIII-A**. A total approximately 240 acres (20 State, 158 Land Trust, 40 acres municipal land, 20 owned by the Borough of Franklin Lakes, and less than an acre owned by Wayne Township) have been preserved in North Haledon, which is approximately 11% of the Borough.

State and Land Trust Open Space

High Mountain Park Preserve

High Mountain Park Preserve, founded in 1993, spans 1,260 acres in Passaic County, with around 200 acres extending into the Borough of North Haledon. Various sections of the preserve are under the ownership of different entities, including The Nature Conservancy, the State of New Jersey, and the Township of Wayne. This expansive area comprises woodlands and wetlands, making it the most extensive forested land east of the Highlands.

The land is the home of a variety of State-listed rare and threatened plants and wildlife. The terrain is rolling to steep and offers 11.5 miles of challenging hiking trails. Scenic

vistas from the summit of High Mountain include views of the New York City skyline and northern New Jersey. Additionally, several rock shelters can be found in the Franklin Clove section of the nature preserve which have been determined to be sites of prehistoric human habitation.

Municipal Open Space

Indian Trail Park

Indian Trail Park is an approximately 3-acre park located at the intersection of Indian Trail and Moccasin Road. The Squaw Brook runs along the western border of the property. The park consists of a playground and a basketball court.

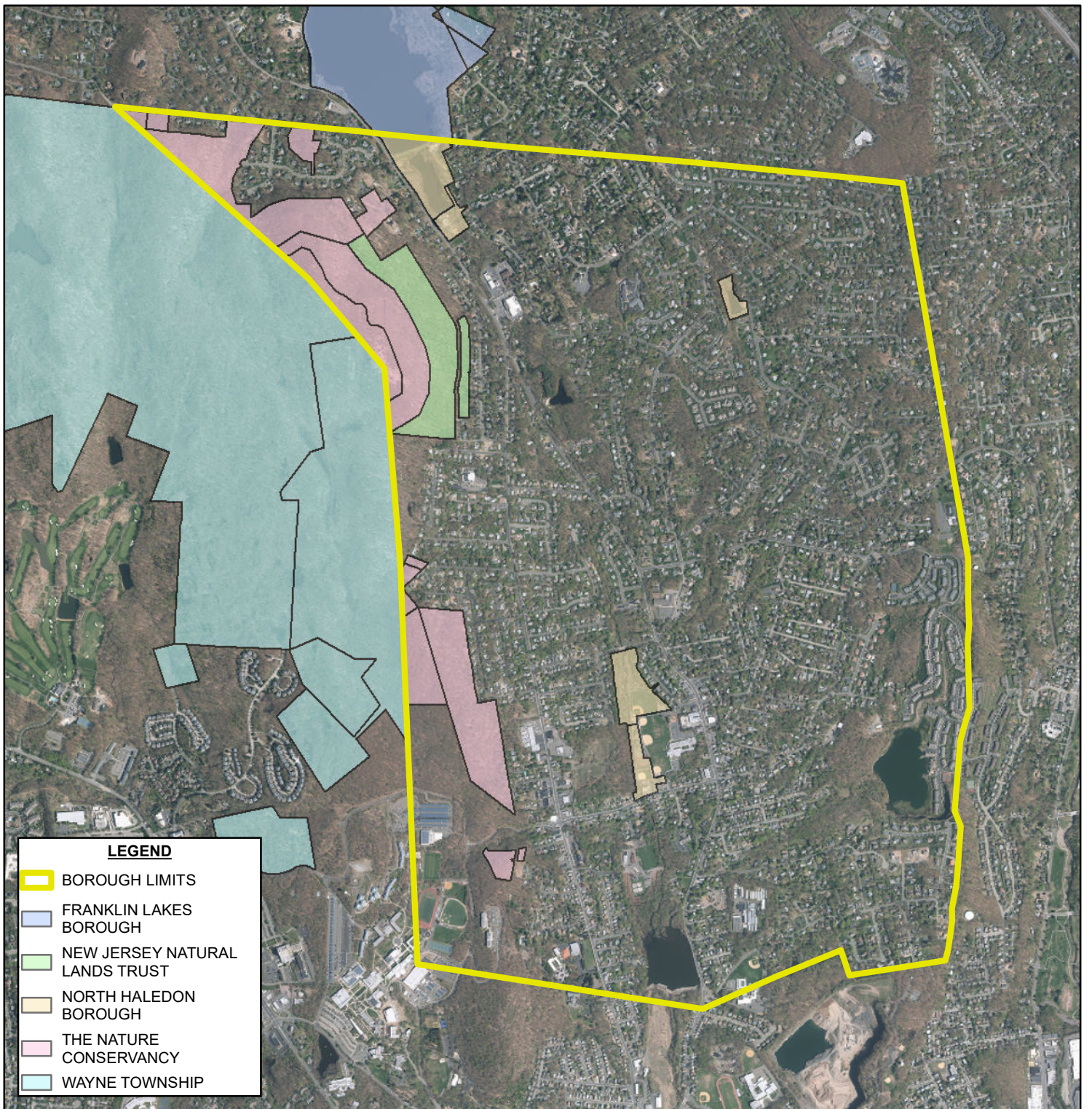
Rec Fields

The North Haledon Rec Fields are comprised of two lots totaling approximately 17 acres. It is located on Brookview Drive and Overlook Avenue. The Molly Ann Brook runs through the western portion of the property. The park consists of athletic fields, including baseball and softball fields, tennis courts, batting cages, and a pavilion. A few wooded areas are along the edges of the property.

Table VIII-1: Preserved Open Space & Recreation Areas

Owner	Park Name	Block	Lot	Acres
Franklin Lakes Borough	Haledon Reservoir	70	6.02	0.085
Franklin Lakes Borough	Haledon Reservoir	70	5	16.236
Franklin Lakes Borough	Haledon Reservoir	70	5	3.866
The Nature Conservancy	High Mountain Park Preserve	54	66.01	4.637
New Jersey Natural Lands Trust-S	High Mountain Park Preserve	72	36	4.375
The Nature Conservancy	High Mountain Park Preserve	31	65.06	0.824
The Nature Conservancy	High Mountain Park Preserve	31	65	2.467
New Jersey Natural Lands Trust-S	High Mountain Park Preserve	54	34.15	36.005
The Nature Conservancy	High Mountain Park Preserve	75	14	4.081
The Nature Conservancy	High Mountain Park Preserve	74	1	1.711
The Nature Conservancy	High Mountain Park Preserve	31	23	35.426
Wayne Township	High Mountain Park Preserve	3000	1	0.022
The Nature Conservancy	High Mountain Park Preserve	1	26	0.427
The Nature Conservancy	High Mountain Park Preserve	1	6	3.315
The Nature Conservancy	High Mountain Park Preserve	54	34.17	15.619
The Nature Conservancy	High Mountain Park Preserve	54	34.16	35.421
The Nature Conservancy	High Mountain Park Preserve	74	33	42.459
The Nature Conservancy	High Mountain Park Preserve	31	24.02	12.727
North Haledon Borough	Indian Trail Park	61.06	4	3.089
North Haledon Borough	Rec Fields	34	16	11.251
North Haledon Borough	Rec Fields	18.01	4.02	5.766
Total Acres:				239.809

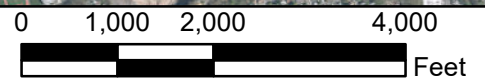
Source: NJDEP, August 2020



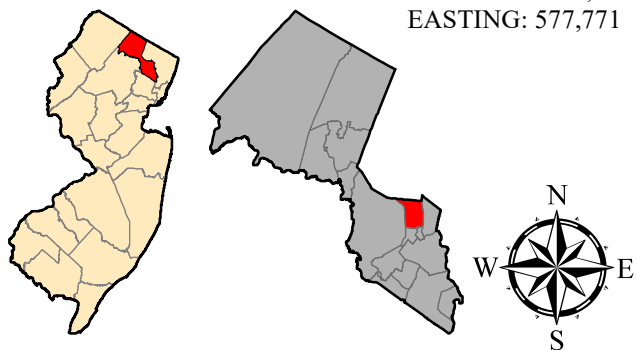
LEGEND

- BOROUGH LIMITS
- FRANKLIN LAKES BOROUGH
- NEW JERSEY NATURAL LANDS TRUST
- NORTH HALEDON BOROUGH
- THE NATURE CONSERVANCY
- WAYNE TOWNSHIP

SOURCE: NJDEP OPEN SPACE DATALAYER



NORTHING: 775,652
EASTING: 577,771



BOSWELL ENGINEERING

330 PHILLIPS AVE., SOUTH HACKENSACK, N.J. 07606

OPEN SPACE MAP (GREEN ACRES)
NATURAL RESOURCES INVENTORY
BOROUGH OF NORTH HALEDON

PASSAIC COUNTY

NEW JERSEY

DR. BY: JMW
CKD. BY: FJR

SCALE: 1 IN = 2,000 FT
DATE: NOVEMBER 2023

JOB NO. NH-711
FIGURE VIII-A

IX. Regional Relationships

A. Water Supply Planning

The Water Supply Management Act (N.J.S.A. 58:1A-1) provides recommendations for managing the State's surface and groundwater supplies to ensure adequate water supply in the event of drought and that the aquifers are not depleted.

The initial Statewide Water Supply Plan, crafted in 1982, led to the implementation of the Wanaque South/Monksville Reservoir Project in Passaic County. In 1996, the Statewide Water Supply Plan underwent a revision that proposed enhancements to water resource protection, supply and delivery management, and water conservation. In alignment with these objectives, the NJDEP formulated Water Quality Planning Rules to ensure that water supply withdrawals do not impede the assimilative capacity of streams, rivers, and estuaries.

Furthermore, water providers, including Manchester Utilities, are mandated to create and execute water conservation plans during drought periods.

B. Water Quality Management Planning

Watershed management is the process of managing water resources within the vicinity of a watershed, rather than on a site-specific basis. This approach is based on three main components: 1) a geographic focus, 2) continuous improvement based on sound science, and 3) partnerships and stakeholder involvement.

The NJDEP regulates watershed management under the Statewide Water Quality Management (WQM) Planning Rules (N.J.A.C. 7:15). Additionally, the regulations provide guidance for developing and adopting a Wastewater Management Plan (WMP). The purpose of a WMP is to outline 20-year planning for wastewater and other water quality concerns. The Rules were last amended on November 7, 2016 and detailed as follows:

- Procedures for the preparation, adoption, amendment, revision, and certification of Water Quality Management (WQM) Plans;
- Procedures for the NJDEP's review of projects and activities for consistency with WQM plans;
- Adoption of other NJDEP rules, priority systems and project priority lists, sludge management plans, regional stormwater management plans, effluent limitations, wastewater management plans, 201 Facilities Plans, and other documents in WQM Plans;
- Coordination of WQM planning with the Highlands RMP, other programs and municipal zoning;
- Mechanisms to resolve conflicts;

- Procedures for submission, adoption, and updating wastewater management plans (WMPs) (wastewater planning responsibility is assigned to counties and requires them to update the WMPs); and
- The process for identifying water bodies on the List of Water Quality Limited Segments and establishing total maximum daily loads (TMDLs) (see **Section VI. E** for more about TMDLs).

C. State Development and Redevelopment Plan

As per N.J.S.A. 52:18A-200(f), the New Jersey Department of State's Business Action Center Office for Planning Advocacy "coordinates statewide planning to protect the environment and guide future growth into compact, mixed-use development and redevelopment. The office implements the goals of the State Development and Redevelopment Plan to achieve comprehensive, long-term planning; and integrates that planning with programmatic and regulatory land-use decisions at all levels of government and the private sector."

The State Plan Policy Map depicts three major components including: Planning Areas, Designated Centers, and Pineland Management Areas. There are five general Planning Areas: Metropolitan (PA1), Suburban (PA2), Fringe (PA3), Rural (PA & PA4B), and Environmentally Sensitive (PA5 & PA5B).

The majority of the Borough of North Haledon (99.98%) is within the Metropolitan Planning Area (PA1) (**Figure IX-A** and **Table IX-1**). The State Plan's goals for the Metropolitan Planning Area are to:

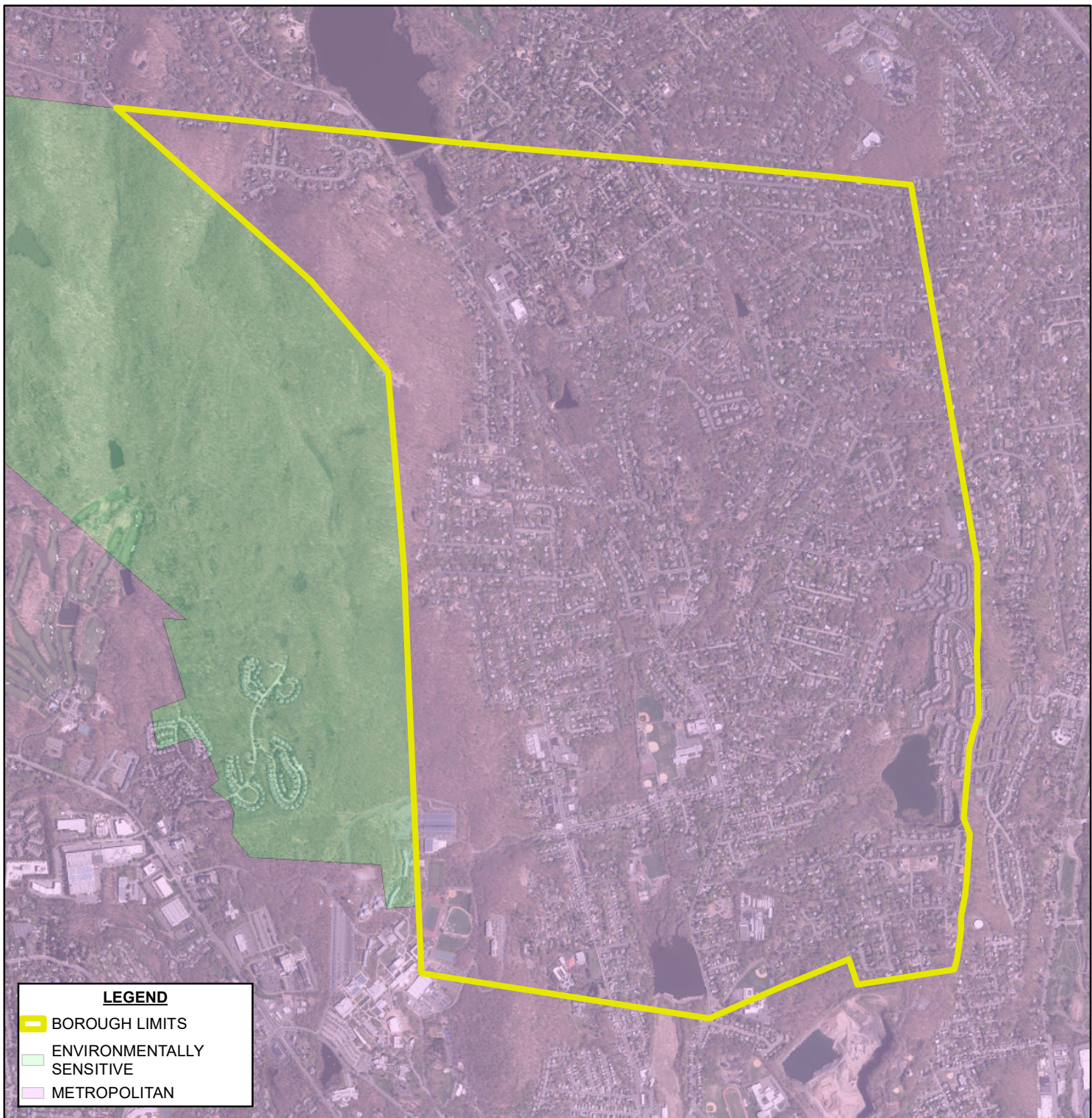
- Provide for much of the State's future redevelopment;
- Revitalize cities and towns; promote growth in compact forms;
- Stabilize older suburbs; redesign areas of sprawl; and
- Protect the character of existing stable communities.

Table IX-1: State Planning Areas in North Haledon




PA	Detail	Acres	Percent
1	Metropolitan	2256.821	99.98
5	Environmentally Sensitive	0.267	0.02
Total:		2,257.088	100
Source: NJOPA, August 2020			

A small portion of the Borough along its western boundary (within High Mountain Park Preserve) is within the Environmentally Sensitive Planning Area (PA5). This classifies areas are large contiguous areas containing valuable ecosystems, geological features, and wildlife habitats. The future environmental and economic integrity of the state rests in the protection of these irreplaceable resources.

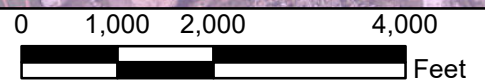
In addition, Historic and Cultural Sites and Critical Environmental Sites can be found throughout the Borough (**Figure IX-B**). The Plan treats these designated areas with the relevant provisions of historic, cultural, scenic, and environmental Statewide Policies.



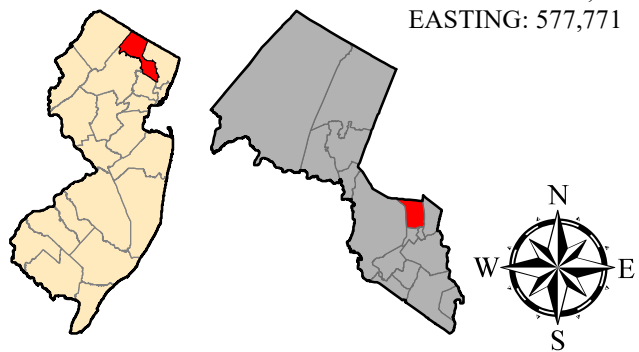
LEGEND

-  BOROUGH LIMITS
-  ENVIRONMENTALLY SENSITIVE
-  METROPOLITAN

SOURCE: NJDEP PLANNING AREA DATA LAYER



NORTHING: 775,652
EASTING: 577,771



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330 PHILLIPS AVE., SOUTH HACKENSACK, N.J. 07606

**PLANNING AREA MAP
NATURAL RESOURCES INVENTORY
BOROUGH OF NORTH HALEDON**

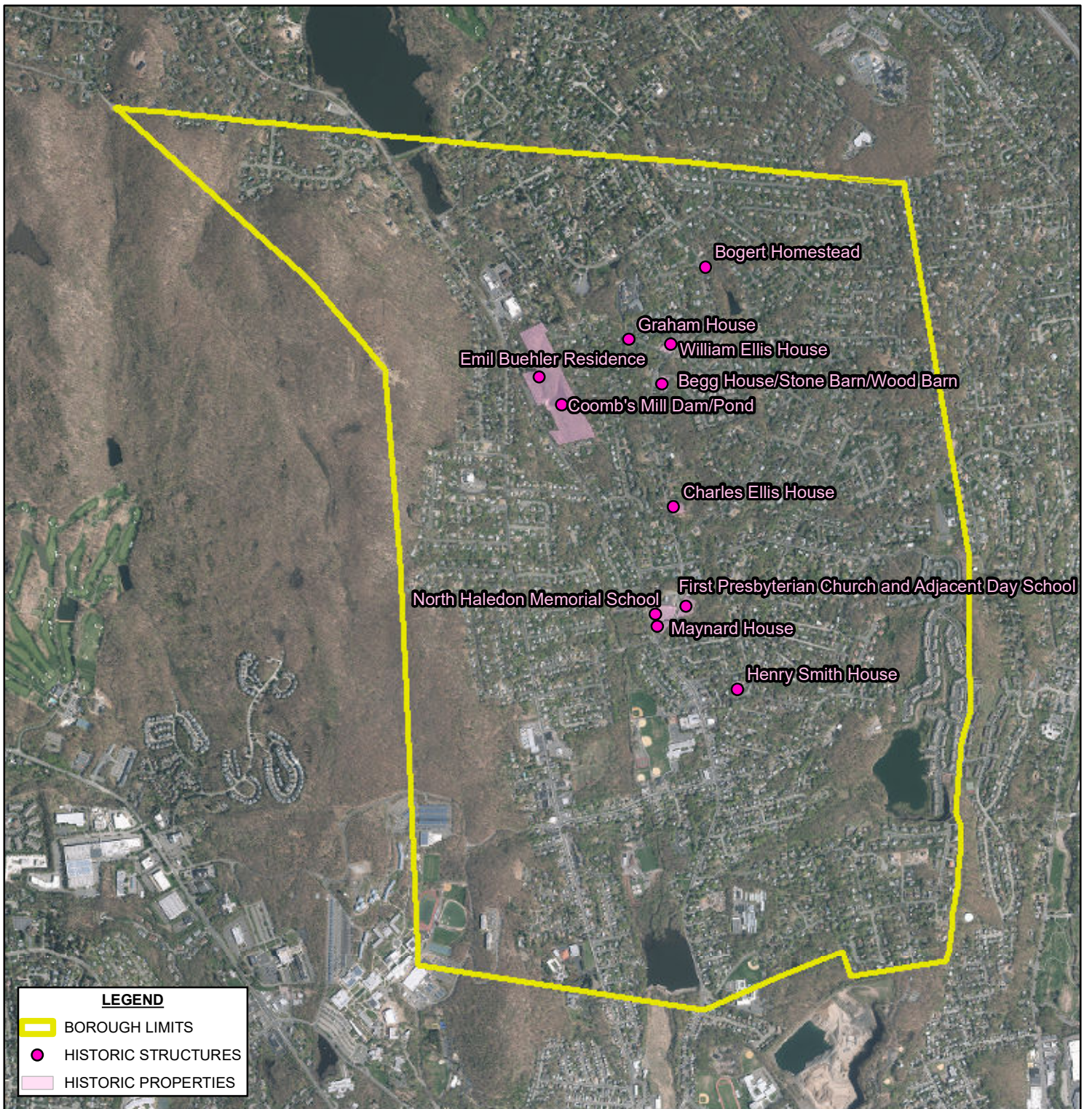
PASSAIC COUNTY

NEW JERSEY

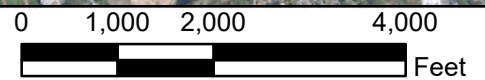
DR. BY: JMW
CKD. BY: FJR

SCALE: 1 IN = 2,000 FT
DATE: NOVEMBER 2023

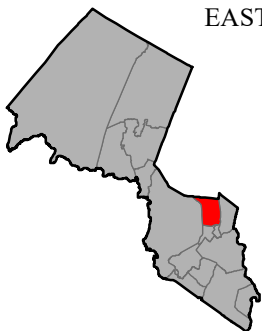
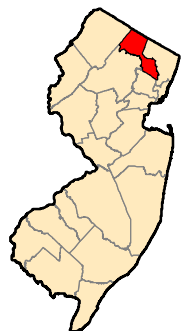
JOB NO. NH-711
FIGURE IX-A



SOURCE: NJDEP HISTORICAL PROPERTIES AND STRUCTURES DATALAYER



NORTHING: 775,652
EASTING: 577,771



BOSWELL ENGINEERING

330 PHILLIPS AVE., SOUTH HACKENSACK, N.J. 07606

HISTORICAL PROPERTIES MAP
NATURAL RESOURCES INVENTORY
BOROUGH OF NORTH HALEDON

PASSAIC COUNTY

NEW JERSEY

DR. BY: JMW
CKD. BY: FJR

SCALE: 1 IN = 2,000 FT
DATE: NOVEMBER 2023

JOB NO. NH-711
FIGURE IX-B

VIII. Open Space and Recreation

A. Purposes and Funding

The objectives of open space preservation include:

- Ensuring sufficient opportunities for both active and passive recreation;
- Providing recreational and open space options that are accessible to all citizens.;
- Safeguarding water quality and groundwater recharge areas.;
- Preserving sensitive environmental features;
- Protecting historic areas;
- Maintaining biodiversity;
- Minimize erosion or damage from flooding; and
- Preserving the rural character of the area.

Open space preservation is financed through a range of channels, encompassing municipal, county, state, and federal government allocations, as well as contributions from private land trusts. Private land trusts, typically non-profit organizations, often exhibit agility and creativity in real estate transactions, outpacing established government agencies. Landowners can realize tax advantages by making charitable donations to a land trust. Successful open space initiatives frequently leverage a combination of funding sources and strategies.

B. Open Space and Recreation

An updated inventory of the preserved open space and recreation properties within the Borough is presented in **Table VIII-1** and **Figure VIII-A**. A total approximately 240 acres (20 State, 158 Land Trust, 40 acres municipal land, 20 owned by the Borough of Franklin Lakes, and less than an acre owned by Wayne Township) have been preserved in North Haledon, which is approximately 11% of the Borough.

State and Land Trust Open Space

High Mountain Park Preserve

High Mountain Park Preserve, founded in 1993, spans 1,260 acres in Passaic County, with around 200 acres extending into the Borough of North Haledon. Various sections of the preserve are under the ownership of different entities, including The Nature Conservancy, the State of New Jersey, and the Township of Wayne. This expansive area comprises woodlands and wetlands, making it the most extensive forested land east of the Highlands.

The land is the home of a variety of State-listed rare and threatened plants and wildlife. The terrain is rolling to steep and offers 11.5 miles of challenging hiking trails. Scenic

vistas from the summit of High Mountain include views of the New York City skyline and northern New Jersey. Additionally, several rock shelters can be found in the Franklin Clove section of the nature preserve which have been determined to be sites of prehistoric human habitation.

Municipal Open Space

Indian Trail Park

Indian Trail Park is an approximately 3-acre park located at the intersection of Indian Trail and Moccasin Road. The Squaw Brook runs along the western border of the property. The park consists of a playground and a basketball court.

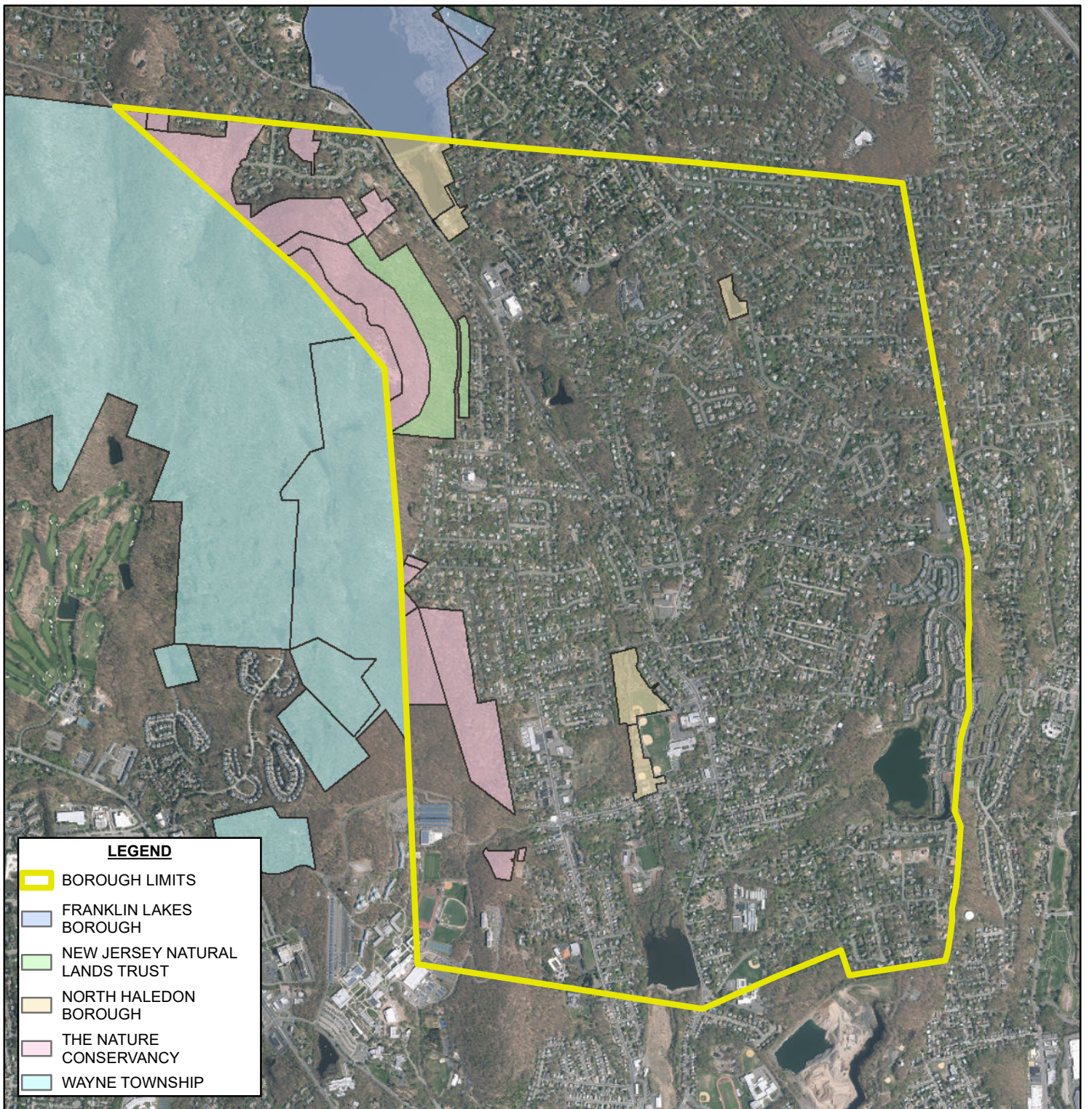
Rec Fields

The North Haledon Rec Fields are comprised of two lots totaling approximately 17 acres. It is located on Brookview Drive and Overlook Avenue. The Molly Ann Brook runs through the western portion of the property. The park consists of athletic fields, including baseball and softball fields, tennis courts, batting cages, and a pavilion. A few wooded areas are along the edges of the property.

Table VIII-1: Preserved Open Space & Recreation Areas

Owner	Park Name	Block	Lot	Acres
Franklin Lakes Borough	Haledon Reservoir	70	6.02	0.085
Franklin Lakes Borough	Haledon Reservoir	70	5	16.236
Franklin Lakes Borough	Haledon Reservoir	70	5	3.866
The Nature Conservancy	High Mountain Park Preserve	54	66.01	4.637
New Jersey Natural Lands Trust-S	High Mountain Park Preserve	72	36	4.375
The Nature Conservancy	High Mountain Park Preserve	31	65.06	0.824
The Nature Conservancy	High Mountain Park Preserve	31	65	2.467
New Jersey Natural Lands Trust-S	High Mountain Park Preserve	54	34.15	36.005
The Nature Conservancy	High Mountain Park Preserve	75	14	4.081
The Nature Conservancy	High Mountain Park Preserve	74	1	1.711
The Nature Conservancy	High Mountain Park Preserve	31	23	35.426
Wayne Township	High Mountain Park Preserve	3000	1	0.022
The Nature Conservancy	High Mountain Park Preserve	1	26	0.427
The Nature Conservancy	High Mountain Park Preserve	1	6	3.315
The Nature Conservancy	High Mountain Park Preserve	54	34.17	15.619
The Nature Conservancy	High Mountain Park Preserve	54	34.16	35.421
The Nature Conservancy	High Mountain Park Preserve	74	33	42.459
The Nature Conservancy	High Mountain Park Preserve	31	24.02	12.727
North Haledon Borough	Indian Trail Park	61.06	4	3.089
North Haledon Borough	Rec Fields	34	16	11.251
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Total Acres:				239.809

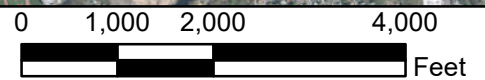
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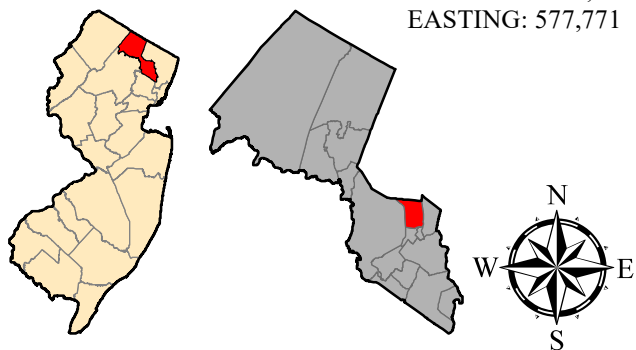
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SOURCE: NJDEP OPEN SPACE DATALAYER



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330 PHILLIPS AVE., SOUTH HACKENSACK, N.J. 07606

OPEN SPACE MAP (GREEN ACRES)
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BOROUGH OF NORTH HALEDON

PASSAIC COUNTY

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JOB NO. NH-711
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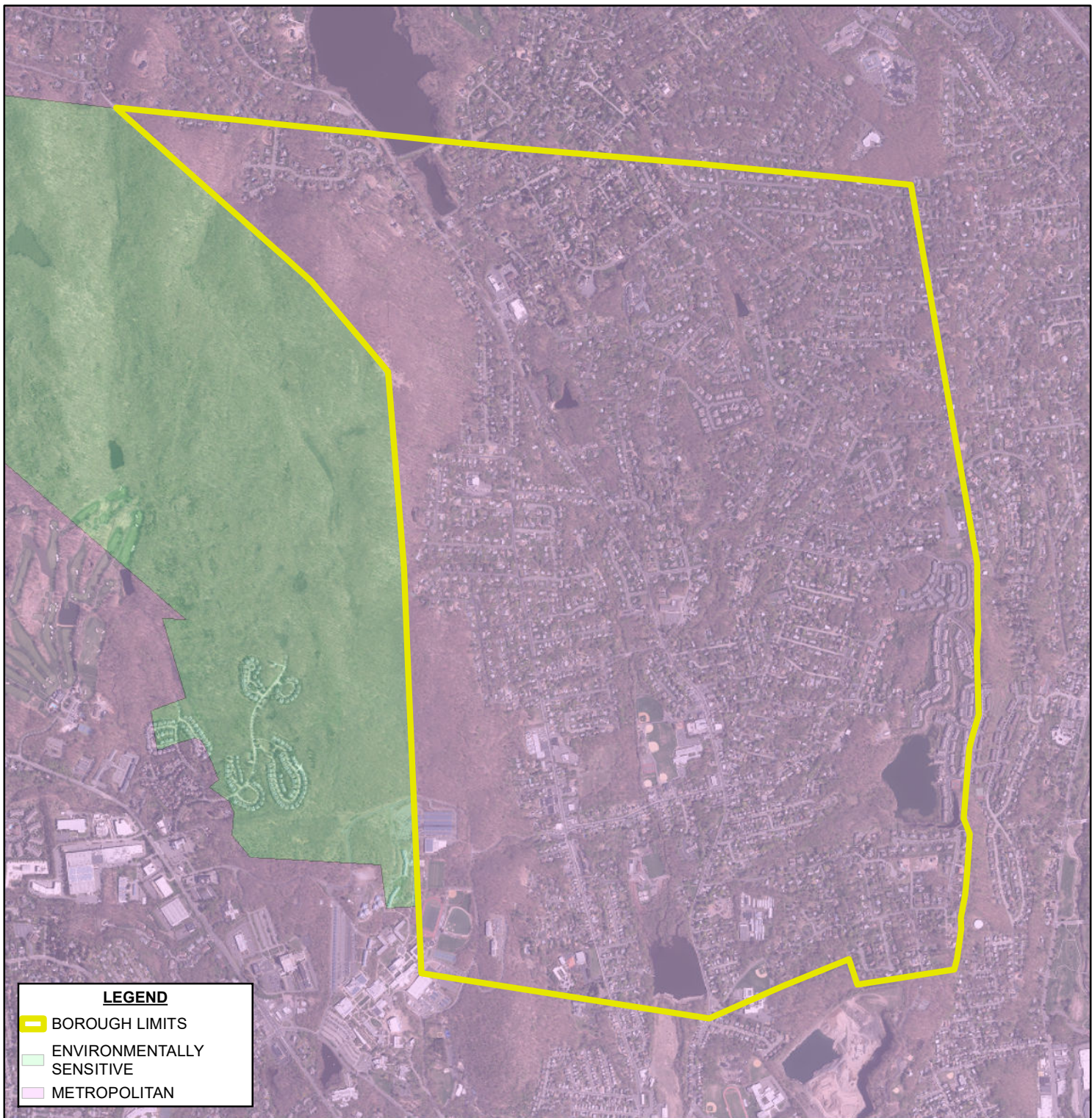
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

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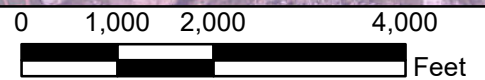
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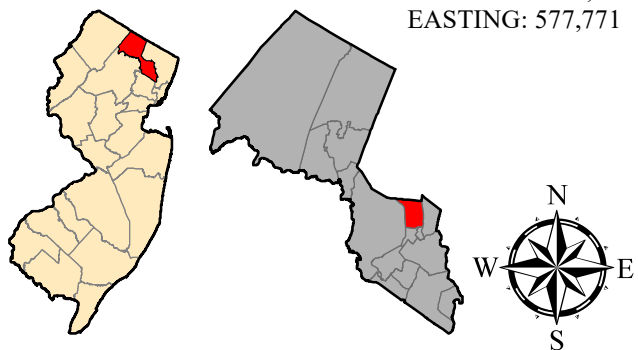
LEGEND

-  BOROUGH LIMITS
-  ENVIRONMENTALLY SENSITIVE
-  METROPOLITAN

SOURCE: NJDEP PLANNING AREA DATA LAYER



NORTHING: 775,652
EASTING: 577,771



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330 PHILLIPS AVE., SOUTH HACKENSACK, N.J. 07606

PLANNING AREA MAP
NATURAL RESOURCES INVENTORY
BOROUGH OF NORTH HALEDON

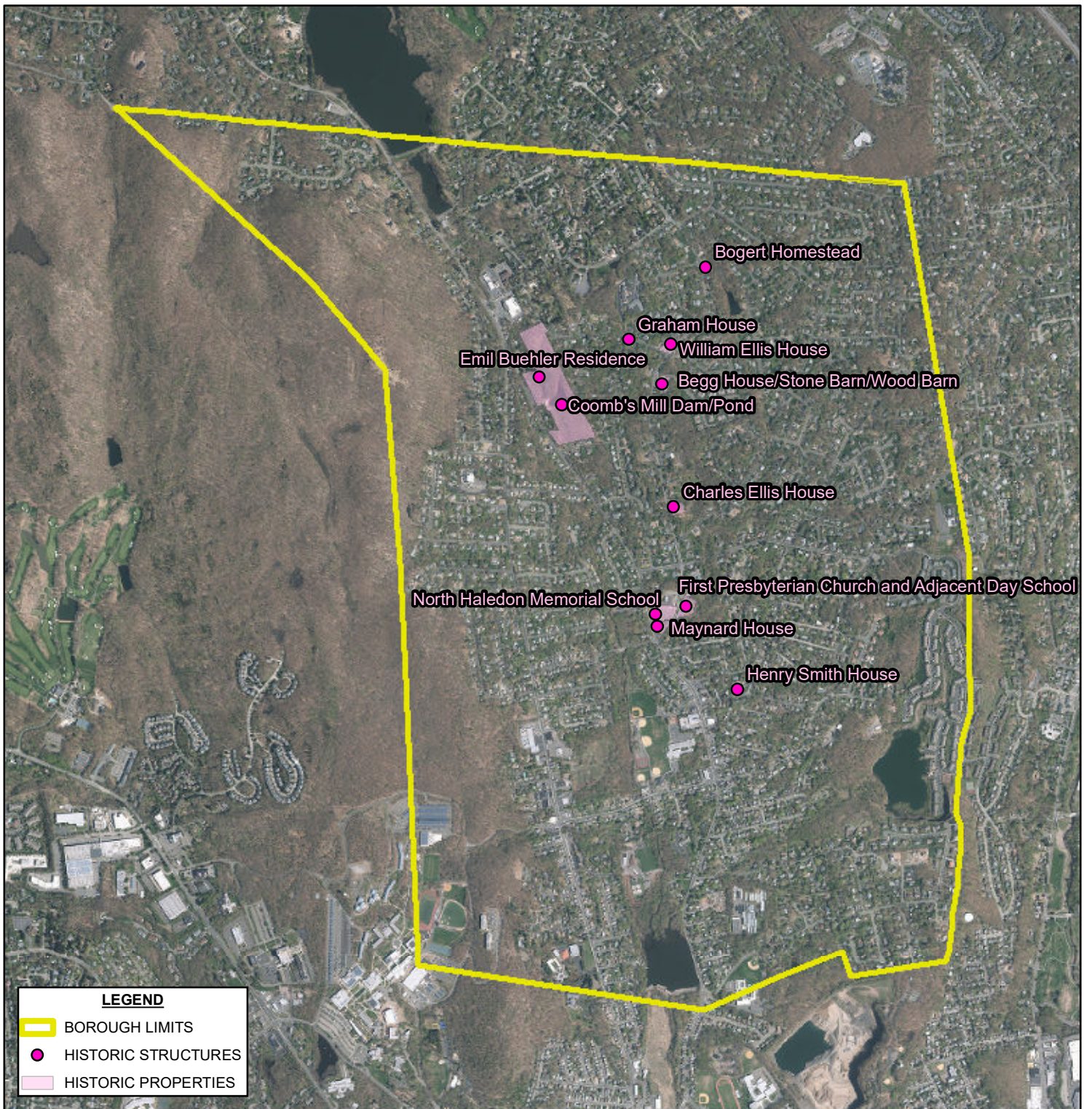
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NEW JERSEY

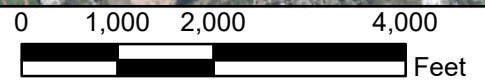
DR. BY: JMW
CKD. BY: FJR

SCALE: 1 IN = 2,000 FT
DATE: NOVEMBER 2023

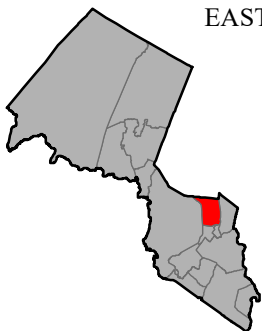
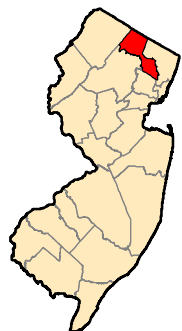
JOB NO. NH-711
FIGURE IX-A



SOURCE: NJDEP HISTORICAL PROPERTIES AND STRUCTURES DATALAYER



NORTHING: 775,652
EASTING: 577,771



BOSWELL ENGINEERING

330 PHILLIPS AVE., SOUTH HACKENSACK, N.J. 07606

HISTORICAL PROPERTIES MAP
NATURAL RESOURCES INVENTORY
BOROUGH OF NORTH HALEDON

PASSAIC COUNTY

NEW JERSEY

DR. BY: JMW
CKD. BY: FJR

SCALE: 1 IN = 2,000 FT
DATE: NOVEMBER 2023

JOB NO. NH-711
FIGURE IX-B

Appendix A

1. **Terms of Agreement for use of NJDEP GIS data**
2. **Cautions and Restrictions on use of Natural Heritage Data**



BOSWELL ENGINEERING

ENGINEERS - SURVEYORS - PLANNERS - SCIENTISTS
330 PHILLIPS AVENUE, SOUTH HACKENSACK, N.J. 07606
TEL: (201) 641-0770 • FAX: (201) 641-1831

A. 1: Terms of Agreement for NJDEP GIS Data Use

1. Digital data received from the NJDEP are to be used solely for internal purposes in the conduct of daily affairs.
2. The data are provided, as is, without warranty of any kind and the user is responsible for understanding the accuracy limitations of all digital data layers provided herein, as documented in the accompanying Data Dictionary and Readme files. Any reproduction or manipulation of the above data must ensure that the coordinate reference system remains intact.
3. Digital data received from the NJDEP may not be reproduced or redistributed for use by anyone without first obtaining written permission from the NJDEP. This clause is not intended to restrict distribution of printed mapped information produced from the digital data.
4. Any maps, publications, reports, or other documents produced as a result of this project that utilize NJDEP digital data will credit the NJDEP's Geographic Information System (GIS) as the source of the data with the following credit/disclaimer:

"This (map/publication/report) was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized."

5. Users shall require any independent contractor, hired to undertake work that will utilize digital data obtained from the NJDEP, to agree not to use, reproduce, or redistribute NJDEP GIS data for any purpose other than the specified contractual work. All copies of NJDEP GIS data utilized by an independent contractor will be required to be returned to the original user at the close of such contractual work. Users hereby agree to abide by the use and reproduction conditions specified above and agree to hold any independent contractor to the same terms. By using data provided herein, the user acknowledges that terms and conditions have been read and that the user is bound by these criteria.

A. 2: Cautions and Restrictions on use of Natural Heritage Data

CAUTIONS AND RESTRICTIONS ON NATURAL HERITAGE DATA

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

This office cannot provide a letter of interpretation or a statement addressing the classification of wetlands as defined by the Freshwater Wetlands Act. Requests for such determination should be sent to the DEP Division of Land Use Regulation, P.O. Box 439, Trenton, NJ 08625-0439.

The Landscape Project was developed by the Division of Fish & Wildlife, Endangered and Nongame Species Program in order to map critical habitat for rare animal species. Natural Heritage Database response letters will also list all species (if any) found during a search of the Landscape Project. However, this office cannot answer any inquiries about the Landscape Project. All questions should be directed to the DEP Division of Fish and Wildlife, Endangered and Nongame Species Program, P.O. Box 400, Trenton, NJ 08625-0400.

This cautions and restrictions notice must be included whenever information provided by the Natural Heritage Database is published.



NJ Department of Environmental Protection
Division of Parks and Forestry

Natural Lands Management

Appendix B

1. GIS data utilized in this report



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Appendix B. 1: GIS Data Utilized in this Report

Figure	Figure Name	Source	Data Title	Date	Online Link
All	All	NJOGIS	Municipal Boundaries of NJ	04/27/20	https://newjersey.maps.arcgis.com/home/item.html?id=3d5d1db8a1b34b418c331f4ce1fd0fef
I-A	Aerial Map (1930)	NJOGIS	NJ 1930 Black & White Imagery	04/22/20	https://newjersey.maps.arcgis.com/home/item.html?id=4e7de8d868c248f99c3fdde5bf8c0386
I-B	Aerial Map (1995)	NJOGIS	NJ 1995 Infrared Imagery	01/23/20	https://newjersey.maps.arcgis.com/home/item.html?id=29b6ab4cc9384713abcbb66875d2d4de
I-C	Aerial Map (2007)	NJOGIS	NJ 2007 Natural Color Imagery	01/23/20	https://newjersey.maps.arcgis.com/home/item.html?id=1149a594baa045f2ada44b8291c24aa1
I-D	Aerial Map (2015)	NJOGIS	NJ 2015 Natural Color Imagery	01/22/20	https://newjersey.maps.arcgis.com/home/item.html?id=3c1090054fee4a498514659d57bfe4ae
I-E	Aerial Map (2020)	NearMap	NearMap Aerial Imagery	02/23/20	https://www.nearmap.com/us/en
I-F	LandUse Type Map	NJDEP	Land Use/Land Cover of New Jersey 2015	01/28/19	https://gisdata-njdep.opendata.arcgis.com/datasets/land-use-land-cover-of-new-jersey-2015-download
		NJOGIS	NJ 2015 Natural Color Imagery	01/22/20	https://newjersey.maps.arcgis.com/home/item.html?id=3c1090054fee4a498514659d57bfe4ae
II-A	Purveyor and Well Water Supply Map	NJDEP	Purveyor Service Areas of New Jersey	02/11/19	https://gisdata-njdep.opendata.arcgis.com/datasets/purveyor-service-areas-of-new-jersey
		NJDEP	Public Community Water Supply	07/07/11	http://www.state.nj.us/dep/njgs/geodata/dgs97-1.htm
		NJDEP	Well Head Protection Areas For Public Community Water Supply Wells In New Jersey	12/26/19	https://gisdata-njdep.opendata.arcgis.com/datasets/well-head-protection-areas-for-public-community-water-supply-wells-in-new-jersey
		NJOGIS	NJ 2015 Natural Color Imagery	01/22/20	https://newjersey.maps.arcgis.com/home/item.html?id=3c1090054fee4a498514659d57bfe4ae
II-B	Sewer Service Area Map	NJDEP	Statewide Sewer Service Area for New Jersey	05/21/20	https://gisdata-njdep.opendata.arcgis.com/datasets/statewide-sewer-service-area-for-new-jersey
		NJOGIS	NJ 2015 Natural Color Imagery	01/22/20	https://newjersey.maps.arcgis.com/home/item.html?id=3c1090054fee4a498514659d57bfe4ae
III-A	Physiographic Provinces Map	NJDEP	Physiographic Provinces of New Jersey	11/07/19	https://gisdata-njdep.opendata.arcgis.com/datasets/physiographic-provinces-of-new-jersey
		NJOGIS	NJ 2015 Natural Color Imagery	01/22/20	https://newjersey.maps.arcgis.com/home/item.html?id=3c1090054fee4a498514659d57bfe4ae
III-B	USGS Topographic Map	USGS	NJ Color Topo 24K Basemap	01/30/20	https://newjersey.maps.arcgis.com/home/item.html?id=381c6d348f9f4a808bea9a2e2767d828
		NJOGIS	NJ 2015 Natural Color Imagery	01/22/20	https://newjersey.maps.arcgis.com/home/item.html?id=3c1090054fee4a498514659d57bfe4ae
III-C	Bedrock Geology Map	NJDEP	Bedrock Geology of New Jersey	07/02/19	https://gisdata-njdep.opendata.arcgis.com/datasets/bedrock-geology-of-new-jersey
		NJOGIS	NJ 2015 Natural Color Imagery	01/22/20	https://newjersey.maps.arcgis.com/home/item.html?id=3c1090054fee4a498514659d57bfe4ae
III-E	Surficial Geology Map	NJDEP	Surficial Geology of New Jersey	07/02/19	https://gisdata-njdep.opendata.arcgis.com/datasets/surficial-geology-of-new-jersey
		NJOGIS	NJ 2015 Natural Color Imagery	01/22/20	https://newjersey.maps.arcgis.com/home/item.html?id=3c1090054fee4a498514659d57bfe4ae
III-F	Historic Fill Map	NJDEP	Historic Fill in New Jersey	7/2/2019	https://gisdata-njdep.opendata.arcgis.com/datasets/historic-fill-in-new-jersey
		NJOGIS	NJ 2015 Natural Color Imagery	01/22/20	https://newjersey.maps.arcgis.com/home/item.html?id=3c1090054fee4a498514659d57bfe4ae

Appendix B. 1: GIS Data Utilized in this Report

Figure	Figure Name	Source	Data Title	Date	Online Link
IV-A	Soils Map	USDA	USDA NRCS Soil Survey Geographic (SSURGO) Database Access	09/09/20	https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx
		NJOGIS	NJ 2015 Natural Color Imagery	01/22/20	https://newjersey.maps.arcgis.com/home/item.html?id=3c1090054fee4a498514659d57bfe4ae
IV-B	Hydrologic Soil Group Map	USDA	Soil Survey Geographic (SSURGO) Database	09/15/19	https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx
		NJOGIS	NJ 2015 Natural Color Imagery	01/22/20	https://newjersey.maps.arcgis.com/home/item.html?id=3c1090054fee4a498514659d57bfe4ae
V-A	Impervious Surface Map	NJDEP	Passaic County Impervious Surface (2015) of New Jersey	01/14/19	https://gisdata-njdep.opendata.arcgis.com/datasets/passaic-county-impervious-surface-2015-of-new-jersey
		NJOGIS	NJ 2015 Natural Color Imagery	01/22/20	https://newjersey.maps.arcgis.com/home/item.html?id=3c1090054fee4a498514659d57bfe4ae
V-B	Bedrock Aquifer Map	NJDEP	Bedrock Aquifers in New Jersey	07/02/19	https://gisdata-njdep.opendata.arcgis.com/datasets/bedrock-aquifers-in-new-jersey
		NJOGIS	NJ 2015 Natural Color Imagery	01/22/20	https://newjersey.maps.arcgis.com/home/item.html?id=3c1090054fee4a498514659d57bfe4ae
V-C	Surficial Aquifer Map	NJDEP	Surficial Aquifers in New Jersey	7/2/2019	https://gisdata-njdep.opendata.arcgis.com/datasets/surficial-aquifers-in-new-jersey
		NJOGIS	NJ 2015 Natural Color Imagery	01/22/20	https://newjersey.maps.arcgis.com/home/item.html?id=3c1090054fee4a498514659d57bfe4ae
V-D	Sole-Source Aquifer Map	NJDEP	Sole-Source Aquifers in New Jersey	7/2/2019	https://gisdata-njdep.opendata.arcgis.com/datasets/sole-source-aquifers-in-new-jersey
		NJOGIS	NJ 2015 Natural Color Imagery	01/22/20	https://newjersey.maps.arcgis.com/home/item.html?id=3c1090054fee4a498514659d57bfe4ae
V-E	Classification Exemption Area Map	NJDEP	Classification Exception Areas-Well Restriction Areas for New Jersey	08/06/20	https://gisdata-njdep.opendata.arcgis.com/datasets/classification-exception-areas-well-restriction-areas-for-new-jersey
		NJOGIS	NJ 2015 Natural Color Imagery	01/22/20	https://newjersey.maps.arcgis.com/home/item.html?id=3c1090054fee4a498514659d57bfe4ae
V-F	Known Contaminated Sites Map	NJDEP	Known Contaminated Site List for New Jersey	04/26/20	https://gisdata-njdep.opendata.arcgis.com/datasets/known-contaminated-site-list-for-new-jersey
		NJOGIS	NJ 2015 Natural Color Imagery	01/22/20	https://newjersey.maps.arcgis.com/home/item.html?id=3c1090054fee4a498514659d57bfe4ae
VI-A	Watershed Map	NJDEP	14 Digit Hydrologic Unit Code Delineations for New Jersey	02/25/11	http://www.state.nj.us/dep/gis/digidownload/zips/statewide/dephec14.zip
		NJOGIS	NJ 2015 Natural Color Imagery	01/22/20	https://newjersey.maps.arcgis.com/home/item.html?id=3c1090054fee4a498514659d57bfe4ae
VI-B	FEMA Flood Map	FEMA	NFHL_34031C	04/17/20	https://msc.fema.gov/portal/availabilitySearch?addcommunity=340402&communityName=NORTH%20HALEDON,%20BOROUGH%20OF#searchresultsanchor
		NJOGIS	NJ 2015 Natural Color Imagery	01/22/20	https://newjersey.maps.arcgis.com/home/item.html?id=3c1090054fee4a498514659d57bfe4ae
VI-C	Freshwater Wetland Map	NJDEP	Wetlands (from Land Use/Land Cover 2012 Update)	12/26/19	https://gisdata-njdep.opendata.arcgis.com/datasets/wetlands-of-new-jersey-from-land-use-land-cover-2012-update
		NJOGIS	NJ 2015 Natural Color Imagery	01/22/20	https://newjersey.maps.arcgis.com/home/item.html?id=3c1090054fee4a498514659d57bfe4ae

Appendix B. 1: GIS Data Utilized in this Report

Figure	Figure Name	Source	Data Title	Date	Online Link
VI-D	Vernal Pool Map	NJDEP	Landscape 3.3 Vernal Pools of New Jersey	12/24/2019	https://gisdata-njdep.opendata.arcgis.com/datasets/landscape-3-3-vernal-pools-of-new-jersey
		NJOGIS	NJ 2015 Natural Color Imagery	01/22/20	https://newjersey.maps.arcgis.com/home/item.html?id=3c1090054fee4a498514659d57bfe4ae
VI-E	Surface Water Quality Standards Map	NJDEP	Surface Water Quality Classification of New Jersey	04/09/20	https://gisdata-njdep.opendata.arcgis.com/datasets/surface-water-quality-classification-of-new-jersey
		NJOGIS	NJ 2015 Natural Color Imagery	01/22/20	https://newjersey.maps.arcgis.com/home/item.html?id=3c1090054fee4a498514659d57bfe4ae
VII-A	LandUse Label Map	NJDEP	Land Use/Land Cover of New Jersey 2015	01/28/19	https://gisdata-njdep.opendata.arcgis.com/datasets/land-use-land-cover-of-new-jersey-2015-download
		NJOGIS	NJ 2015 Natural Color Imagery	01/22/20	https://newjersey.maps.arcgis.com/home/item.html?id=3c1090054fee4a498514659d57bfe4ae
VII-B	Threatened and Endangered Species Map	NJDEP	Landscape 3.3 Regions of New Jersey	12/24/19	https://gisdata-njdep.opendata.arcgis.com/datasets/landscape-3-3-regions-of-new-jersey
		NJOGIS	NJ 2015 Natural Color Imagery	01/22/20	https://newjersey.maps.arcgis.com/home/item.html?id=3c1090054fee4a498514659d57bfe4ae
VIII-A	Open Space Map (Green Acres)	NJDEP	State, Local and Nonprofit Open Space of New Jersey	08/03/20	https://gisdata-njdep.opendata.arcgis.com/datasets/state-local-and-nonprofit-open-space-of-new-jersey
		NJOGIS	NJ 2015 Natural Color Imagery	01/22/20	https://newjersey.maps.arcgis.com/home/item.html?id=3c1090054fee4a498514659d57bfe4ae
IX-A	Planning Area Map	NJOPA	Planning Area Boundaries of the NJ State Development and Redevelopment Plan New Jersey	08/10/20	https://njogis-newjersey.opendata.arcgis.com/datasets/dosopa::planning-area-boundaries-of-the-nj-state-development-and-redevelopment-plan-new-jersey-1
		NJOGIS	NJ 2015 Natural Color Imagery	01/22/20	https://newjersey.maps.arcgis.com/home/item.html?id=3c1090054fee4a498514659d57bfe4ae
IX-B	Historical Properties Map	NJDEP	Historic Properties of New Jersey	04/02/20	https://gisdata-njdep.opendata.arcgis.com/datasets/historic-properties-of-new-jersey
		NJDEP	Historic Districts of New Jersey	04/02/20	https://gisdata-njdep.opendata.arcgis.com/datasets/historic-districts-of-new-jersey
		NJOGIS	NJ 2015 Natural Color Imagery	01/22/20	https://newjersey.maps.arcgis.com/home/item.html?id=3c1090054fee4a498514659d57bfe4ae

Appendix C

1. **Birds of New Jersey**
2. **Mammals of New Jersey**
3. **Reptiles and Amphibians of New Jersey**



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C. 1: Birds of New Jersey

Birds of New Jersey

The state of New Jersey boasts around 450 species of vertebrate wildlife, including 85 freshwater fish. Additionally, the bays, estuaries, and marine waters provide habitats for 28 marine mammals and 336 marine finfish throughout the year. This rich biodiversity is remarkable for a state of New Jersey's size. The table below enumerates various bird species along with their respective status classifications as defined below:

Endangered Status

E - Endangered	RP - Regional Priority	Breeding Status	Seasonal Status
T - Threatened	S - Stable	b - breeding	w - winters
SC - Special Concern	U - Undertermined	pb - possibly breeding	a - accidental
D - Decreasing	I - Introduced	m - migrant	* - present during
INC - Increasing	P - Peripheral		breeding season-no confirmed nesting

For definitions of above terms and links to other checklists use the Checklists of NJ Wildlife page.

COMMON NAME	SCIENTIFIC NAME	STATUS	
Red-throated Loon	<i>Gavia stellata</i>	RP	mw
Common Loon	<i>Gavia immer</i>	S	mw
Pied-billed Grebe	<i>Podilymbus podiceps</i>	E	bmw
Horned Grebe	<i>Podiceps auritus</i>	RP	mw
Red-necked Grebe	<i>Podiceps grisegena</i>	D	mw
Cory's Shearwater	<i>Calonectris diomedea</i>	D	mw
Greater Shearwater	<i>Puffinus gravis</i>	RP	mw
Sooty Shearwater	<i>Puffinus griseus</i>	U	mw
Wilson's Storm-petrel	<i>Oceanites oceanicus</i>	U	mw
Leach's Storm-petrel	<i>Oceanodroma leucorhoa</i>	U	mw
Northern Gannet	<i>Morus bassanus</i>	RP	mw
Brown Pelican	<i>Pelecanus occidentalis</i>	INC	*
Great Cormorant	<i>Phalacrocorax carbo</i>	U	mw
Double-crested Cormorant	<i>Phalacrocorax auritus</i>	S	bmw
American Bittern	<i>Botaurus lentiginosus</i>	E	bm
Least Bittern	<i>Ixobrychus exilis</i>	SC	bm
Great Blue Heron	<i>Ardea herodias</i>	SC	bmw
Great Egret	<i>Casmerodius albus</i>	RP	bm
Snowy Egret	<i>Egretta thula</i>	RP	bm
Little Blue Heron	<i>Egretta caerulea</i>	RP	bm
tricolored Heron	<i>Egretta tricolor</i>	RP	bm
Cattle Egret	<i>Bubulcus ibis</i>	RP	bm
Green Heron	<i>Butorides striatus</i>	RP	bm
Black-crowned Night Heron	<i>Nycticorax nycticorax</i>	T	bm
Yellow-crowned Night Heron	<i>Nyctanassa violaceus</i>	T	bm
Glossy Ibis	<i>Plegadis falcinellus</i>	RP	bm
Fulvous Whistling Duck	<i>Dendrocygna bicolor</i>	P	a
Tundra Swan	<i>Cygnus columbianus</i>	INC	mw
Mute Swan	<i>Cygnus olor</i>	I	bmw
Snow Goose	<i>Chen caerulescens</i>	INC	mw
Brant	<i>Branta bernicla</i>	RP	mw
Canada Goose	<i>Branta canadensis</i>	INC	bmw

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Wood Duck	<i>Aix sponsa</i>	RP	bmw
Green-winged Teal	<i>Anas crecca</i>	S	bmw
American Black Duck	<i>Anas rubripes</i>	RP	bmw
Mallard	<i>Anas platyrhynchos</i>	INC	bmw
Northern Pintail	<i>Anas acuta</i>	RP	mw
Blue-winged Teal	<i>Anas discors</i>	S	bmw
Northern Shoveler	<i>Anas clypeata</i>	S	mw
Gadwall	<i>Anas strepera</i>	S	bmw
Eurasian Wigeon	<i>Anas penelope</i>	P	mw
American Wigeon	<i>Anas americana</i>	S	mw
Canvasback	<i>Aythya valisineria</i>	RP	mw
Redhead	<i>Aythya americana</i>	S	mw
Ring-necked Duck	<i>Aythya collaris</i>	S	mw
Greater Scaup	<i>Aythya marila</i>	RP	mw
Lesser Scaup	<i>Aythya affinis</i>	RP	mw
Common Eider	<i>Somateria mollissima</i>	RP	mw
King Eider	<i>Somateria spectabilis</i>	S	mw
Harlequin Duck	<i>Histrionicus histrionicus</i>	S	mw
Oldsquaw	<i>Clangula hyemalis</i>	S	mw
Black Scoter	<i>Melanitta nigra</i>	RP	mw
Surf Scoter	<i>Melanitta perspicillata</i>	RP	mw
White-winged Scoter	<i>Melanitta fusca</i>	RP	mw
Common Goldeneye	<i>Bucephala clangula</i>	S	mw
Bufflehead	<i>Bucephala albeola</i>	RP	mw
Hooded Merganser	<i>Lophodytes cucullatus</i>	S	bmw
Common Merganser	<i>Mergus merganser</i>	S	bmw
Red-breasted Merganser	<i>Mergus serrator</i>	S	bmw
Ruddy Duck	<i>Oxyura jamaicensis</i>	D	bmw
Black Vulture	<i>Coragyps atratus</i>	INC	bmw
Turkey Vulture	<i>Cathartes aura</i>	INC	bmw
Osprey	<i>Pandion haliaetus</i>	T	bm
Amer. Swallowtail Kite	<i>Elanoides forficodus</i>	U	m
Mississippi Kite	<i>Ictinia mississippiensis</i>	S	m
Bald Eagle	<i>Haliaeetus leucocephalus</i>	E	bmw
Northern Harrier	<i>Circus cyaneus</i>	E	bmw
Sharp-shinned Hawk	<i>Accipiter striatus</i>	SC	bmw
Cooper's Hawk	<i>Accipiter cooperii</i>	T	bmw
Northern Goshawk	<i>Accipiter gentilis</i>	E	bmw
Red-shouldered Hawk	<i>Buteo lineatus</i>	E	bmw
Broad-winged hawk	<i>Buteo platypterus</i>	SC	bm
Red-tailed Hawk	<i>Buteo jamaicensis</i>	INC	bmw
Rough-legged Hawk	<i>Buteo lagopus</i>	D	mw
Golden Eagle	<i>Aquila chrysaetos</i>	S	mw
American Kestrel	<i>Falco sparverius</i>	SC	bmw
Merlin	<i>Falco columbarius</i>	INC	m
Peregrine Falcon	<i>Falco peregrinus</i>	E	bmw
Ring-necked Pheasant	<i>Phasianus colchicus</i>	D	bw
Ruffed Grouse	<i>Bonasa umbellus</i>	D	bw
Eastern Wild Turkey	<i>Meleagris gallopavo</i>	INC	bw

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Chukar	<i>Alectoris graeca</i>	I	---
Northern Bobwhite	<i>Colinus virginianus</i>	RP	bw
Yellow Rail	<i>Coturnicops noveboracensis</i>	U	m
Black Rail	<i>Laterallus jamaicensis</i>	T	bm
Clapper Rail	<i>Rallus longirostris</i>	INC	bmw
King Rail	<i>Rallus elegans</i>	SC	bm
Virginia Rail	<i>Rallus limicola</i>	RP	bmw
Sora	<i>Porzana carolina</i>	S	bm
Common Moorhen	<i>Gallinula chloropus</i>	U	bm
Purple Gallinule	<i>Porphyryla martinica</i>	P	a
American Coot	<i>Fulica americana</i>	U	bmw
Black-bellied Plover	<i>Pluvialis squatarola</i>	S	m
American Golden-plover	<i>Pluvialis dominica</i>	RP	m
Semipalmated Plover	<i>Charadrius semipalmatus</i>	S	m
Piping Plover	<i>Charadrius melodus</i>	E	bm
Killdeer	<i>Charadrius vociferus</i>	S	bmw
American Oystercatcher	<i>Haematopus palliatus</i>	RP	bm
Black-necked Stilt	<i>Himantopus mexicanus</i>	U	m
American Avocet	<i>Recurvirostra americana</i>	U	m
Greater Yellowlegs	<i>tringa melanoleuca</i>	RP	m
Lesser Yellowlegs	<i>tringa flavipes</i>	S	m
Solitary Sandpiper	<i>tringa solitaria</i>	U	m
Willet	<i>Catoptrophorus semipalmatus</i>	RP	bm
Spotted Sandpiper	<i>Actitis macularia</i>	SC	bm
Upland Sandpiper	<i>Bartramia longicauda</i>	E	bm
Whimbrel	<i>Numenius phaeopus</i>	RP	m
Hudsonian Godwit	<i>Limosa haemastica</i>	RP	m
Marbled Godwit	<i>Limosa fedoa</i>	RP	m
Ruddy Turnstone	<i>Arenaria interpres</i>	RP	m
Red Knot	<i>Calidris canutus</i>	T	m
Sanderling	<i>Calidris alba</i>	SC	mw
Semipalmated Sandpiper	<i>Calidris pusilla</i>	RP	m
Western Sandpiper	<i>Calidris mauri</i>	S	m
Least Sandpiper	<i>Calidris minutilla</i>	U	m
White-rumped Sandpiper	<i>Calidris fuscicollis</i>	U	m
Baird's Sandpiper	<i>Calidris bairdii</i>	U	m
Pectoral Sandpiper	<i>Calidris melanotos</i>	U	m
Purple Sandpiper	<i>Calidris maritima</i>	RP	m
Dunlin	<i>Calidris alpina</i>	S	m
Curlew Sandpiper	<i>Calidris ferruginea</i>	U	m
Stilt Sandpiper	<i>Calidris himantopus</i>	U	m
Buff-breasted Sandpiper	<i>tryngites subruficollis</i>	RP	m
Ruff	<i>Philomachus pugnax</i>	U	m
Short-billed Dowitcher	<i>Limnodromus griseus</i>	U	m
Long-billed Dowitcher	<i>Limnodromus scolopaceus</i>	U	m
Common Snipe	<i>Gallinago gallinago</i>	S	bmw
American Woodcock	<i>Philohela minor</i>	RP	bmw
Wilson's Phalarope	<i>Phalaropus tricolor</i>	U	m
Red-necked Phalarope	<i>Phalaropus lobatus</i>	U	m

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Red Phalarope	<i>Phalaropus fulicarius</i>	U	m
Pomarine Jaeger	<i>Stercorarius pomarinus</i>	U	m
Parasitic Jaeger	<i>Stercorarius parasiticus</i>	U	m
Long-tailed Jaeger	<i>Stercorarius longicaudus</i>	U	m
Laughing Gull	<i>Larus atricilla</i>	S	bmw
Little Gull	<i>Larus minutus</i>	U	mw
Common Black-headed Gull	<i>Larus ridibundus</i>	D	mw
Bonaparte's Gull	<i>Larus philadelphia</i>	D	mw
Ring-billed Gull	<i>Larus delawarensis</i>	INC	bmw
Herring Gull	<i>Larus argentatus</i>	S	bmw
Iceland Gull	<i>Larus glaucoides</i>	D	mw
Lesser Black-backed Gull	<i>Larus fuscus</i>	INC	mw
Glaucous Gull	<i>Larus hyperboreus</i>	D	mw
Great Black-backed Gull	<i>Larus marinus</i>	D	bmw
Black-legged Kittiwake	<i>Rissa tridactyla</i>	D	mw
Gull-billed Tern	<i>Sterna nilotica</i>	RP	bm
Caspian Tern	<i>Sterna caspia</i>	SC	m
Royal Tern	<i>Sterna maxima</i>	RP	m
Roseate Tern	<i>Sterna dougallii</i>	E	bm
Common Tern	<i>Sterna hirundo</i>	SC	bm
Forster's Tern	<i>Sterna forsteri</i>	RP	bm
Least Tern	<i>Sterna antillarum</i>	E	bm
Black Tern	<i>Chidonias niger</i>	SC	m
Black Skimmer	<i>Rynchops niger</i>	E	bm
Dovekie	<i>Alle alle</i>	U	w
Thick-billed Murre	<i>Uria lomvia</i>	U	w
Razorbill	<i>Alca torda</i>	RP	w
Rock Dove	<i>Columba livia</i>	I	bmw
Mourning Dove	<i>Zenaida macroura</i>	S	bmw
Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>	RP	bm
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	RP	bm
Common Barn Owl	<i>Tyto alba</i>	SC	bmw
Eastern Screech Owl	<i>Otus asio</i>	RP	bw
Great Horned Owl	<i>Bubo virginianus</i>	S	bw
Snowy Owl	<i>Nyctea scandiaca</i>	U	w
Barred Owl	<i>Strix varia</i>	T	bw
Long-eared Owl	<i>Asio otus</i>	T	bmw
Short-eared Owl	<i>Asio flammeus</i>	E	bmw
Northern Saw-whet Owl	<i>Aegolius acadicus</i>	S	bmw
Common Nighthawk	<i>Chordeiles minor</i>	SC	bm
Chuck-will's-widow	<i>Caprimulgus carolinensis</i>	RP	b
Whip-poor-will	<i>Caprimulgus vociferus</i>	RP	bm
Chimney Swift	<i>Chaetura pelagica</i>	RP	bm
Ruby-throated Hummingbird	<i>Archilochus colubris</i>	D	bm
Belted Kingfisher	<i>Ceryle alcyon</i>	S	bmw
Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	T	bmw
Red-bellied Woodpecker	<i>Melanerpes carolinus</i>	INC	bw
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>	U	mw
Downy Woodpecker	<i>Picoides pubescens</i>	S	bw

C. 1: Birds of New Jersey

Hairy Woodpecker	<i>Picoides villosus</i>	D	bw
Northern Flicker	<i>Colaptes auratus</i>	RP	bmw
Pileated Woodpecker	<i>Dryocopus pileatus</i>	D	bw
Olive-sided Flycatcher	<i>Contopus borealis</i>	U	m
Eastern Wood Pewee	<i>Contopus virens</i>	RP	bm
Yellow-bellied Flycatcher	<i>Empidonax flaviventris</i>	U	m
Acadian Flycatcher	<i>Empidonax virescens</i>	RP	bm
Alder Flycatcher	<i>Empidonax alnorum</i>	INC	bm
Willow Flycatcher	<i>Empidonax traillii</i>	RP	bm
Least Flycatcher	<i>Empidonax minimus</i>	SC	bm
Eastern Phoebe	<i>Sayornis phoebe</i>	S	bm
Great Crested Flycatcher	<i>Myiarchus crinitus</i>	RP	bm
Western Kingbird	<i>Tyrannus verticalis</i>	U	m
Eastern Kingbird	<i>Tyrannus Tyrannus</i>	RP	bm
Horned Lark	<i>Eremophila alpestris</i>	SC	bmw
Purple martin	<i>Progne subis</i>	S	bm
tree Swallow	<i>Tachycineta bicolor</i>	INC	bm
No. Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>	S	bm
Bank Swallow	<i>Riparia riparia</i>	S	bm
Cliff Swallow	<i>Hirundo pyrrhonota</i>	SC	bm
Barn Swallow	<i>Hirundo rustica</i>	S	bm
Blue Jay	<i>Cyanocitta cristata</i>	D	bmw
American Crow	<i>Corvus brachyrhynchos</i>	S	bmw
Fish Crow	<i>Corvus ossifragus</i>	S	bmw
Common Raven	<i>Corvus corax</i>	INC	bmw
Black-capped Chickadee	<i>Parus atricapillus</i>	S	bmw
Carolina Chickadee	<i>Parus carolinensis</i>	S	bw
Boreal Chickadee	<i>Parus hudsonicus</i>	U	a
Tufted Titmouse	<i>Parus bicolor</i>	INC	bw
Red-breasted Nuthatch	<i>Sitta canadensis</i>	S	bmw
White-breasted Nuthatch	<i>Sitta carolinensis</i>	INC	bw
Brown Creeper	<i>Certhia americana</i>	INC	bmw
Carolina Wren	<i>Thryothorus ludovicianus</i>	INC	bw
House Wren	<i>troglogytes aedon</i>	S	bm
Winter Wren	<i>troglogytes troglodytes</i>	SC	bmw
Sedge Wren	<i>Cistothorus platensis</i>	E	bm
Marsh Wren	<i>Cistothorus palustris</i>	RP	bmw
Golden-crowned Kinglet	<i>Regulus satrapa</i>	INC	bmw
Ruby-crowned Kinglet	<i>Regulus calendula</i>	D	mw
Blue-gray Gnatcatcher	<i>Poliophtila caerulea</i>	S	bm
Eastern Bluebird	<i>Sialia sialis</i>	INC	bmw
Veery	<i>Catharus fuscescens</i>	SC	bm
Gray-cheeked Thrush	<i>Catharus minimus</i>	SC	m
Swainson's Thrush	<i>Catharus ustulatus</i>	S	m
Hermit Thrush	<i>Catharus guttatus</i>	D	bmw
Wood Thrush	<i>Hylocichla mustelina</i>	RP	bm
American Robin	<i>Turdus migratorius</i>	S	bmw
Gray Catbird	<i>Dumetella carolinensis</i>	RP	bmw
Northern Mockingbird	<i>Mimus polyglottos</i>	D	bmw

C. 1: Birds of New Jersey

Brown Thrasher	<i>Toxostoma rufum</i>	RP	bmw
Water Pipit	<i>Anthus rubescens</i>	U	mw
Cedar Waxwing	<i>Bombycilla cedrorum</i>	S	bmw
Northern Shrike	<i>Lanius exubitor</i>	S	w
Loggerhead Shrike	<i>Lanius ludovicianus</i>	E	mw
European Starling	<i>Sturnus vulgaris</i>	I	bmw
White-eyed Vireo	<i>Vireo griseus</i>	D	bm
Blue-headed Vireo	<i>Vireo solitarius</i>	SC	bm
Yellow-throated Vireo	<i>Vireo flavifrons</i>	RP	bm
Warbling Vireo	<i>Vireo gilvus</i>	S	bm
Philadelphia Vireo	<i>Vireo philadelphicus</i>	S	m
Red-eyed Vireo	<i>Vireo olivaceus</i>	S	bm
Blue-winged Warbler	<i>Vermivora pinus</i>	RP	bm
Golden-winged Warbler	<i>Vermivora chrysoptera</i>	SC	bm
Tennessee Warbler	<i>Vermivora peregrina</i>	D	m
Orange-crowned Warbler	<i>Vermivora celata</i>	S	m
Nashville Warbler	<i>Vermivora reficapilla</i>	S	bm
Northern Parula	<i>Parula americana</i>	SC	bm
Yellow Warbler	<i>Dendroica petechia</i>	S	bm
Chestnut-sided Warbler	<i>Dendroica pensylvanica</i>	S	bm
Magnolia Warbler	<i>Dendroica magnolia</i>	INC	bm
Cape May Warbler	<i>Dendroica tigrina</i>	S	m
Black-throated Blue Warbler	<i>Dendroica caerulescens</i>	RP	bm
Yellow-rumped Warbler	<i>Dendroica coronata</i>	INC	bmw
Black-throated Green Warbler	<i>Dendroica virens</i>	SC	bm
Blackburnian Warbler	<i>Dendroica fusca</i>	RP	bm
Yellow-throated Warbler	<i>Dendroica dominica</i>	RP	bm
Pine Warbler	<i>Dendroica pinus</i>	RP	bm
Prairie Warbler	<i>Dendroica discolor</i>	RP	bm
Palm Warbler	<i>Dendroica palmarum</i>	INC	m
Bay-breasted Warbler	<i>Dendroica castanea</i>	S	m
Blackpoll Warbler	<i>Dendroica striata</i>	D	m
Cerulean Warbler	<i>Dendroica cerulea</i>	SC	bm
Black-and-white Warbler	<i>Miniotilta varia</i>	RP	bm
American Redstart	<i>Setophaga ruticilla</i>	INC	bm
Prothonotary Warbler	<i>Protonotaria citrea</i>	RP	bm
Worm-eating Warbler	<i>Helmitheros vermivorus</i>	RP	bm
Ovenbird	<i>Seiurus aurocapillus</i>	D	bm
Northern Waterthrush	<i>Seiurus noveboracensis</i>	S	bm
Louisiana Waterthrush	<i>Seiurus motacilla</i>	RP	bm
Kentucky Warbler	<i>Oporornis formosus</i>	SC	bm
Connecticut Warbler	<i>Oporornis agilis</i>	D	m
Mourning Warbler	<i>Oporornis philadelphia</i>	INC	m
Common Yellowthroat	<i>Geothlypis trichas</i>	D	bm
Hooded Warbler	<i>Wilsonia citrina</i>	RP	bm
Wilson's Warbler	<i>Wilsonia pusilla</i>	S	m
Canada Warbler	<i>Wilsonia canadensis</i>	SC	bm
Yellow-breasted Chat	<i>Icteria virens</i>	SC	bm
Summer Tanager	<i>Piranga rubra</i>	RP	bm

C. 1: Birds of New Jersey

Scarlet Tanager	<i>Piranga olivacea</i>	RP	bm
Northern Cardinal	<i>Cardinalis cardinalis</i>	INC	bw
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>	RP	bm
Blue Grosbeak	<i>Guiraca caerulea</i>	INC	bm
Indigo Bunting	<i>Passerina cyanea</i>	RP	bm
Dickcissel	<i>Spiza americana</i>	RP	bm
Eastern Towhee	<i>Pipilo erythrophthalmus</i>	RP	bmw
American tree Sparrow	<i>Spizella arborea</i>	U	mw
Chipping Sparrow	<i>Spizella passerina</i>	S	bmw
Field Sparrow	<i>Spizella pusilla</i>	RP	bmw
Vesper Sparrow	<i>Pooecetes gramineus</i>	E	bmw
Lark Sparrow	<i>Chondestes grammacus</i>	S	a
Savannah Sparrow	<i>Passerculus sandwichensis</i>	T	bmw
Grasshopper Sparrow	<i>Ammodramus savannarum</i>	T	bm
Henslow's Sparrow	<i>Ammodramus henslowii</i>	E	bm
Saltmarsh Sharp-tailed Sparrow	<i>Ammodramus caudacutus</i>	RP	bmw
Nelson's Sharp-tailed Sparrow	<i>Ammodramus nelsoni</i>	RP	m
Seaside Sparrow	<i>Ammodramus maritima</i>	RP	bmw
Fox Sparrow	<i>Passerella iliaca</i>	INC	mw
Song Sparrow	<i>Melospiza melodia</i>	D	bmw
Lincoln's Sparrow	<i>Melospiza lincolni</i>	INC	m
Swamp Sparrow	<i>Melospiza georgiana</i>	D	bmw
White-throated Sparrow	<i>Zonotrichia albicollis</i>	D	bmw
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>	D	mw
Dark-eyed Junco	<i>Junco hyemalis</i>	S	bmw
Lapland Longspur	<i>Calcarius lapponicus</i>	U	mw
Snow Bunting	<i>Plectrophenax nivalis</i>	U	mw
Bobolink	<i>Dolichonyx oryzivorus</i>	T	bm
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	S	bmw
Eastern Meadowlark	<i>Sturnella magna</i>	SC	bmw
Rusty Blackbird	<i>Euphagus carolinus</i>	INC	mw
Boat-tailed Grackle	<i>Quiscalus major</i>	INC	bmw
Common Grackle	<i>Quiscalus quiscula</i>	D	bmw
Brown-headed Cowbird	<i>Molothrus ater</i>	S	bmw
Orchard Oriole	<i>Icterus spurius</i>	S	bm
Baltimore Oriole	<i>Icterus galbula</i>	RP	bm
Pine Grosbeak	<i>Pinicola enucleator</i>	U	w
Purple Finch	<i>Carpodacus purpureus</i>	RP	bmw
House Finch	<i>Carpodacus mexicanus</i>	S	bmw
Red Crossbill	<i>Loxia curvirostra</i>	INC	a
White-winged Crossbill	<i>Loxia leucoptera</i>	INC	a
Common Redpoll	<i>Carduelis flammea</i>	U	a
Pine Siskin	<i>Carduelis pinus</i>	S	mw
American Goldfinch	<i>Carduelis tristis</i>	INC	bmw
Evening Grosbeak	<i>Hesperiphona vespertinus</i>	D	w
House Sparrow	<i>Passer domesticus</i>	I	bmw

C. 2: Mammals of New Jersey

Mammals of New Jersey

Mammals have not been inventoried specifically within the Borough of North Haledon.

Status

E - Endangered

S - Stable

T - Threatened

U - Undertermined

D - Decreasing

I - Introduced

INC - Increasing

P - Peripheral

COMMON NAME	SCIENTIFIC NAME	STATUS
Atlantic Killer Whale	<i>Orcinus orca</i>	U
Beaver	<i>Castor canadensis</i>	INC
Beluga Whale	<i>Delphinapterus leucas</i>	P
Big Brown Bat	<i>Eptesicus fuscus</i>	S
Black Bear	<i>Ursus americanus</i>	INC
Black Rat	<i>Rattus rattus</i>	I
Black Right Whale	<i>Balaena glacialis</i>	E
Black-tailed Jackrabbit	<i>Lepus californicus</i>	I
Blue Whale	<i>Balaenoptera musculus</i>	E
Bobcat	<i>Felis rufus</i>	E
Bottle-nosed Dolphin	<i>Tursiops truncatus</i>	S
Bridled Spotted Dolphin	<i>Stenella frontalis</i>	U
Brown Rat	<i>Rattus norvegicus</i>	I
Dense Beaked Whale	<i>Mesoplodon densirostris</i>	U
Dwarf Sperm Whale	<i>Kogia simus</i>	U
Eastern Chipmunk	<i>Tamias striatus</i>	S
Eastern Cottontail	<i>Sylvilagus floridanus</i>	S
Eastern Coyote	<i>Canis latrans, var.</i>	INC
Eastern Mole	<i>Scalopus aquaticus</i>	S
Eastern Pipistrel	<i>Pipistrellus subflavus</i>	U
Eastern Wood Rat	<i>Neotoma floridana</i>	E
Ermine	<i>Mustela erminea</i>	U
European Hare	<i>Lepus capensis</i>	I
Fin Whale	<i>Balaenoptera physalus</i>	E
Gervais Beaked Whale	<i>Mesoplodon europaeus</i>	U
Goose-beaked Whale	<i>Ziphius cavirostris</i>	U
Gray Fox	<i>Urocyon cinereoargenteus</i>	S
Gray Seal	<i>Halichoerus grypus</i>	P
Gray Squirrel	<i>Sciurus carolinensis</i>	S
Hairy-tailed Mole	<i>Parascalops breweri</i>	U
Harbor Porpoise	<i>Phocoena phocoena</i>	U
Harbor Seal	<i>Phoca vitulina</i>	S
Harp Seal	<i>Pagophilus groenlandica</i>	P
Hoary Bat	<i>Lasiurus cinereus</i>	U
Hooded Seal	<i>Cystophora cristata</i>	P

C. 2: Mammals of New Jersey

House mouse	<i>Mus musculus</i>	I
Humpback Whale	<i>Megaptera novaeangliae</i>	E
Indiana Bat	<i>Myotis sodalis</i>	E
Keen Myotis	<i>Myotis septentrionalis</i>	U
Least Shrew	<i>Cryotis parva</i>	U
Little Brown Bat	<i>Myotis lucifugus</i>	S
Long-finned Pilot Whale	<i>Globicephala melaena</i>	U
Long-tailed Shrew	<i>Sorex dispar</i>	U
Long-tailed Weasel	<i>Mustela frenata</i>	S
Marsh Rice Rat	<i>Oryzomys palustris</i>	S
Masked Shrew	<i>Sorex cinereus</i>	S
Meadow Jumping Mouse	<i>Zapus hudsonius</i>	U
Meadow Vole	<i>Microtus pennsylvanicus</i>	S
Mink	<i>Mustela vison</i>	S
Minke Whale	<i>Balaenoptera acutorostrata</i>	U
Muskrat	<i>Ondatra zibethicus</i>	S
New England Cottontail	<i>Sylvilagus transitionalis</i>	U
Northern Flying Squirrel	<i>Glaucomys sabrinus</i>	U
Northern yellow bat	<i>Lasiurus intermedius</i>	P
Nutria	<i>Myocastor coypus</i>	I
Opossum	<i>Didelphis marsupialis</i>	S
Pine Vole	<i>Microtus pinetorum</i>	S
Porcupine	<i>Erethizon dorsatum</i>	INC
Pygmy Shrew	<i>Sorex hoyii</i>	U
Pygmy Sperm Whale	<i>Kogia breviceps</i>	U
Raccoon	<i>Procyon lotor</i>	S
Red Bat	<i>Lasiurus borealis</i>	S
Red Fox	<i>Vulpes vulpes</i>	S
Red Squirrel	<i>Tamiasciurus hudsonicus</i>	S
Red-backed Mouse	<i>Clethrionomys gapperi</i>	S
Risso's Dolphin	<i>Grampus griseus</i>	U
River Otter	<i>Lutra canadensis</i>	S
Saddle-backed Dolphin	<i>Delphinus delphis</i>	U
Sei Whale	<i>Balaenoptera borealis</i>	E
Short-finned Pilot Whale	<i>Globicephala macrorhyncus</i>	U
Short-tailed Shrew	<i>Blarina brevicauda</i>	S
Silver-haired Bat	<i>Lasionycteris noctivagans</i>	U
Small-footed Myotis	<i>Myotis leibii</i>	U
Smokey Shrew	<i>Sorex fumeus</i>	U
Southern Bog Lemming	<i>Synaptomys cooperi</i>	U
Southern Flying Squirrel	<i>Glaucomys volans</i>	U
Sperm Whale	<i>Physeter macrocephalus</i>	E
Spotted Dolphin	<i>Stenella plagiodon</i>	U
Star-nosed Mole	<i>Condylura cristata</i>	U
Striped Dolphin	<i>Stenella coeruleoalba</i>	U
Striped Skunk	<i>Mephitis mephitis</i>	S
True's Beaked Whale	<i>Mesoplodon mirus</i>	U

C. 2: Mammals of New Jersey

Tuckahoe Masked Shrew	<i>Sorex cinereus nigriculus</i>	U
Water Shrew	<i>Sorex palustris</i>	U
White-footed Mouse	<i>Peromyscus leucopus</i>	S
White-tailed Deer	<i>Odocoileus virginianus</i>	D
White-tailed Jackrabbit	<i>Lepus townsendii</i>	I
Woodchuck	<i>Marmota monax</i>	S
Woodland Jumping Mouse	<i>Napaeozapus insignis</i>	U

C. 3: Reptiles and Amphibians of New Jersey

Reptiles and Amphibians of New Jersey

COMMON NAME	SCIENTIFIC NAME
TURTLES	
Bog Turtle (E)	<i>Clemmys muhlenbergii</i>
Common Map Turtle	<i>Graptemys geographica</i>
Common Musk Turtle	<i>Sternotherus odoratus</i>
Common Snapping Turtle	<i>Chelydra serpentina</i>
Diamondback Terrapin	<i>Malaclemys t. terrapin</i>
Eastern Box Turtle	<i>Terrapene c. carolina</i>
Eastern Mud Turtle	<i>Kinosternon s. subrubrum</i>
Eastern Painted Turtle	<i>Chrysemys p. picta</i>
Eastern Spiny Softshell	<i>Apalone s. spinifera</i>
Redbelly Turtle	<i>Pseudemys rubriventris</i>
Red-eared Slider	<i>Trachemys scripta elegans</i>
Spotted Turtle	<i>Clemmys guttata</i>
Wood Turtle (T)	<i>Clemmys insculpta</i>
LIZARDS	
Five-lined Skink	<i>Eumeces fasciatus</i>
Ground Skink	<i>Scincella lateralis</i>
Northern Fence Lizard	<i>Sceloporus undulatus hyacinthinus</i>
SNAKES	
Black Rat Snake	<i>Elaphe o. obsoleta</i>
Corn Snake (E)	<i>Elaphe g. guttata</i>
"Coastal Plain" Milk Snake	<i>L. t. triangulum X L. t. elapsoides</i>
Eastern Garter Snake	<i>Thamnophis s. sirtalis</i>
Eastern Hognose Snake	<i>Heterodon platyrhinos</i>
Eastern Kingsnake	<i>Lampropeltis g. getula</i>
Eastern Milk Snake	<i>Lampropeltis t. triangulum</i>
Eastern Ribbon Snake	<i>Thamnophis s. sauritus</i>
Eastern Smooth Earth Snake	<i>Virginia v. valeriae</i>
Eastern Worm Snake	<i>Carphophis a. amoenus</i>
Northern Black Racer	<i>Coluber c. constrictor</i>
DeKay's Brown Snake (formerly No. Brown Snake)	<i>Storeria d. dekayi</i>
Northern Copperhead	<i>Agkistrodon contortrix mokasen</i>
Northern Pine Snake (T)	<i>Pituophis m. melanoleucus</i>
Northern Redbelly Snake	<i>Storeria o. occipitomaculata</i>
Northern Ringneck Snake	<i>Diadophis punctatus edwardsii</i>
Northern Scarlet Snake	<i>Cemophora coccinea copei</i>
Northern Water Snake	<i>Nerodia s. sipedon</i>
Queen Snake (E)	<i>Regina septemvittata</i>
Rough Green Snake	<i>Opheodrys aestivus</i>
Smooth Green Snake	<i>Opheodrys vernalis</i>
Southern Ringneck Snake	<i>Diadophis p. punctatus</i>
Timber Rattlesnake (E)	<i>Crotalus horridus</i>
SALAMANDERS	
Blue-spotted Salamander (E)	<i>Ambystoma laterale</i>

C. 3: Reptiles and Amphibians of New Jersey

Eastern Mud Salamander (T)	<i>Pseudotriton m. montanus</i>
Eastern Tiger Salamander (E)	<i>Ambystoma t. tigrinum</i>
Four-toed Salamander	<i>Hemidactylium scutatum</i>
Jefferson Salamander	<i>Ambystoma jeffersonianum</i>
Longtail Salamander (T)	<i>Eurycea l. longicauda</i>
Marbled Salamander	<i>Ambystoma opacum</i>
Mountain Dusky Salamander	<i>Desmognathus ochrophaeus</i>
Northern Dusky Salamander	<i>Desmognathus f. fuscus</i>
Northern Red Salamander	<i>Pseudotriton r. ruber</i>
Northern Slimy Salamander	<i>Plethodon glutinosus</i>
Northern Spring Salamander	<i>Gyrinophilus p. porphyriticus</i>
Northern Two-lined Salamander	<i>Eurycea bislineata</i>
Redback Salamander	<i>Plethodon cinereus</i>
Red-spotted Newt	<i>Notophthalmus v. viridescens</i>
Spotted Salamander	<i>Ambystoma maculatum</i>
FROGS & TOADS	
American Toad	<i>Bufo americanus</i>
Bullfrog	<i>Rana catesbeiana</i>
Carpenter Frog	<i>Rana virgatipes</i>
Eastern Spadefoot (toad)	<i>Scaphiopus h. holbrookii</i>
Fowler's Toad	<i>Bufo woodhousii fowleri</i>
Green Frog	<i>Rana clamitans melanota</i>
New Jersey Chorus Frog	<i>Pseudacris triseriata kalmi</i>
Northern Cricket Frog	<i>Acris c. crepitans</i>
Northern Gray Treefrog	<i>Hyla versicolor</i>
Northern Spring Peeper	<i>Pseudacris c. crucifer</i>
Pickerel Frog	<i>Rana palustris</i>
Pine Barrens Treefrog (T)	<i>Hyla andersonii</i>
Southern Gray Treefrog (E)	<i>Hyla chrysoscelis</i>
Southern Leopard Frog	<i>Rana utricularia</i>
Upland Chorus Frog	<i>Pseudacris triseriata feriarum</i>
Wood Frog	<i>Rana sylvatica</i>

Appendix D

1. **NJDEP List of Rare Plant Species in Passaic County**
2. **Rare Plant Reporting Form**
3. **Rare Wildlife Reporting Form**
4. **Fact Sheets for Threatened and Endangered Species within North Haledon**
 - a. **Bobcat**
 - b. **Red Shouldered Hawk**
 - c. **Barred Owl**
 - d. **Bald Eagle**
5. **NJENSP Special Concern - Species Status Listing**



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D. 1: NJDEP List of Rare Plant Species in Passaic County
**Rare Plant Species and Ecological Communities Presently
Recorded in the NJ Natural Heritage Database**

Scientific Name	Common Name	Federal Status	State Status	Regional Status	G Rank	S Rank
<i>County: Passaic</i>						
International Vegetation Classification						
<i>Picea mariana</i> / (<i>Vaccinium corymbosum</i> , <i>Gaylussacia baccata</i>) / <i>Sphagnum</i> sp. <i>Woodland</i>	Black Spruce Woodland Bog			HL	G3G5	S1
<i>Chamaecyparis thyoides</i> / <i>Rhododendron maximum</i> Forest	Atlantic White-cedar / Great Rhododendron Swamp			HL	G2G3	S1
Nonvascular Plant						
<i>Sphagnum fuscum</i>	Sphagnum			HL	G5	S2
<i>Sphagnum riparium</i>	Sphagnum		E	LP, HL	G5	S1
<i>Sphagnum squarrosum</i>	Sphagnum			HL	G5	S2
<i>Sphagnum subsecundum</i>	Sphagnum		E	LP, HL	G5	S1
Terrestrial Community - Other Classification						
<i>Traprock glade/rock outcrop community</i>	Traprock Glade/rock Outcrop Community				G2	S1
Vascular Plant						
<i>Adlumia fungosa</i>	Climbing Fumitory			HL	G4	S2
<i>Agastache nepetoides</i>	Yellow Giant-hyssop			HL	G5	S2
<i>Agastache scrophulariifolia</i>	Purple Giant-hyssop			HL	G4	S2
<i>Agrimonia microcarpa</i>	Small-fruit Grooveburr			HL	G5	S2
<i>Alisma triviale</i>	Large Water-plantain		E	LP, HL	G5	S1
<i>Andromeda polifolia</i> var. <i>glaucophylla</i>	Bog Rosemary		E	LP, HL	G5T5	S1

D. 1: NJDEP List of Rare Plant Species in Passaic County

Scientific Name	Common Name	Federal Status	State Status	Regional Status	G Rank	S Rank
<i>County: Passaic</i>						
<i>Anemone canadensis</i>	Canada Anemone			HL	G5	SX
<i>Arabis hirsuta var. pycnocarpa</i>	Western Hairy Rockcress			HL	G5T5	S1
<i>Asclepias quadrifolia</i>	Four-leaf Milkweed			HL	G5	S3
<i>Asclepias verticillata</i>	Whorled Milkweed			HL	G5	S2
<i>Botrychium oneidense</i>	Blunt-lobe Grape Fern			HL	G4	S2
<i>Calystegia spithamea ssp. spithamea</i>	Erect Bindweed		E	LP, HL	G4G5T4T5	S1
<i>Cardamine longii</i>	Long's Bittercress		E	LP, HL	G3?	SH
<i>Carex bebbii</i>	Bebb's Sedge			HL	G5	S2
<i>Carex brunnescens var. sphaerostachya</i>	Round-spike Brownish Sedge		E	LP, HL	G5T5	S1
<i>Carex bushii</i>	Bush's Sedge		E	LP, HL	G4	S1
<i>Carex deweyana var. deweyana</i>	Dewey's Sedge		E	LP, HL	G5T5	S1
<i>Carex disperma</i>	Soft-leaf Sedge			HL	G5	S1S2
<i>Carex limosa</i>	Mud Sedge		E	LP, HL	G5	S1
<i>Carex pallescens</i>	Pale Sedge			HL	G5	S2
<i>Carex siccata</i>	Hillside Sedge		E	LP, HL	G5	S1
<i>Carex utriculata</i>	Bottle-shaped Sedge			HL	G5	S2
<i>Carex willdenowii var. willdenowii</i>	Willdenow's Sedge			HL	G5T5	S2
<i>Castilleja coccinea</i>	Scarlet Indian-paintbrush			HL	G5	S2
<i>Cercis canadensis var. canadensis</i>	Redbud		E	LP, HL	G5T5	S1
<i>Chenopodium simplex</i>	Maple-leaf Goosefoot			HL	G5	S2
<i>Clematis occidentalis var. occidentalis</i>	Purple Clematis			HL	G5T5	S2
<i>Coeloglossum viride var. virescens</i>	Long-bract Green Orchid			HL	G5T5	S2

D. 1: NJDEP List of Rare Plant Species in Passaic County

Scientific Name	Common Name	Federal Status	State Status	Regional Status	G Rank	S Rank
<i>County: Passaic</i>						
<i>Conioselinum chinense</i>	Hemlock-parsley		E	LP, HL	G5	S1
<i>Corallorhiza trifida</i>	Early Coralroot			HL	G5	S2
<i>Corallorhiza wisteriana</i>	Spring Coralroot			HL	G5	SX
<i>Cornus canadensis</i>	Bunchberry			HL	G5	S1S2
<i>Crataegus calpodendron</i>	Pear Hawthorn		E	LP, HL	G5	S1
<i>Crataegus chrysocarpa var. chrysocarpa</i>	Fireberry Hawthorn			HL	G5T5	S2
<i>Cuphea viscosissima</i>	Blue Waxweed			HL	G5?	S3
<i>Cynoglossum virginianum var. boreale</i>	Northern Wild Comfrey		E	LP, HL	G5T4T5	SH.1
<i>Cynoglossum virginianum var. virginianum</i>	Wild Comfrey			HL	G5T5	S2
<i>Cypripedium reginae</i>	Showy Lady's-slipper		E	LP, HL	G4	S1
<i>Desmodium cuspidatum var. cuspidatum</i>	Toothed Tick-trefoil			HL	G5T5?	S2
<i>Dirca palustris</i>	Leatherwood			HL	G4	S2
<i>Doellingeria infirma</i>	Cornel-leaf Aster			HL	G5	S2
<i>Dryopteris celsa</i>	Log Fern		E	LP, HL	G4	S1
<i>Elatine americana</i>	American Waterwort			HL	G4	S2
<i>Eleocharis halophila</i>	Salt-marsh Spike-rush			HL	G4	S2
<i>Elymus trachycaulus</i>	Slender Wheatgrass		E	LP, HL	G5	S1
<i>Epilobium angustifolium ssp. circumvagum</i>	Narrow-leaf Fireweed			HL	G5T5	S1S2
<i>Equisetum pratense</i>	Meadow Horsetail		E	LP, HL	G5	S1
<i>Eriophorum viridicarinatum</i>	Thin-leaf Cotton-grass			HL	G5	S3
<i>Galium labradoricum</i>	Labrador Marsh Bedstraw		E	LP, HL	G5	S1
<i>Gaultheria hispidula</i>	Creeping-snowberry		E	LP, HL	G5	S1

D. 1: NJDEP List of Rare Plant Species in Passaic County

Scientific Name	Common Name	Federal Status	State Status	Regional Status	G Rank	S Rank
<i>Gentiana linearis</i>	Narrow-leaf Gentian		E	LP, HL	G4G5	SH
<i>Gnaphalium macounii</i>	Winged Cudweed		E	LP, HL	G5	SH
<i>Gymnocarpium dryopteris</i>	Oak Fern			HL	G5	S1S2
<i>Helianthemum bicknellii</i>	Hoary Frostweed			HL	G5	S3
<i>Hottonia inflata</i>	Featherfoil		E	LP, HL	G4	S1
<i>Ilex montana</i>	Large-leaf Holly		E	LP, HL	G5	S1
<i>Isotria medeoloides</i>	Small Whorled Pogonia	LT	E	LP, HL	G2	S1
<i>Juncus brevicaudatus</i>	Narrow-panicle Rush			HL	G5	S2
<i>Lechea tenuifolia</i>	Narrow-leaf Pinweed		E	LP, HL	G5	S1
<i>Lemna perpusilla</i>	Minute Duckweed		E	LP, HL	G5	S1
<i>Lemna trisulca</i>	Star Duckweed			HL	G5	S2
<i>Lemna valdiviana</i>	Pale Duckweed		E	LP, HL	G5	S1
<i>Leptochloa fascicularis var. maritima</i>	Long-awn Sprangletop			HL	G5T3T4Q	S2
<i>Liatris spicata var. spicata</i>	Blazing-star			HL	G5T5?	S3
<i>Lilium philadelphicum var. philadelphicum</i>	Wood Lily			HL	G5T4T5	S2
<i>Lipocarpha micrantha</i>	Small-flower Halfchaff Sedge		E	LP, HL	G5	S1
<i>Lonicera canadensis</i>	American Fly-honeysuckle		E	LP, HL	G5	S1
<i>Lupinus perennis var. perennis</i>	Sundial Lupine			HL	G5T5?	S3
<i>Lycopodiella inundata</i>	Northern Bog Club-moss			HL	G5	S1S2
<i>Lysimachia hybrida</i>	Lowland Loosestrife			HL	G5	S3
<i>Malaxis bayardii</i>	Bayard Long's Adder's-mouth		E	LP, HL	G1G2	SH
<i>Malaxis unifolia</i>	Green Adder's-mouth		E	LP, HL	G5	SH

D. 1: NJDEP List of Rare Plant Species in Passaic County

Scientific Name	Common Name	Federal Status	State Status	Regional Status	G Rank	S Rank
<i>Melanthium virginicum</i>	Virginia Bunchflower		E	LP, HL	G5	S1
<i>Menyanthes trifoliata</i>	Buck-bean			HL	G5	S2
<i>Monarda clinopodia</i>	Basil Beebalm		E	LP, HL	G5	SH
<i>Muhlenbergia capillaris</i> var. <i>capillaris</i>	Long-awn Smoke Grass		E	LP, HL	G5T5?	S1
<i>Myriophyllum heterophyllum</i>	Variable-leaf Water-milfoil			HL	G5	S2
<i>Myriophyllum verticillatum</i>	Whorled Water-milfoil		E	LP, HL	G5	SH
<i>Obolaria virginica</i>	Virginia Pennywort			HL	G5	S2
<i>Panicum boreale</i>	Northern Panic Grass		E	LP, HL	G5	S1
<i>Penstemon laevigatus</i>	Smooth Beardtongue		E	LP, HL	G5	S1
<i>Phaseolus polystachios</i> var. <i>polystachios</i>	Wild Kidney Bean			HL	G5T5?	S2
<i>Phegopteris connectilis</i>	Northern Beech Fern			HL	G5	S2
<i>Picea rubens</i>	Red Spruce		E	LP, HL	G5	S1
<i>Platanthera ciliaris</i>	Yellow Fringed Orchid			LP, HL	G5	S2
<i>Platanthera flava</i> var. <i>herbiola</i>	Tuberled Rein Orchid			HL	G4?T4Q	S2
<i>Platanthera hookeri</i>	Hooker's Orchid		E	LP, HL	G4	SH
<i>Platanthera hyperborea</i> var. <i>huronensis</i>	Leafy Northern Green Orchid			HL	G5T5?	SX
<i>Populus heterophylla</i>	Swamp Cottonwood			HL	G5	S2
<i>Porteranthus trifoliatus</i>	Indian Physic			HL	G4G5	S2
<i>Potamogeton obtusifolius</i>	Blunt-leaf Pondweed		E	LP, HL	G5	S1
<i>Prenanthes racemosa</i> var. <i>racemosa</i>	Smooth Rattlesnake-root		E	LP, HL	G5T4	SH
<i>Pycnanthemum clinopodioides</i>	Basil Mountain-mint		E	LP, HL	G1G2	S1
<i>Pycnanthemum torrei</i>	Torrey's Mountain-mint		E	LP, HL	G2	S1

D. 1: NJDEP List of Rare Plant Species in Passaic County

Scientific Name	Common Name	Federal Status	State Status	Regional Status	G Rank	S Rank
<i>County: Passaic</i>						
<i>Ranunculus ambigens</i>	Water-plantain Spearwort			HL	G4	S2
<i>Ranunculus fascicularis</i>	Early Buttercup		E	LP, HL	G5	S1
<i>Ranunculus flabellaris</i>	Yellow Water Buttercup			HL	G5	S3
<i>Ranunculus pusillus var. pusillus</i>	Low Spearwort			HL	G5T4?	S2
<i>Ranunculus trichophyllus var. trichophyllus</i>	Thread-leaf Water Buttercup			HL	G5T5	S2
<i>Rotala ramosior</i>	Toothcup			HL	G5	S3
<i>Rubus canadensis</i>	Smooth Blackberry		E	LP, HL	G5	S1
<i>Rubus setosus</i>	Bristly Blackberry			HL	G5	SH.1
<i>Sabatia dodecandra var. dodecandra</i>	Large Marsh-pink			HL	G5?T4T5	S2
<i>Sagittaria subulata</i>	Awl-leaf Arrowhead			HL	G4	S2
<i>Salix lucida ssp. lucida</i>	Shining Willow			HL	G5T5	S1?
<i>Salix pedicellaris</i>	Bog Willow		E	LP, HL	G5	S1
<i>Salix serissima</i>	Autumn Willow			HL	G4	S2
<i>Sanicula trifoliata</i>	Large-fruit Black-snakeroot		E	LP, HL	G4	S1
<i>Scirpus atrocinctus</i>	Black-girdle Woolgrass			HL	G5	S2
<i>Scleria pauciflora var. caroliniana</i>	Carolina Nut-rush			HL	G5T4T5	S2
<i>Scleria verticillata</i>	Whorled Nut-rush		E	LP, HL	G5	S1
<i>Scutellaria leonardii</i>	Small Skullcap		E	LP, HL	G4T4	S1
<i>Scutellaria nervosa</i>	Veined Skullcap			HL	G5	S2
<i>Selaginella rupestris</i>	Rock Spike-moss			HL	G5	S2
<i>Sphenopholis pensylvanica</i>	Swamp Oats			HL	G4	S2
<i>Spiranthes laciniata</i>	Lace-lip Ladies'-tresses		E	LP, HL	G4G5	S1

D. 1: NJDEP List of Rare Plant Species in Passaic County

Scientific Name	Common Name	Federal Status	State Status	Regional Status	G Rank	S Rank
<i>County: Passaic</i>						
<i>Stachys tenuifolia</i>	Smooth Hedge-nettle			HL	G5	S3
<i>Stellaria borealis var. borealis</i>	Boreal Starwort		E	LP, HL	G5T5	S1
<i>Streptopus lanceolatus</i>	Rosy Twisted-stalk		E	LP, HL	G5T5	S1
<i>Taxus canadensis</i>	American Yew			HL	G5	S2
<i>Tiarella cordifolia var. cordifolia</i>	Foamflower		E	LP, HL	G5T5	S1
<i>Trillium undulatum</i>	Painted Trillium			HL	G5	S2
<i>Trollius laxus ssp. laxus</i>	Spreading Globe Flower		E	LP, HL	G5T3	S1
<i>Vaccinium oxycoccus</i>	Small Cranberry			HL	G5	S2
<i>Verbena simplex</i>	Narrow-leaf Vervain		E	LP, HL	G5	S1
<i>Viburnum lantanoides</i>	Witch-hobble		E	LP, HL	G5	S1
<i>Viola hirsutula</i>	Southern Wood Violet			HL	G4	S2
<i>Viola septentrionalis</i>	Northern Blue Violet		E	LP, HL	G5	S1
<i>Wolffiella gladiata</i>	Sword Bogmat		E	LP, HL	G5	S1
<i>Xyris montana</i>	Northern Yellow-eyed-grass		E	LP, HL	G4	S1.1



D. 2: Rare Plant Reporting Form

Natural Heritage Rare Plant Species Reporting Form

This form is used to report a personal field sighting of a rare plant species (element occurrence) tracked by the Natural Heritage Database. It may also be used to summarize locational information from a published or unpublished report. Plant species tracked include those appearing on the List of Endangered Plant Species and Plant Species of Concern (<http://www.nj.gov/dep/parksandforests/natural/heritage/spplant.html>). The Office of Natural Lands Management can provide copies of the list upon request. In order for this form to be processed, the sections preceded by an asterisk (*) must be completed.

Send completed form to: DEP, Division of Parks and Forestry, Office of Natural Lands Management, Natural Heritage Program, Mail Code 501-04, P.O. Box 420, Trenton, NJ 08625-0420 or email to Natlands@dep.nj.gov

Form Completion Date: _____ *** Date(s) of the Observation(s):** _____

Common Name: _____ **Scientific Name:** _____

***Location Map:** *A mapped location of the occurrence must accompany this form.* The ideal format is to locate the site on a photocopied section of a U.S. Geological Survey 7.5 minute topographical map, and to also sketch a second map showing finer details. Be sure to provide the name of the USGS map.

GPS Coordinates (If available please provide the following):

Datum Used:	<input type="checkbox"/> NAD 1983	<input type="checkbox"/> NAD 1927	<input type="checkbox"/> WGS84	<input type="checkbox"/> Other _____
Lat/Long (if applicable):	_____ N (Latitude)		_____ W (Longitude)	
UTM (if applicable)	18 N/S: _____ Northing		_____ Easting	
Accuracy Level:	+/- _____ <input type="checkbox"/> feet or <input type="checkbox"/> meters			

***Directions to Site:** Directions to the element occurrence using a readily locatable and relatively permanent landmark on or near the site (such as a road intersection, a prominent hill or cliff) as the starting point. Use clear, complete sentences so that someone who is unfamiliar with the area will be able to relocate the element occurrence using your written directions (e.g., "About 50 ft. N. of small stream draining Brindel Lake, 0.5 mi. SE of Brindeltown and 0.2 mi. WSW of jct. of Range Rd. and Rt. 539, Fort Dix").

Identification: How was the species identification made? Name the identification manuals used or the experts consulted. Were there identification problems?

***Number of Individuals Observed:**

1-10 11-50 51-100 101-1,000 1,001-10,000 >10,000

If possible, provide the exact number of individuals and an estimated percentage of flowering/fruitlet individuals. For rhizomatous plants such as grasses and sedges, what was counted as individual – separate culms or entire clumps or patches?

Life Stages Present: Check life stages observed and provide an estimate of the numbers of individuals for each life stage.

vegetative _____ bud _____ flower _____ fruiting _____ seedling _____

D. 2: Rare Plant Reporting Form

Associated Species/Additional Biological Data: List any associated species and/or additional rare species observed at this site. What else was observed? Provide information on the general condition or vigor of the individuals and viability of the population(s). A separate Rare Plant Species Reporting Form is recommended for each element occurrence observed.

--

Habitat Data: Describe the specific area where the occurrence is located. List natural community types, dominant vegetation and information on the physical environment such as substrate type, hydrology, moisture regime, slope and aspect. Also, describe the surrounding landscape.

--

Threats: Describe any current or potential threats to this occurrence. If invasive species are present, please list.

--

Ownership: If known, please provide landowner(s) name, address, phone #, block, lot.

--

Information Source:

***Name, Address and Phone #** (of person filing report):

Name:	
Address:	
Phone Number:	

*Does this information come directly from a field visit or a published or unpublished report?

Citation: For information taken from a published or unpublished report, please provide a copy of the cover page and the pertinent portions of the report. If a copy can not be provided, list below the author, date, title, publisher, and page numbers.

--

Voucher: Was the observation vouchered with a photograph? a video/digital format? a specimen?
If possible, attach a copy of the photograph, etc. If specimen voucher, please provide the name of the repository:

--

Confirmation: Would you accompany a biologist to the site if needed? yes no

Additional Comments: (use extra sheets if needed)

--

***Attachment:** Include a mapped location of the occurrence and a sketched map with finer details and landmarks.

Last Revised 8/10/2018

D. 3: Rare Wildlife Reporting Form

Rare Wildlife Sighting Report Form

Report form must be accompanied by an aerial photograph or satellite image with the location precisely marked. Please complete online or print legibly.

*The inclusion of a map is mandatory, please see other side for further information on maps.

General Information

Today's Date _____ (mm/dd/yyyy)

Common Name _____ Scientific Name (If known) _____

Where did the sighting take place?

Municipality/Township _____ County _____

Coordinates (in state plane feet, if known) _____

Directions to location of sighting with landmarks, which will enable the future relocation of the site. _____

Land Owner (name, address and phone number, if known) _____

Describe habitat at the point of sighting and habitat in the general area of the sighting location. _____

Would you accompany a biologist to the site if needed? Yes No

Can you describe any immediate or future plans to develop or disturb the site? Yes No

If so, please describe. _____

Locational Accuracy

1. Is your depiction of the sighting location on the map or aerial photo within 6m (20ft) of the animal's actual location on the ground? Yes No (if No, answer question 2 below)

2. Your mapping is accurate to within ____meters ____feet ____miles of the actual location.

What was observed?

How was the species identification made (ex. Sighting, Call, Road Kill, etc.)? _____

Date and time of this sighting (ex. August 20, 2018, 10:30am). _____

How frequently has this species been sighted at this location and over how long a period of time? _____

Number of individuals sighted: Adult _____ Immature _____ Larva _____ Unknown/Other _____

Describe sighting and activity observed (ex. Nesting, Perched, Flying, Sunning, etc.). _____

Describe physical features that identify the sighted animal as the species you are reporting. _____

D. 3: Rare Wildlife Reporting Form

Were photos taken? Yes No Was video recorded? Yes No Was audio recorded? Yes No

Photos/video/audio are strongly encouraged in order to verify the accuracy of a sighting. Items should be identified with the date taken, location, and observer signature. Items will not be returned.

List manuals used or experts consulted to verify identification. _____

Provide a brief background on wildlife knowledge and/or experience, or additional information that would add to the validity of the sighting. _____

Can this be verified by someone else or can anyone vouch for your identification skills? Yes No _____

Describe any additional information that may be useful regarding the condition of the animal or location. _____

Your contact information

Name _____ Street _____

City _____ State _____ ZIP _____

Daytime Phone _____ E-mail _____

Preferred method of contact _____

Signature _____

I'm 18 or over and all information contained on this form and in the supporting documentation is true and accurate to the best of my knowledge.

Instructions

1. Complete this form for first-hand field observations only.
2. DO NOT COMPLETE THIS FORM if the source of your information is a report, letter, conversation, or other document. Send us the documentation instead.
3. Attach a copy of a map. (**see below*)
4. Only report one species at each location per form and map.

*Mapping

A map is necessary to help our biologists determine if suitable habitat is present at the location. Once the suitability of the area is determined, the map provided aids in the delineation of land to be protected. Ideally the most accurate form of map is an aerial photo. Satellite-derived images are available at <https://www.google.com/maps>. These images can be printed and clearly marked with a pen or saved in a digital format and e-mailed along with this form. If you zoom in on the map or imagery and click directly on the exact location of your observation, Google Maps will show a location icon, and provide latitude and longitude coordinates. Please provide an aerial image or map. Thank you.

Refer to the DFW website for further information: www.njfishandwildlife.com/ensp/rprtform.htm



Appendix D
2023

Return to:

Endangered and Nongame Species Program
NJ Division of Fish and Wildlife
P.O. Box 420
Mail Code 501-03
Trenton, NJ 08625-0420
609-292-9400
bioticsnj@dep.nj.gov



North Haledon Natural Resources Inventory
BOSWELL ENGINEERING

Bobcat, *Lynx rufus*

Status:

State: Endangered

Federal: Not listed

Identification

The bobcat is a medium-sized feline, standing at approximately two feet tall. It surpasses the size of a domestic housecat but falls considerably short of the dimensions of a cougar or lion. In New Jersey, adult females typically weigh between 18 and 25 lbs, while adult males can reach weights of up to 35 lbs. Their fur displays a range of hues from yellowish brown to reddish brown, adorned with markings that vary from 'tabby' stripes to pronounced spotting. Bobcats feature slightly tufted ears and a short, bobbed tail measuring between three and seven inches, with a black tip. They are known to engage in both daytime and nighttime hunting, although research suggests that the majority of hunting activities occur during dawn and dusk. Bobcats are notably elusive creatures and are rarely spotted by humans; however, as their population has increased in the northern regions of the state, more people are reporting sightings of these elusive felines.



Distribution and Habitat

The bobcat is recognized for being the most widely distributed native wild cat in North America. Its habitat encompasses coniferous and mixed forests in the northern regions, swampy and coastal areas in and around Florida, and desert and scrubland in the southwestern United States. Notably, it can be found in all 48 contiguous United States, with the sole exception of Delaware. However, during the late 1800s and early 1900s, factors such as extensive deforestation, development, and changes in agricultural practices played a role in its decline in specific regions of the country by the 1970s, particularly in the northeast and midwest.

Encouragingly, a thorough range-wide status assessment carried out in 2008 by researchers from Cornell University and the University of Montana brought forth positive results. The report highlighted that bobcat populations are currently more extensively spread and more plentiful throughout North America than they were in the early 1980s.

Diet

Bobcats prey on rabbits, mice, squirrels, ground-nesting songbirds, turkeys, and even small or sick deer. They only eat about 3 pounds of meat at a time, so if they manage to catch a larger animal, they will drag it to a safe spot, cover it up, and return later to feed again. They have excellent vision and hearing, and use these senses most in hunting. The soft pads on their feet help them sneak up quietly on their prey.

Life Cycle

Bobcats den in crevices in rocks, under fallen logs, in thick tangles of vegetation or under the root mass of a fallen tree. They generally breed between February and June, and have a litter size of 1-6 young (2-3 is typical) that are born after a gestation period of approximately 60 days.

D. 4: Fact Sheets for Threatened and Endangered Species within North Haledon

The spotted kittens are weaned at about 12 weeks. As the kittens are weaned, they begin eating meat that the mother brings back for them. Later, she will bring live animals (like mice) back to the den, so the kittens can practice hunting. A bobcat becomes independent of its mother at about 10-12 months of age, and may live 12-13 years in the wild.

Management & Research

In New Jersey, the bobcat was historically widespread and common; occurring in all counties, but by the 1970s was considered extremely rare. European settlement brought hard times for bobcats. Early settlers hunted and trapped them for their pelts and changes in land-use occurred that were unfavorable for bobcats. The greatest blow to the once large population was the massive deforestation that occurred here at the turn of the century. As forests were cleared for lumber, fuel and charcoal, and land was converted to agricultural use, bobcat habitat became fragmented. As NJ's human population grew, along with roads and development, bobcat habitat became even more fragmented. Populations became isolated and plummeted. Scattered reports of bobcats being seen or killed on roads continued throughout the 1950s and 1960s, and the species was listed as endangered in NJ in June of 1991.

The NJ Division of Fish and Wildlife conducted a restoration project where 24 bobcats captured in Maine were released in northern New Jersey from 1978-1982. By the 1990's reports of bobcat sightings began to increase. Today, bobcat reports from northern NJ are on the increase. Unfortunately, so are the numbers of bobcats killed by automobiles on our roadways. In 2019, for example, 15 bobcats were confirmed killed by vehicles, which was the highest number ever recorded. Over 70% of bobcats struck by vehicles in New Jersey are less than 2 years old, likely because these young cats are naïve to road hazards and because they often disperse long distances, crossing unfamiliar habitat including many roads, to find a territory of their own.

Since 1991, the Division's management efforts have led to consistent bobcat sightings from an increasingly larger area of northern New Jersey, but very few if any from central and southern New Jersey. Most sightings continue to come from Warren, Sussex, Passaic and Morris counties but there have been scattered, recent sightings from Bergen and Hunterdon counties, and in 2017, the first confirmed observations from Mercer county in decades. Bobcats are difficult to study because they exhibit elusive behavior, occur at relatively low densities, and have large area requirements. Yet, monitoring of population characteristics (e.g. size and sex ratio), distribution, habitat availability, and genetic health are essential components needed to develop and implement a recovery plan for the species. In recent years, biologists have used a few different methods in an attempt to gather this vital information.

In February of 1997, biologists first started tracking bobcats using radio telemetry. Since that time, biologists have used telemetry, and more recently GPS collar data, to track the movements of over a dozen bobcats to determine the kind of habitat they use and the size of their home range. In recent years ENSP has collared bobcats near major roadways in northern NJ to evaluate the response of bobcats to these roads.

In late 2005 ENSP, still looking for an effective way to more broadly survey the bobcat population and its overall genetic health, contracted with Working Dogs for Conservation to

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acquire Bear, a professionally trained detection dog. Bear effectively located and alerted the biologist/dog handler to bobcat scats (as well as additional species “targets”) over a period of 12 years. DNA analyses of these scats, more specifically the sloughed off intestinal cells in the scats, provide DNA ‘fingerprints’ of individual bobcats, allowing biologists to estimate the bobcat population size for the first time in New Jersey. Systematic surveys conducted in northwestern New Jersey by the dog-handler team between 2007 and 2016 resulted in over 530 bobcat scats representing over 170 different individuals. These data have been analyzed, with the help of DEP’s Division of Science, Research, and Environmental Health, using a statistical method called spatial mark-recapture. Those analyses estimate that there are between approximately 200 and 400 individuals in that region of the state, varying slightly by year. Bear passed away in 2017. In 2019, ENSP again worked with Working Dogs for Conservation to acquire a new detection named ‘Fly’. The dog-handler team has been targeting bobcat scat surveys in central and southern New Jersey.

The DNA data from scats as well as tissue samples we collect from bobcats that have been killed on the road, accidentally trapped, or trapped by ENSP in order to fit with GPS collars, have also been used to evaluate the genetic health of the population in NJ and in relation to surrounding states, as well as to assess the population’s ability to move through the landscape, or its gene flow. These genetic analyses, in addition to remotely triggered cameras, roadkill locations, and the GPS collar data, are enabling biologists to identify potential barriers to gene flow or bobcat movement between areas of suitable habitat in the state.

The threat from habitat loss and fragmentation, changes in land use, the existence of barriers to free movement between suitable habitats and automobile collisions on our busy and abundant roadways will likely limit the growth of NJ’s bobcat population unless we can effectively reconnect areas of suitable habitat and enable them to move safely through the landscape. This understanding of the essential need for a connected landscape, for bobcats, and all of our terrestrial wildlife, was the basis for a project that the Division is leading called [Connecting Habitat Across New Jersey \(CHANJ\)](#), released in 2019.

All of the aforementioned research is informing a status assessment and recovery plan for bobcats that spells out what a healthy bobcat population in New Jersey is in terms of abundance, geographic distribution, and genetic diversity. A recovery plan also lays out the actions we need to take to support the recovery, ensuring the population is healthy and stable not only in the near term, but in the long terms as well - 100 years from now.

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More information:

DEP podcast about bobcats in New Jersey: <https://www.podbean.com/media/share/pb-vxtyj-6925e2>

Short film about bobcat in New Jersey entitled 'Dogs and Bobcats': <http://www.creatureshow.com>

Learn more about Connecting Habitat Across New Jersey (CHANJ): www.chanj.nj.gov

Report a live bobcat observation (please include photos if you have them!):
<http://www.state.nj.us/dep/fgw/ensp/rprtform.htm>

Report an injured or dead bobcat: Call 1-877-WARNDEP (1-877-927-6337)

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Red-shouldered Hawk, *Buteo lineatus*

Status: *State:* Endangered (breeding population), Threatened (nonbreeding population)

Federal: Migratory Nongame Bird of Management Concern

Identification

The red-shouldered hawk is a crow-sized buteo, or soaring hawk. The adults are strikingly plumed, with rufous (brownish red) shoulder patches and a rufous barred breast. Rufous lesser and median upperwing coverts form the “red shoulders” evident on this species. The flight feathers of adults are barred black and white and show a white crescent-shaped window across the primaries,



which is visible in flight. The underparts, which are rufous with white barring, often exhibit thin, dark streaks on the chest. The head and back are dark brown. The black tail is bisected by several narrow white bands. Although females average slightly larger than males, plumage is similar for both sexes. The call of the red-shouldered hawk is a series of nasal drawn-out “aahhh” cries.

Juvenile red-shouldered hawks can be distinguished from adults by their overall browner, less brilliant plumage. The shoulder patches of juveniles are paler rufous and the crescents across the primaries are tawny. The underparts are whitish with variable amounts of brown streaking. The tail is brown with several thin pale bands. Adult plumage appears in the second year.

The red-shouldered hawk is a long-tailed buteo with squared-off wings and a protruding head. Characterized by quick choppy wingbeats interspersed with short glides, the flight style of this hawk is similar to that of an accipiter. When soaring, most buteos hold their wings straight out, whereas the red-shouldered hawk bows its wings forward.

Habitat

Mature wet woods such as hardwood swamps and riparian forests typify red-shouldered hawk breeding habitat. Nesting territories, which occur in deciduous, coniferous, or mixed woodlands, are typically located within remote and extensive old growth forests containing standing water. Consequently, breeding barred owls (*Strix varia*) and Cooper’s hawks (*Accipiter cooperii*) are often found in habitats containing red-shouldered hawks.

Red-shouldered hawks select large deciduous and, to a lesser extent, coniferous trees for nesting. Nests have been documented in oak (*Quercus spp.*), pine (*Pinus spp.*), maple (*Acer spp.*), ash (*Fraxinus spp.*), beech (*Fagus grandifolia*), birch (*Betula spp.*),

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basswood (*Tilia americana*), chestnut (*Castanea dentata*), hemlock (*Tsuga canadensis*), elm (*Ulmus spp.*), cherry (*Prunus spp.*), hickory (*Carya spp.*), and tulip poplar (*Liriodendron tulipifera*). Forest characteristics include a closed canopy of tall trees, an open subcanopy, and variable amounts of understory cover.

Red-shouldered hawks inhabit wetland forest types unique to the different physiographic regions throughout northern and southern New Jersey. In north Jersey, they occupy riparian forests, wooded wetlands, beaver meadows, and mesic (slightly moist) lowland forests. Within the Pequannock Watershed, red-shouldered hawks are found in stream bottomlands and coniferous or mixed forests containing eastern hemlock or white pine (*Pinus strobus*). Nests are predominately located in wilderness areas where there are abundant wetlands, small forest openings, and limited areas of large open water such as lakes. In the Pequannock Watershed, red-shouldered hawks avoid areas of human inhabitation, steep uplands, dry slopes, open water, areas with limited conifers, and areas with too many or too few forest openings. Although red-shouldered hawks require extensive tracts of forested habitat for nesting, territories may also contain edges where the birds forage.

The majority of red-shouldered hawk nests in southern New Jersey are contained within vast contiguous freshwater wetlands. Hardwood or mixed hardwood/cedar swamps containing red maple (*Acer rubrum*), black gum (*Nyssa sylvatica*), sassafras (*Sassafras albidum*), sweetbay magnolia (*Magnolia virginiana*), and Atlantic white cedar (*Chamaecyparis thyoides*) are occupied by red-shouldered hawks. Often, such large forested tracts are surrounded by oak/pine forests or agricultural fields. Although red-shouldered hawks nest in large contiguous tracts of wet old growth forests in Cumberland County, they occupy younger wet woods, often on private property safeguarded from high levels of human activity, in Cape May County.

An-area sensitive species, the red-shouldered hawk typically nests away from residences, roads, and development. In the Pequannock Watershed, red-shouldered hawk nests were located an average of 1,013 m and a standard deviation of plus or minus 614 m (3,324 ± 2,014 ft.) from the nearest building; and an average of 812 m and a standard deviation of plus or minus 634 m (2,664 ± 2,080 ft) from the nearest road (Bosakowski et al. 1991). Red-shouldered hawks avoid small fragmented woodlots and forests that do not contain trees large enough for nesting.

Red-shouldered hawks require large contiguous wooded tracts of 100 to 250 hectares (250 to 620 acres) (Johnsgard 1990). Eastern populations occupy breeding home ranges of 109 to 339 hectares (270 to 838 acres) (Crocoll 1994). In the Pequannock Watershed, red-shouldered hawk breeding densities were estimated at one nest per 450 hectares (1,112 acres) with an average distance of 1.2 to 1.6 km (0.75 to 1.0 mi.) between nests in areas containing the highest breeding concentrations (Bosakowski et al. 1991). Home range sizes of males exceed those of females, during both the breeding and nonbreeding seasons. Individuals of either sex may expand their home ranges while rearing young or throughout the winter months.

During the nonbreeding season, red-shouldered hawks are less restrictive in their habitat use. They inhabit the traditional wetland forests occupied during the breeding season as well as uplands, fragmented woods, smaller forests, open areas, and edges.

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Status and Conservation

The red-shouldered hawk was once considered a common resident of wet lowland forests in New Jersey. Only a century ago, bounties were placed on birds of prey, which were accused of poultry and game predation. This unfortunate practice, coupled with egg collecting and the placement of wild red-shouldered hawks in captivity, may have caused initial population declines. The clearing of forests and filling of wetlands exacerbated red-shouldered hawk declines, which were noted as early as the mid-1920s. Reduced numbers of red-shouldered hawks wintering in New Jersey were documented from the early 1950s to the 1970s, as development increased and forest contiguity and patch size decreased. As a result, the red-shouldered hawk, with an estimated 100 breeding pairs in the state, was listed as a threatened species in New Jersey in 1979. In 1982, the U.S. Fish and Wildlife Service listed the red-shouldered hawk as a Migratory Nongame Bird of Management Concern due to population declines and restricted habitat requirements. In addition, the red-shouldered hawk was included on the National Audubon Society's Blue List of Imperiled Species from 1972 to 1986, the final year of the list.

During the 1980s, habitat loss continued to pose an increasing threat, causing red-shouldered hawk populations to decline ever further. By the late 1980s and early 1990s, the state's breeding population was estimated at only 36 pairs, nearly one-third the population size at the time of original listing. As a result, the breeding population of the red-shouldered hawk was reclassified as endangered in 1991. The nonbreeding population remained listed as threatened. The New Jersey Natural Heritage Program considers the red-shouldered hawk to be "demonstrably secure globally," yet "imperiled in New Jersey because of rarity" (Office of Natural Lands Management 1992). Habitat loss and declines of red-shouldered hawks in the Northeast have resulted in the listing of this species as threatened in New York and of special concern in Connecticut.

Barred Owl, *Strix varia*

Status:

State: Threatened

Federal: Not listed

Identification

On still spring evenings, the hooting and eerie caterwauling of barred owls resonate throughout the remote, swampy woodlands of New Jersey. The resounding song of the barred owl, often represented as “who cooks for you, who cooks for you alllll,” is often accompanied by loud “hoo-ah” calls and yowling reminiscent of monkeys. Barred owls may vocalize throughout the year, but are most expressive during courtship, from late February to early April. These owls often call at night but may also vocalize during the day.



© Blaine Rothausser

The barred owl is a large fluffy-looking owl with brown barring on the upper breast and brown streaking on the lower breast and belly. The upperparts are brown with buffy-white barring. The tail is patterned with alternating bands of brown and buff-gray. The throat is white and the round head lacks ear tufts. The facial disk is grayish-white with a brown outline. The large facial disk funnels sounds towards the owl's proportionally gigantic ears, providing it with extraordinary hearing for detecting minute noises, such as the rustling of mice in the dark. Unlike all other eastern owls excluding the barn owl, the eyes of the barred owl are dark brown. The hooked bill is buff yellow. The feet and toes are feathered and the talons are dark brownish-black. Sexes are similar in plumage and, although there is much overlap, females may be larger than males. Juveniles resemble adults.

Barred owls fly with slow, moth-like wing beats that are interspersed with glides. In flight, the head appears large and the wings are broad and rounded. Soft feathers and serrated edges on the outer wing feathers minimize noise, enabling these and all other owls to fly silently--an advantage that enables them to surprise their prey.

The barred owl can be distinguished from most other New Jersey owls by its plumage, large size, distinctive vocalizations, and habitat selection. The great horned owl (*Bubo virginianus*), a common breeding species in the state, is also a large owl but has rich brown plumage and yellow eyes. The ear tufts of great horned owls may not be noticeable in flight, making them appear round-headed like a barred owl. The call of the great horned owl is a melancholy “hoo-hoo-hoo.” Great horned owls, which often reside in forested uplands or near human habitation, are less restrictive in their habitat choice than barred owls. The barn owl (*Tyto alba*), the only other New Jersey owl with dark eyes, is white below and golden brown above. In addition, the barn owl, which resides in

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open fields and grasslands, has a narrow body, long unfeathered legs, and a heart-shaped facial disk.

Habitat

Traditionally known as the “swamp owl,” the barred owl is a denizen of remote, contiguous, old-growth wetland forests. These owls require mature wet woods that contain large trees with cavities suitable for nesting. Barred owl habitats typically have an open understory through which the owls can fly and hunt. The lack of large nesting cavities is often the primary limiting factor for barred owls. Consequently, these owls may nest immediately outside of a wetland or in sub-climax wetland forests if adequate nest sites are unavailable within a mature wetland forest. Barred owls are typically found in remote wilderness areas that may also contain other rare species such as the red-shouldered hawk (*Buteo lineatus*) or the Cooper’s hawk (*Accipiter cooperii*). Barred owls typically shun human activity by avoiding residential, agricultural, industrial, or commercial areas. In northern New Jersey, barred owls favored sites that were at least 500 meters (1640 ft.) from human habitation and had little or no forest clearings or trails (Bosakowski 1987).

In southern New Jersey, barred owls inhabit both deciduous wetland forests and Atlantic white cedar (*Chamaecyparis thyoides*) swamps associated with stream corridors. Often such lowland forests are buffered by surrounding pine or pine/oak uplands that may protect the owls from human disturbance and provide additional foraging habitat. Mixed hardwood swamps are often dominated by red maple (*Acer rubrum*) and black gum (*Nyssa sylvatica*) and may include highbush blueberry (*Vaccinium corymbosum*), swamp magnolia (*Magnolia virginiana*), or greenbrier (*Smilax spp.*) in the shrub layer. Although barred owls utilize white cedars for roosting, they infrequently provide cavities that are large enough for nesting owls.

In northern New Jersey, barred owls inhabit hemlock ravines and mixed deciduous wetland or riparian forests. Oak hardwood forests containing white oak (*Quercus alba*), red maple, black birch (*Betula lenta*), black willow (*Salix nigra*), hickory (*Carya spp.*), white ash (*Fraxinus americana*), basswood (*Tilia americana*), tulip poplar (*Liriodendron tulipifera*), black cherry (*Prunus serotina*), and black gum may be occupied. Barred owls may also inhabit northern hardwood forests that contain sugar maple (*A. saccharum*), birch (*Betula spp.*), and beech (*Fagus grandifolia*). Dense stands of hemlock (*Tsuga canadensis*), white pine (*Pinus strobus*), Norway spruce (*Picea abies*), or other conifers provide cover for roosting owls and protection from harsh weather. Barred owls prefer flat, lowland terrain and avoid rocky slopes and hillsides.

As a resident species, barred owls establish territories with fairly stable boundaries that are continuously maintained throughout the year. In eastern North America, home range sizes of 86 to 370 hectares (213 to 914 acres) have been documented for barred owls (Johnsgard 1988).

Status and Conservation

The barred owl was traditionally a common resident within the deep wooded swamps of New Jersey. Historically, these owls were shot as trophies or because of alleged poultry predation. Collectors also looted young owls and eggs. Despite human

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persecution, the barred owl persisted virtually unscathed until the early 1940s when the cutting of old growth forests and the filling of wetlands greatly reduced habitat throughout the state. Rampant habitat loss and associated barred owl population declines continued for the next several decades. Consequently, these owls were lost from many historic breeding locales.

Due to population declines and habitat loss, the barred owl was listed as a threatened species in New Jersey in 1979. The New Jersey Natural Heritage Program considers the barred owl to be “demonstrably secure globally,” yet “rare in New Jersey” (Office of Natural Lands Management 1992). Currently, barred owl populations appear to be declining due to development and fragmentation of large tracts of private forested lands. The barred owl population has been estimated at 37 pairs in South Jersey and 75 pairs in North Jersey (Sutton and Sutton 1985, Bosakowski 1988). But recent surveys in South Jersey indicate as much as a 30 percent decline there.



Wildlife Notes

NJ Division of Fish and Wildlife

Endangered and Nongame Species Program



CONSERVE WILDLIFE
FOUNDATION OF NEW JERSEY

Bald Eagle

(Haliaeetus leucocephalus)

THE BALD EAGLE IN NEW JERSEY

Historic population counts of bald eagles are not available for our state, but we do know that the population was exactly one nesting pair by 1970. The massive bald eagle decline was the result of persecution, followed by the impact of widespread use of the persistent pesticide DDT from the mid-1940s until it was banned in 1972. New Jersey's bald eagle population remained at one into the early 1980's. The ban of DDT combined with restoration efforts by biologists within the NJ Division of Fish and Wildlife's Endangered and Nongame Species Program (ENSP) acted to increase the number of New Jersey bald eagles to 146 active pairs in 2014.

The bald eagle is currently listed as endangered (breeding season) and threatened (non-breeding season) in New Jersey. The US Fish & Wildlife Service removed the bald eagle from the federal list of endangered species in 2007.

ENSP recovery efforts – first implemented in the 1980's – continue to bear fruit as New Jersey's eagle population has rebounded from the edge of extinction. In 1982, after Bear Swamp eagles (New Jersey's only active bald eagle nest since 1970) had failed to produce young for years, ENSP biologists removed an egg for artificial incubation, and fostered the young back to the nest. The necessity of this fostering technique was eggshell thinning as a result of DDT contamination that meant the eggs couldn't withstand normal incubation. Fostering continued successfully until 1989, when the previous female of the pair died and a new female was able to hatch her own eggs.

Increasing the production from a single nest, however, was not enough to boost the state's population in a reasonable amount of time. Mortality rates are high in young eagles (as high as

80%), and they do not reproduce until four or five years of age. ENSP instituted a hacking project in 1983 that resulted in the release of 60 young eagles in NJ over an eight year period. These eagles contributed to the population increase since 1990.

IDENTIFICATION

Adult bald eagles are distinguished by their full white heads and tails, but subadult and juvenile birds are brown overall with some white mottling. Both sexes have similar plumage, although the female is slightly larger than the male. With a wing span of six to seven feet, eagles are larger than most birds, but can be confused with vultures from a distance. While eagles eat mostly fish during the warmer months, they feed on waterfowl, muskrat, and carrion during winter and early spring.

BREEDING BIOLOGY

New Jersey bald eagles reside year-round, usually remaining in their nest area. Eagles usually build their large stick nests close to water in trees taller than the forest canopy. They begin courtship and nest building in early January, adding to their existing nest. Pairs lay one to three eggs in mid-January to early March, and incubate for about 35 days. Upon hatching, the chicks are helpless and require close parental care. After about five weeks, the young birds begin to stand up and feed themselves when the adults deliver food. Eaglets fledge the nest at 11-12 weeks in late June to early July. Adults continue to feed young near the nest for a month while the eaglets learn to fly and hunt. In September many young eagles leave the area and may spend the winter in Chesapeake Bay area, where open water and abundant food provide favorable conditions. Recent telemetry studies show NJ eaglets may make long distance flights in nearly any direction before returning to our area.

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MANAGEMENT

ENSP biologists continually work to manage and reduce disturbance in eagle habitats, especially around nest sites. Eagles are sensitive to human disturbance and will abandon their nest sites if people encroach on the area during the nesting season. Education and established viewing areas are important in minimizing disturbance, as are the efforts of eagle project volunteers. Biologists also work to protect habitat in a variety of ways, including working with landowners, land acquisition experts, and through the state's land use regulations.

Bald eagles are proven indicators of environmental health. As residents and consumers of fish, their health reflects the quality of resources shared by humans. ENSP continues to investigate the possible impacts of environmental contaminants on eagles and other raptors. ENSP monitors these species during the nesting season to evaluate nest success and assess any problems that occur.

How You Can Help

The ENSP receives no funding from state tax dollars. You can help support New Jersey's bald eagles by:

- Checking-Off for Wildlife on the NJ State Income Tax Form
- Purchasing a *Conserve Wildlife* license plate
- Participating in the *Adopt an Eagle Nest Program*
- Making a donation to the Conserve Wildlife Foundation of NJ, a non-profit organization dedicated to supporting the eagle project

www.conservewildlifenj.org

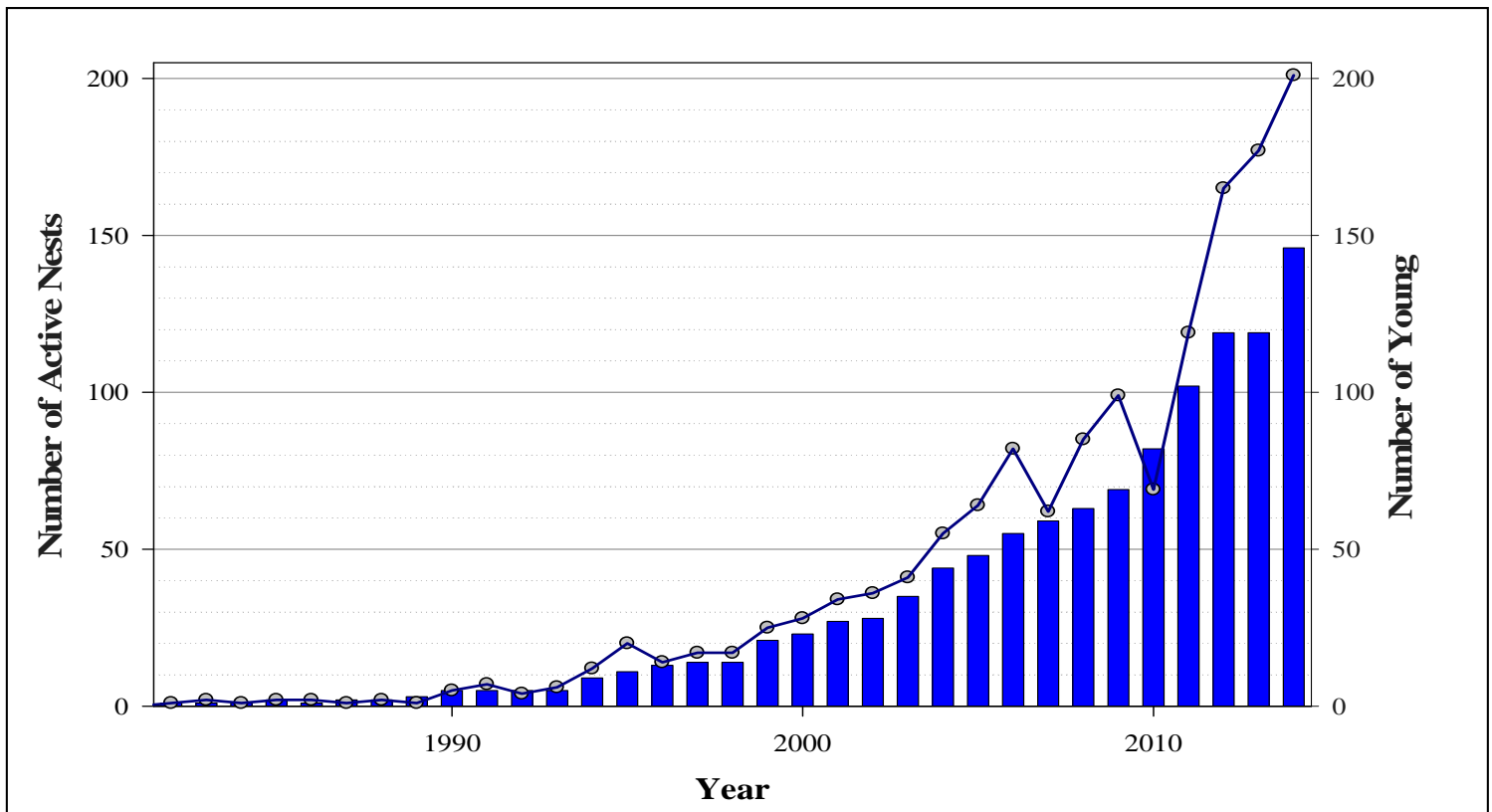
For more information, please contact the ENSP at:

Endangered & Nongame Species Program
NJ Division of Fish and Wildlife
MC 501-03
P.O. Box 420
Trenton, NJ 08625-0420
(609) 292-9400

www.njfishandwildlife.com

VISIT THE NJ EAGLE CAM AT:

www.conservewildlifenj.org/education/eaglecam



To learn where you can view eagles in the state, purchase the NJ Wildlife Viewing Guide, available from the CWF

NJ Endangered and Nongame Species Program Special Concern – Species Status Listing

Status Definitions:

Endangered: Applies to a species whose prospects for survival within the state are in immediate danger due to one or several factors, such as loss or degradation of habitat, over-exploitation, predation, competition, disease or environmental pollution, etc. An endangered species likely requires immediate action to avoid extinction within NJ.

Threatened: Applies to species that may become Endangered if conditions surrounding it begin to or continue to deteriorate. Thus, a Threatened species is one that is already vulnerable as a result of, for example, small population size, restricted range, narrow habitat affinities, significant population decline, etc.

Special Concern: Applies to species that warrant special attention because of inherent vulnerability to environmental deterioration or habitat modification that would result in its becoming threatened if conditions surrounding the species begin or continue to deteriorate. Factors that can lead to classification as special concern include, but are not limited to, species rarity in the State, highly specialized food and/or habitat requirements, low reproductive rate, isolated populations of the species within the State and/or other characteristics that make the species particularly susceptible to environmental or habitat changes. This category includes a species that meets the foregoing criteria and for which there is little understanding of its current population status in the state.

Stable: Applies to species that appear to be secure in NJ and not in danger of falling into any of the preceding the categories in the near future.

Undetermined: A species about which there is not enough information available to determine the status.

Birds

Species	Breeding Status	Non-breeding Status
American Bittern (<i>Botaurus lentiginosus</i>)	Endangered	Special Concern
American Oystercatcher (<i>Haematopus palliatus</i>)	Special Concern	Special Concern
Barn Owl (<i>Tyto alba</i>)	Special Concern	Special Concern
Black-billed Cuckoo (<i>Coccyzus erythrophthalmus</i>)	Special Concern	Stable
Blackburnian Warbler (<i>Dendroica fusca</i>)	Special Concern	Stable

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Black-crowned Night-heron (<i>Nycticorax nycticorax</i>)	Threatened	Special Concern
Black-throated Blue Warbler (<i>Dendroica caerulescens</i>)	Special Concern	Stable
Black-throated Green Warbler (<i>Dendroica virens</i>)	Special Concern	Stable
Blue-headed Vireo (<i>Vireo solitarius</i>)	Special Concern	Stable
Bobolink (<i>Dolichonyx oryzivorus</i>)	Threatened	Special Concern
Broad-winged Hawk (<i>Buteo platypterus</i>)	Special Concern	Stable
Brown Thrasher (<i>Toxostoma rufum</i>)	Special Concern	Stable
Canada Warbler (<i>Wilsonia canadensis</i>)	Special Concern	Stable
Caspian Tern (<i>Hydroprogne caspia</i>)	Special Concern	Stable
Cattle Egret (<i>Bubulcus ibis</i>)	Threatened	Special Concern
Cerulean Warbler (<i>Dendroica cerulea</i>)	Special Concern	Special Concern
Cliff Swallow (<i>Petrochelidon pyrrhonota</i>)	Special Concern	Stable
Common Nighthawk (<i>Chordeiles minor</i>)	Special Concern	Special Concern
Common Tern (<i>Sterna hirundo</i>)	Special Concern	Stable
Cooper's Hawk (<i>Accipiter cooperii</i>)	Special Concern	Stable
Eastern Meadowlark (<i>Sturnella magna</i>)	Special Concern	Special Concern
Glossy Ibis (<i>Plegadis falcinellus</i>)	Special Concern	Stable
Golden-winged Warbler (<i>Vermivora chrysoptera</i>)	Endangered	Special Concern
Grasshopper Sparrow (<i>Ammodramus savannarum</i>)	Threatened	Special Concern
Gray-cheeked Thrush (<i>Catharus minimus</i>)	N/A	Special Concern
Great Blue Heron (<i>Ardea herodias</i>)	Special Concern	Stable
Gull-billed Tern (<i>Gelochelidon nilotica</i>)	Special Concern	Special Concern
Hooded Warbler (<i>Wilsonia citrina</i>)	Special Concern	Stable
Horned Lark (<i>Eremophila alpestris</i>)	Threatened	Special Concern
Ipswich Sparrow (<i>Passerculus sandwichensis princeps</i>)	N/A	Special Concern
Kentucky Warbler (<i>Oporornis formosus</i>)	Special Concern	Special Concern
Least Bittern (<i>Ixobrychus exilis</i>)	Special Concern	Special Concern
Least Flycatcher (<i>Empidonax minimus</i>)	Special Concern	Stable
Little Blue Heron (<i>Egretta caerulea</i>)	Special Concern	Special Concern
Nashville Warbler (<i>Oreothlypis ruficapilla</i>)	Special Concern	Stable
Northern Goshawk (<i>Accipiter gentilis</i>)	Endangered	Special Concern
Northern Harrier (<i>Circus cyaneus</i>)	Endangered	Special Concern
Northern Parula (<i>Parula americana</i>)	Special Concern	Stable
Peregrine Falcon (<i>Falco peregrinus</i>)	Endangered	Special Concern
Pied-billed Grebe (<i>Podilymbus podiceps</i>)	Endangered	Special Concern
Red-shouldered Hawk (<i>Buteo lineatus</i>)	Endangered	Special Concern
Saltmarsh Sparrow (<i>Ammodramus caudacutus</i>)	Special Concern	Stable
Sanderling (<i>Calidris alba</i>)	N/A	Special Concern
Semipalmated Sandpiper (<i>Calidris pusilla</i>)	N/A	Special Concern
Sharp-shinned Hawk (<i>Accipiter striatus</i>)	Special Concern	Special Concern
Short-eared Owl (<i>Asio flammeus</i>)	Endangered	Special Concern

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Snowy Egret (<i>Egretta thula</i>)	Special Concern	Stable
Spotted Sandpiper (<i>Actitis macularius</i>)	Special Concern	Stable
Tricolored Heron (<i>Egretta tricolor</i>)	Special Concern	Special Concern
Veery (<i>Catharus fuscescens</i>)	Special Concern	Stable
Vesper Sparrow (<i>Pooecetes gramineus</i>)	Endangered	Special Concern
Whimbrel (<i>Numenius phaeopus</i>)	N/A	Special Concern
Whip-poor-will (<i>Caprimulgus vociferus</i>)	Special Concern	Undetermined
Winter Wren (<i>Troglodytes hiemalis</i>)	Special Concern	Stable
Wood Thrush (<i>Hylocichla mustelina</i>)	Special Concern	Stable
Worm-eating Warbler (<i>Helmitheros vermivorum</i>)	Special Concern	Stable
Yellow-breasted Chat (<i>Icteria virens</i>)	Special Concern	Stable

Reptiles and Amphibians

Species
Eastern Box Turtle (<i>Terrapene carolina carolina</i>)
Eastern King Snake (<i>Lampropeltis getula getula</i>)
Northern Copperhead Snake (<i>Agkistrodon contortrix mokasen</i>)
Spotted Turtle (<i>Clemmys guttata</i>)
Carpenter Frog (<i>Lithobates virgatipes</i>)
Fowlers Toad (<i>Anaxyrus fowleri</i>)
Jefferson Salamander (<i>Ambystoma jeffersonianum</i>)
Marbled Salamander (<i>Ambystoma opacum</i>)
Northern Spring Salamander (<i>Gyrinophilus porphyriticus porphyriticus</i>)

Invertebrates

Species
Allegheny River Cruiser (<i>Macromia alleghaniensis</i>) – dragonfly
Arrowhead Spiketail (<i>Cordulegaster obliqua</i>) – dragonfly
Brush-tipped Emerald (<i>Somatochlora walshii</i>) – dragonfly
Cobra Clubtail (<i>Gomphus vastus</i>) – dragonfly
Coppery Emerald (<i>Somatochlora georgiana</i>) – dragonfly
Creeper (<i>Strophitus undulatus</i>) - mussel
Crimson-ringed Whiteface (<i>Leucorrhinia glacialis</i>) – dragonfly
Dotted Skipper (<i>Hesperia attalus slossonae</i>) – butterfly
Extra-striped Snaketail (<i>Ophiogomphus anomalus</i>) – dragonfly
Forcipate Emerald (<i>Somatochlora forcipata</i>) – dragonfly
Georgia Satyr (<i>Neonympha areolatus septentrionalis</i>) – butterfly
Golden-winged Skimmer (<i>Libellula auripennis</i>) – dragonfly
Green-faced Clubtail (<i>Gomphus viridifrons</i>) – dragonfly
Harris' Checkerspot (<i>Chlosyne harrisii</i>) – butterfly
Hessel's Hairstreak (<i>Callophrys hesseli</i>) – butterfly
Hoary Elfin (<i>Callophrys polios</i>) – butterfly
Hudsonian Whiteface (<i>Leucorrhinia hudsonica</i>) – dragonfly

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Leonard's Skipper (<i>Hesperia leonardus</i>) - butterfly
Maine Snaketail (<i>Ophiogomphus mainensis</i>) – dragonfly
Midland Clubtail (<i>Gomphus fraternus</i>) – dragonfly
New England Bluet (<i>Enallagma laterale</i>) – dragonfly
Northern Metalmark (<i>Calephelis borealis</i>) – butterfly
Pine Barrens Bluet (<i>Enallagma recurvatum</i>) – dragonfly
Rapids Clubtail (<i>Gomphus quadricolor</i>) – dragonfly
Sable Clubtail (<i>Gomphus rogersi</i>) – dragonfly
Scarlet Bluet (<i>Enallagma pictum</i>) – dragonfly
Septima's Clubtail (<i>Gomphus septima</i>) – dragonfly
Ski-tailed Emerald (<i>Somatochlora elongata</i>) – dragonfly
Spatterdock Darner (<i>Rhionaeschna mutata</i>) – dragonfly
Subarctic Darner (<i>Aeshna subarctica</i>) – dragonfly
Tiger Spiketail (<i>Cordulegaster erronea</i>) – dragonfly
Two-spotted Skipper (<i>Euphyes bimacula</i>) – butterfly
Williamson's Emerald (<i>Somatochlora williamsoni</i>) – dragonfly
Zebra Clubtail (<i>Stylurus scudderi</i>) – dragonfly

The lists of New Jersey's endangered and nongame wildlife species are maintained by the DEP's Division of Fish and Wildlife's Endangered and Nongame Species Program. These lists are used to determine protection and management actions necessary to ensure the survival of the state's endangered and nongame wildlife.

This work is made possible through voluntary contributions received through check-off donations to the Endangered Wildlife Conservation Fund on the New Jersey State Income Tax Form, the sale of Conserve Wildlife License Plates, and donations. For more information about the Endangered and Nongame Species Program or to report a sighting of endangered or threatened wildlife, contact the Endangered and Nongame Species, NJ Division of Fish and Wildlife, Mail Code 501-03, PO Box 420, Trenton, NJ 08625-0420.

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