

Borough of Ringwood
Environmental Resource Inventory

County of Passaic



ENVIRONMENTAL RESOURCE INVENTORY

Borough of Ringwood

County of Passaic, State of New Jersey



Prepared November 30, 2023 by:



With Assistance from the Ringwood Environmental Commission

Paid for by a grant from the New Jersey Highlands Council

A handwritten signature in black ink, reading "Jessica C. Caldwell Dykstra".

Jessica C. Caldwell Dykstra, P.P., A.I.C.P., Borough Planner, P.P. #5944

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

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I. Introduction

An Environmental Resource Inventory (ERI), sometimes called a Natural Resource Inventory, provides a snapshot of the natural and cultural resources of a community. The data is provided in maps and narrative for and assists the community on multiple levels with respect to long-range planning and resource conservation.

The Borough of Ringwood Environmental Commission developed this updated ERI, in part to conform to the Highlands Regional Master Plan (hereinafter “Highlands RMP”) but most importantly to provide an updated environmental resource document for the community and region.

The last ERI for Ringwood was prepared by the Highlands Council and updated and adopted by the Borough in August 2011. This report is based on available data from federal, state, and municipal resources as well as the Highlands Interactive Environmental Resources Inventory application and prior ERI’s completed by the Borough.

The Borough’s 2022 Master Plan Reexamination Report addresses Ringwood’s desire to create land use policies that support redevelopment and increased efficiency in existing developed areas as well as promote the efficient use of existing developed lands in order to promote economic development and sustainability throughout the Borough. This ERI will help the Borough meet its goal of being a sustainable community. The ERI will assist the community as it makes decisions regarding future planning and development. Knowledge of the natural resources will allow the Borough’s officials and citizens to make informed decisions as they strive to preserve and promote the character of the Borough and create a sustainable community within the existing landscape.

II. Purpose and Scope

The purpose of this ERI is to provide a foundation for identifying and preserving the existing environmental and cultural resources. Specifically, this ERI includes a review of Ringwood's geology, soils and topography; hydrology; forests and wildlife habitats; flood prone areas; historic and cultural resources; open space and trails; land use; and transportation options.

Ringwood State Park - Photo credit: NJ State Parks



III. Geology, Soils, and Topography

Landscape Origins

The Borough of Ringwood is located on the site of one of North America's oldest landscapes – the Appalachian Mountains. The Appalachian Mountains are made up of bands of ancient highland rocks that extend from Maine to Georgia, and include the Ramapo Mountains and the Hudson Highlands. A study of these rocks reveals the geologic history of the region.

Ramapo Mountains; Photo Credit Ramapo Valley County Reservation



Approximately 800 to 900 million years ago, in the Precambrian Era, a large mountain range spanned the area around Ringwood Borough. Over tens of millions of years, the range was degraded by erosion. The debris accumulated as sediments, which flowed through streams into ancient sea bottoms. These sediments over time were subjected to heat, pressure, and infiltration by magma (molten material) from the planet's interior, and gradually turned into solid rock.

Around 300 to 250 million years ago, in the Paleozoic Era, a new mountain range was forming. One of the great moving plates of Earth's crust, thrusting westward and turning down beneath the eastern edges of the continent, disrupted the older Appalachians and crumpled the deep sea-bottom sediments, raising them in long, generally parallel folds to form a range of new mountains, mostly west of the older ones but partly enfolded with them. These new mountains, reaching from what is now Nova Scotia to Georgia, are known as the Younger, or Folded, Appalachians.

Mountain building slowed, and the processes of weathering and erosion were increasingly dominant. Great masses of sediments were washed down from the mountains. Then, about 200 million years ago, in the Mesozoic Era, a large block or blocks of the continent broke free and began to drift eastward, forming parts of Western Europe and Northwest Africa.

Behind the withdrawing land masses, the worn-down Appalachians heaved higher and the Atlantic Ocean opened up. East of the Appalachians, deep deposits of red erosional sediments, turned to solid rock and sank along crustal fractures – New Jersey's Ramapo Fault and other faults. Magma rising through fractures east of the Ramapo Fault burst onto the surface as lava flows, including those of the Watchung Hills, or cooled underground to form igneous rock, similar to that of the Hudson Palisades.

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Since these major events, the Appalachian region has been mostly the story of successive erosion cycles. In each cycle the land is "dissected" and worn down mainly by stream action; but, as elevations are lowered, the stream loses vigor and a gentler topography is created, perhaps approaching the character of a low, rolling plain near sea level. Then, uplift occurs, in which the rise in elevations "rejuvenates" the streams, and a new cycle of dissection and land-lowering begins. The Appalachian region, including the Ramapo Highlands and surrounding mountains, has experienced three or four such cycles during the past 200 million years. A major erosion cycle began with an uplift of hundreds of feet, with consequent reinvigoration of stream activity, around 30 million years ago. It is possible that the major Appalachian landforms were first delineated, though not actually "cut out," during the early part of this cycle.

The older Appalachians, as we presently see them, are the foundations of mountains worn down by erosion during the remote geologic past, but uplifted and reshaped during relatively recent geologic time. In New Jersey and New York, they consist of the Ramapos and the Hudson Highlands, corresponding in age and geological nature to parts of the New England Highlands and, in the south, to the Blue Ridge and the Great Smoky Mountains. The rocks are predominantly granites and metamorphic (altered) rocks such as gneiss, schist, marble, and quartzite. The topography features consist of somewhat rounded hills, often elongated north-northeast to south-southwest. The remnants of the younger Appalachians, which are situated mostly to the west, consist mainly of long, approximately parallel ridges – the stumps of ancient folds deeply truncated by erosion. They rise in New York as the Shawangunks, Schunemunk Mountain, and Mt. Peter, continuing into New Jersey as the Kittatinny and Bearfort Mountains, and running south-southwest through Pennsylvania as far south as Georgia. These folded Appalachians consist essentially of sedimentary rocks, mainly shale, sandstone, and limestone. In most areas they are clearly distinguished from the ancestral forms from which they differ in rock composition, structure, and landforms.

The Ice Age

About two (2) million years ago the erosion cycle, dominated by stream action, was interrupted by the onset of the Pleistocene Epoch. This “ice age” began with the cooling of the Earth’s atmospheric temperatures by about 11 degrees Fahrenheit. During four (4) relatively cold periods, alternating with relatively mild ones, annual snow accumulation on Greenland and Canada created significant ice caps, which joined and spread as a continental glacier south in to the United States forming a curving line extending from Staten Island, New York; to St. Louis, Missouri; and further through Nebraska into Montana. In the Appalachians from Maine to Pennsylvania the ice, thousands of feet thick in most areas, overwhelmed hills and scraped the terrain. Then, as the last continental glacier melted away – about 12,000 years ago - in what are now the Mid-Atlantic States – vast amounts of rock debris were deposited on the scraped and barren land.

Glacial ice. Photo credit: Grafissimo.



Although the Pleistocene glaciers did not move mountains and dig out great valleys, evidence of the glaciations is clear. Broadly speaking, the hills tend to show smoothed forms, often with ramp-like northern slopes produced at least partly by the glacier’s pushing, abrasive action. Valleys especially those with an approximately north-south orientation, were somewhat deepened by southward-moving ice streams. Where the glacier temporarily froze to the terrain and then moved on again, it plucked out chunks of rock, particularly on southern slopes where the southward moving ice was pulling area from the terrain rather than pushing against it. Thus, plucking was at least partly responsible for the usually rugged character of southern slopes, especially in the older Appalachian region. Plucking and abrasion together created basins in bedrock on hilltops and valley bottoms alike – basins which often are the sites of ponds and swamps.

Many hilltops feature “sheepbacks,” which are rock humps or knobs streamlined by glacial abrasion, smoothed on the upstream (north) side and made rugged by plucking on the downstream (south) side. Also notable are “crescentic fractures” (actually, parabolic) made in bedrock by boulders which, embedded in the bottom of the glacier, “chattered” as they were pushed or dragged over the bedrock. These fractures are concave in the direction of the glacier’s movement (that is, approximately north-south). “Crescentic gouges,” another kind of chatter mark, are depressions made where chips of bedrock were removed; they are convex in the direction of the ice movement. “Glacial polish” is seen where glacier-smoothed bedrock was long covered by loose earth and has only recently become exposed to roughening by weathering.

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Hilltops, slopes, and valley bottoms alike are sprinkled or patched with glacier-broken or -pulverized rock, known as "glacial drift," ranging in caliber from bits of clay to house-size boulders. Many rock fragments were transported long distances by the glacier and then deposited; these are called "erratics," especially if they are types of rock different from the bedrock of the locality where they were deposited. Some erratics are "propped" by smaller stones on which they were let down by the melting glacier, and occasionally erratics are lined up in "trains" in an approximately north-south direction – the direction of glacier movement.

Much glacial rock debris was plastered hard against the land by ponderous moving ice. Some were deposited by meltwater streams to form kames (small rounded hillocks), alluvial fans, and plains or deltas (the latter in bodies of standing water). Some of these deposits of debris blocked streams to form ponds and swamps, or deflected the streams into other courses. In areas where deposits are deep, depressions called kettles (some of them now containing ponds) were formed where drift settled around the melting ice blocks.

Despite widespread human-made changes on the land, "signatures" of the Pleistocene will exist on local terrains for centuries to come.

Glacial Geology

The glacial sediments in Ringwood are dominated by this glacial till composed of a mix of sand, silt, clay, gravel and boulders. Information provided by the New Jersey Geological Survey (NJGS) indicates that the glacial sediments reach a thickness of 50 to 100 feet in isolated areas, and 100 to 150 feet in the southeastern corner of the Borough. The permeable sediments also act as significant groundwater recharge areas for the underlying fractured crystalline bedrock aquifer.

Upsala Glacier. Photo credit: David via Flickr.



The majority of the Township is characterized by thin glacial till and rock outcrop. Discontinuous deposits of glacial till up to 100 feet in thickness occur within stream corridors and around lakes, with the largest area occurring around Cupsaw Lake. Subordinate, discontinuous ice contact deposits up to 150 feet in thickness are also present, with the largest being located along West Brook and includes a sand and gravel mine. Lesser amounts of coarser grained

fluvial and deltaic deposits occur in stream corridors, especially along Ringwood Creek, a deltaic deposit up to 100 feet in thickness is located between Erskin Lake and Wanaque Reservoir.

A Continuing Erosion Cycle

Since the great melting that closed the Pleistocene, geological processes have proceeded locally much as they did before the glaciers. Bedrock is disintegrated by weathering; rock fragments fall, roll, slide, or creek downslope, accumulating at lower levels; running water, carrying abrasive sediments, slowly erodes solid rock, carving valleys and shaping hills; and transported sediments are deposited temporarily on valley bottoms and floodplains, then picked up again by streams and carried further toward their eventual destination on the continental shelf.

Over a long period, the terrains that strongly resist weathering and erosion tend to become hills and ridges, and less resistant terrains are lowered to become valleys and broad lowlands.

There are several kinds of weathering processes. One occurs as erosion removes the overburden from extremely dense rock (formed at depth under pressure) and allows it to expand, so that thick plates, or shells, break off the surface. This process is called "exfoliation due to unloading." Another kind of weathering is the splintering off of thin flakes or grains of surface rock because of abrupt changes in temperature, especially if the rock is wet. Air and moisture combine to form acids that decompose rock chemically, converting it into carbonates, hydrates, and other relatively soft compounds. Rock is broken up by expansions of plant roots in crevices. The more the bedrock has been fractured, the larger the surfaces exposed to weathering, and the more rapidly the rock disintegrates.

A particularly destructive kind of weathering is frost-prying – also called ice-prying or frost-wedging. It occurs as rainwater or meltwater freezes in crevices and expands with a force up to 2,000 pounds per square inch, when the thaw-freeze process occurred during many more days of the year than now. Many of the large angular rock fragments seen today on bedrock outcrops and at the foot of steep slopes testify to the intensity of late-Pleistocene weathering.

Loose rock material tends to gravitate downward in processes called "mass wasting." Examples include rockfalls, rockslides, creep (very slow, intermittent movement of loose earth, particle by particle), and earthflows or mudflows. Freezing and thawing, rain, wind, earth tremors, and activities of animals and plants disturb loose rock and trigger the downward movements. Rock fragments accumulate at the bottom of steep slopes in apron-like masses called "talus." Where rock debris is mass-wasted into streambeds, the streams carry it to still lower levels.

Slopes limit development due to the possibility of placing structures and facilities on slopes that are either already unstable, or by the disturbance of stable slopes resulting in failure. In Ringwood, the Township ordinance prohibits development on slopes greater than 15 percent. Critical slopes place limitations on development due to concerns of storm run-off control and soil erosion, suitability of terrain for specific land uses, and potential for safe access roads. Many areas of the Borough of Ringwood are limited by slope constraints. The most severe slopes are located along the eastern border, along the west

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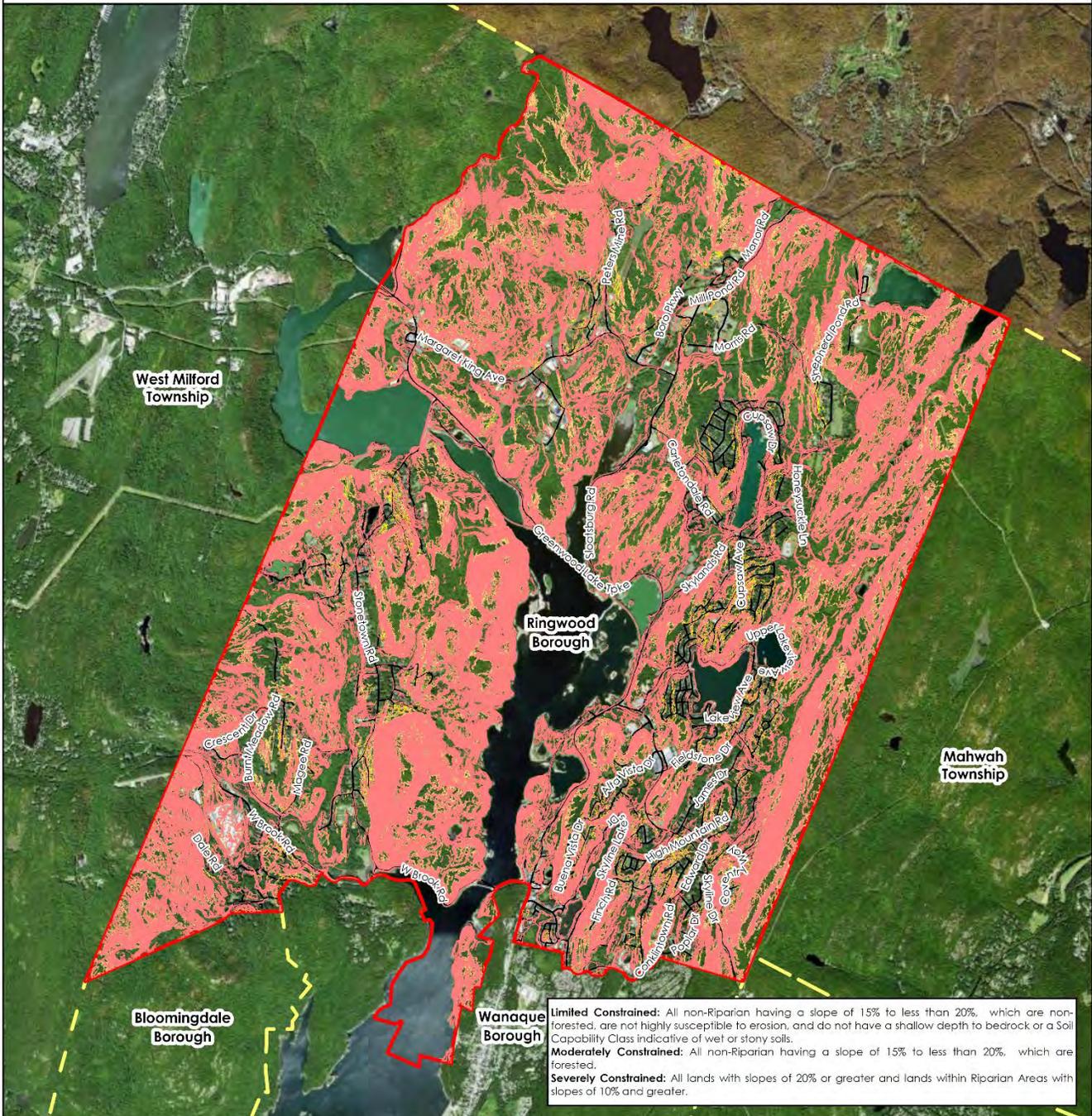
side of the Wanaque Reservoir, and within isolated topography located along the western border of the Borough. The lands which are least constrained by slopes are those surrounding lakes and the areas north and east of the Wanaque Reservoir. This map (**Figure 1**) is not intended to be used as a substitute for site-specific information but rather be used as a guide in community-wide planning.

Highlands erosion is done mostly by sheets and streams of water. The water digs out loose earth and carries it downstream. Stream-borne rock debris abrades bedrock, gradually cutting gullies, which may eventually become valleys. The steeper the watercourse, the more rapid the stream and more quickly it can cut into the terrain. A vigorous permanent stream can cut through local bedrock at the rate of a few inches to perhaps a foot for 1,000 years. A torrent produced during the heavy rainstorm can cut a foot or more into loose earth of a lawn or a roadcut.

If erosion is proceeded in the local area for tens of millions of years, without any uplift of the land, the topography would probably be reduced to a nearly flat surface only slightly above sea level. The Ramapos, like other parts of the Appalachians, show evidence of peneplains of the past. Higher summits on the landscape are of approximately similar elevations. This "accordance" is believed due to peneplanation of the region beginning some 50 million years ago and ending with a new regional uplift around 30 million years ago. Since then, several partial cycles of erosion and uplift have shaped the Ramapo landscapes over time.

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Figure 1. Constrained Slopes.



<ul style="list-style-type: none"> Ringwood Municipal Boundaries Street Centerlines Limited Constrained Severe Moderate 		
<p>Prepared November 2023</p> <p>J Caldwell & Associates, LLC Community Planning Consultants</p>		<p>Data: This map was developed using New Jersey Highlands Council Geographic Information System digital data, but this secondary product has not been verified by Highlands Council and is not endorsed. Municipal Boundaries, Street Centerlines: NJ Office of Information Technology, Office of GIS (OGIS)</p>

Bedrock Geology

The geology of Ringwood can be classified into two layers: bedrock geology, which is consolidated, underlying rock that extends deep into the earth's crust; and surficial geology, which is the unconsolidated sedimentary materials overlaying bedrock formations, and is the parent material for soils. The properties of these layers:

"...determine the physical extent of aquifers and productivity of aquifers and the quality of the water they yield. They also control how groundwater enters and moves through aquifers, how contaminants seep into and move through soil and ground-water; where hazards like radon, sinkholes, landslides, and soil instability may occur, and where resources such as sand, gravel, peat, clay, quarry rock, and mineral ores are located. These properties also determine soil fertility, the suitability of an area for the use of septic systems, the management of stormwater and surface-water runoff, and the stability of foundations for buildings, bridges, tunnels, and other structures."¹

Metamorphic Rock Isua. Photo credit: James L. Amos.



The Borough of Ringwood contains various types of bedrock within its bounds, illustrated in **Figure 2**. The most prominent bedrock types are Diorite (41% of the Borough's total acreage), Quartz-Oligoclase Gneiss (40%), and Biotite-Quartz-Feldspar Gneiss (15%). Diorite contains andesine or oligoclase, clinopyroxene, hypersthene, and sparse amounts of biotite and magnetite²; Quartz-Oligoclase Gneiss is composed of quartz, oligoclase or andesine, and locally, biotite, hornblende and/or clinopyroxene, and contains thin amphibolite layers³; and Biotite-Quartz-Feldspar Gneiss is composed of oligoclase, microcline microperthite, quartz, and biotite, and contains garnet, graphite, Sillimanite, and opaque minerals.⁴

¹ NJGS, "New Jersey Geological and Water Survey: Information Circular," 2013. Retrieved from <https://www.nj.gov/dep/njgs/enviroed/infocirc/mapping.pdf>

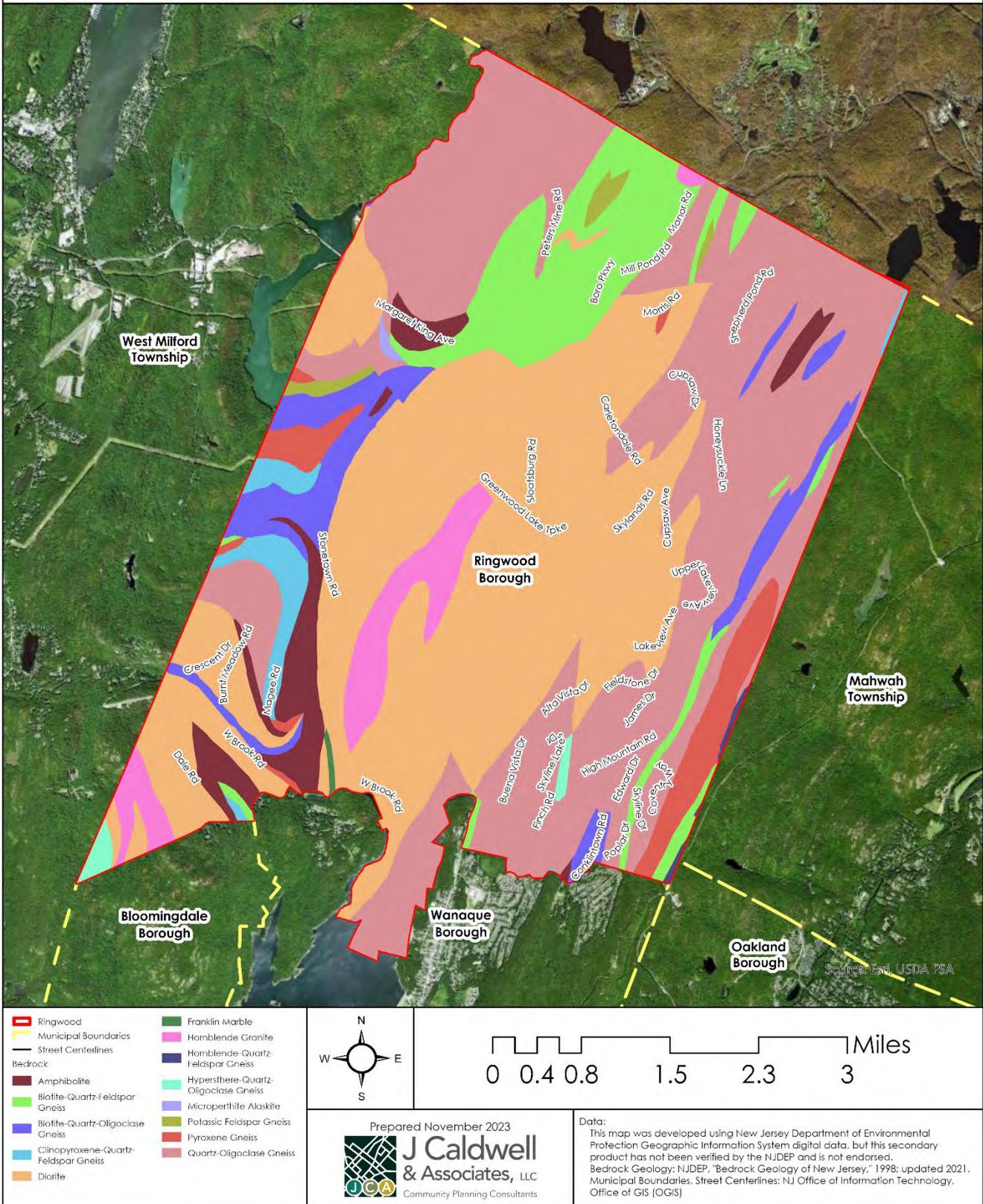
² United States Geological Survey, "Diorite," n.d. Retrieved from <https://mrdata.usgs.gov/geology/state/sgmc-unit.php?unit=NJYd%3B11>

³ United States Geological Survey, "Biotite-Quartz-Feldspar Gneiss," n.d. Retrieved from <https://mrdata.usgs.gov/geology/state/sgmc-unit.php?unit=NJYo%3B11>

⁴ United States Geological Survey, "Biotite-Quartz-Feldspar Gneiss," n.d. Retrieved from <https://mrdata.usgs.gov/geology/state/sgmc-unit.php?unit=NJYb%3B11>

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Figure 2. Bedrock Geology.



Surficial Geology

Surficial deposits are sediments deposited by rivers, glaciers, ocean currents and waves, wind, and movement of soil and rocks on hillslopes. The surficial geology illustrated in **Figure 3** shows the distribution of *Till after Avalanche. Photo credit: CC BY-SA 3.0*

surface-level loose materials in the Borough of Ringwood. The predominant material is Netcong Till, which comprises just approximately 44 percent of the Borough's surface layer. This layer is characterized by silty sand that typically contains as much as 30 percent gravel and thin beds of well- to moderately-sorted sand, gravel, and silt. Clast consists of un-weathered to lightly weathered gneiss and granite with minor marble, quartzite, sandstone, and carbonate rock. Matrix is a varied mixture of gneiss and granite fragments, quartz, feldspar, mica, heavy minerals, and silt; minor constituents may include fragments of sandstone, siltstone, quartzite, carbonate rock, and clay.⁵



⁵ NJDEP, Division of Science and Research, NJ Geological Survey, "Environmental Geology of Warren County, New Jersey: Surficial Geology and Earth Material Resources," 1995. Retrieved from <https://nj.gov/dep/njgs/pricelst/ofmap/ofm15c.pdf>

Soils

Healthy soil. Photo credit: Catherine Ulitsky.



Soils play a critical role in the environment. They support an area's vegetation, absorb rainwater, and provide habitat. The physical and chemical properties of soils reflect a large number of variables, including the parent material (bedrock), climate, vegetative cover, animal activities, slopes and drainage patterns, and time. New Jersey's complex bedrock geology, history

of glaciations, abundant precipitation, and patterns of human use have led to complex patterns of soil distribution.⁶

There are 34 types of soil throughout Ringwood (**Figure 4**), the three most prominent soils are the Rockaway – Rock outcrop complex ⁷(RomC), Hibernia loam (HhmCc), and Rockaway sandy loam (RobCc). Both the RomC and RobCc soils contain 8 to 15 percent slopes while HhmCc soils contain 0 to 15% slopes; and HhmCc and RobCc soils are classified as being extremely and very stoney respectively.⁶

Both RomC and RobCc soils are part of the Rockaway series, which consists of very deep well or moderately well drained soils with slopes ranging from 3 to 6 percent⁸; while HhmCc is a part of the Hibernia series which consists of very deep, somewhat poorly drained soils in low positions on uplands. Furthermore, Hibernia series soils are shallow or moderately deep with slope ranges from 0 to 25 percent.⁹

⁶ NJGS, "New Jersey Geological and Water Survey: Information Circular," 2013. Retrieved from <https://www.nj.gov/dep/njgs/enviroed/infocirc/mapping.pdf>

⁷ Stock Photo showing soil strata.

⁸ United States National Cooperative Soil Survey, "Official Series Description – Rockaway Series," 2023. Retrieved from https://soilseries.sc.egov.usda.gov/OSD_Docs/R/ROCKAWAY.html

⁹ United States National Cooperative Soil Survey, "Official Series Description – Hibernia Series," 2023. Retrieved from https://soilseries.sc.egov.usda.gov/OSD_Docs/H/HIBERNIA.html

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Topography

Norvin Green State Forest, Wyanokie High Point. Photo credit: NJHiking.com

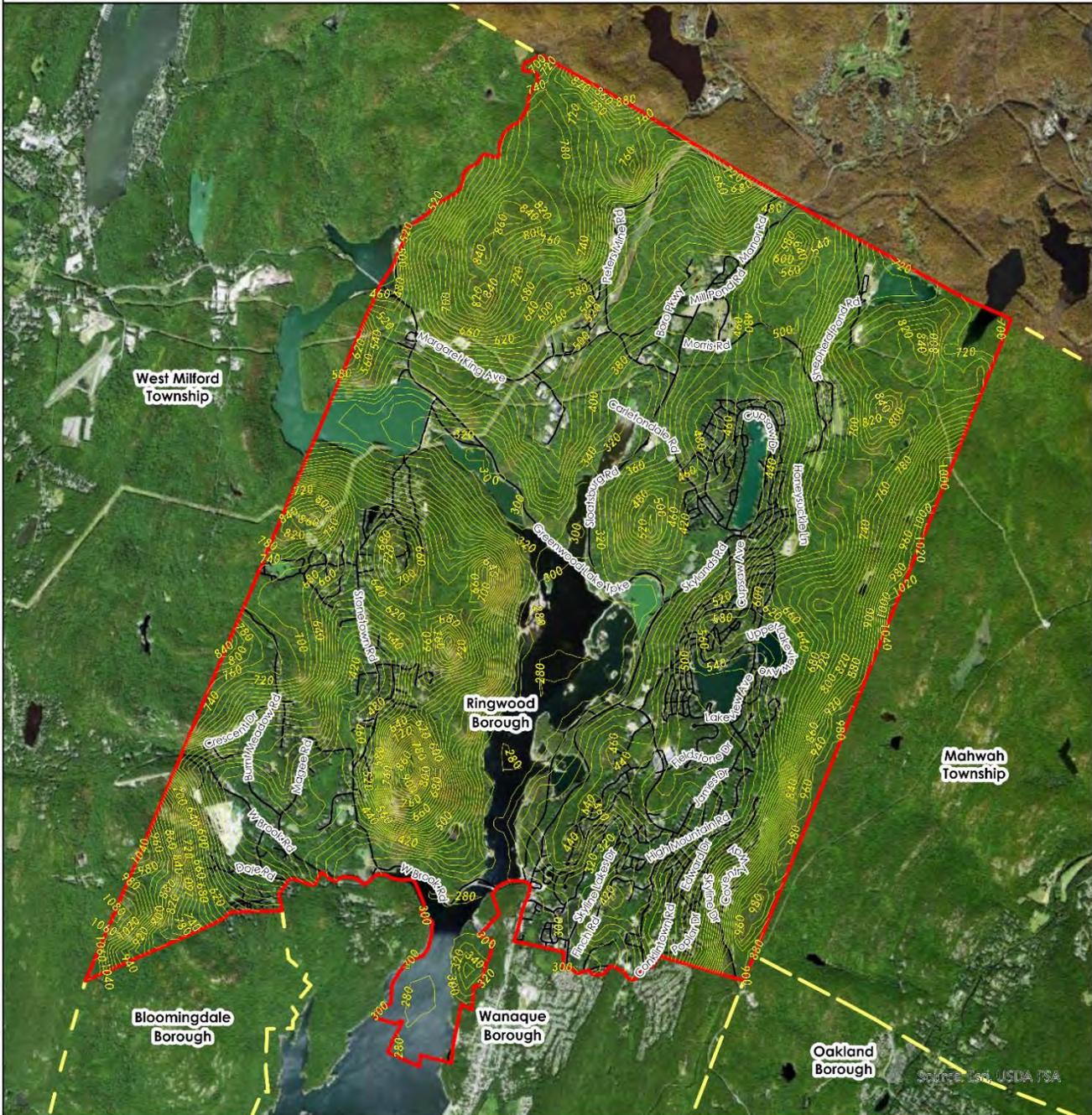


Elevations in Ringwood vary significantly, but range from 300 feet above sea level (the approximate level of the Wanaque Reservoir) to over 1,100 feet above sea level. The highest elevation, approximately 1,180 feet, occurs in the southwestern corner of the Borough at the border of the Norvin Green State Forest, also known as the Wyanokie High Point. Other high points are found

along the eastern boundary, shared with the Township of Mahwah, and the northwestern corner, toward Sterling Forest Lake.¹⁰ **Figure 5** illustrates the Borough's topography.

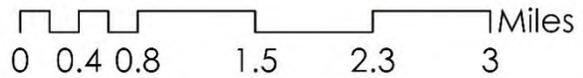
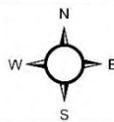
¹⁰ Ringwood Environmental Commission, "Natural Resources Inventory," (2003). Retrieved from <https://rucore.libraries.rutgers.edu/rutgers-lib/32119/>

Figure 5. Topography.



Source: Esri, USDA, FSA

- ▭ Ringwood
- ▭ Municipal Boundaries
- Street Centerlines
- Elevation (feet above mean sea level)



Prepared November 2023



Data:

This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by the NJDEP and is not endorsed.
 Elevation: NJ DEP, Bureau of GIS.
 Municipal Boundaries, Street Centerlines: NJ Office of Information Technology, Office of GIS (OGIS)

III. Hydrology

Watersheds

Wanaque Reservoir. Photo credit: NJDEP.



“A watershed is a topographic area within which surface water runoff drains into a specific point on a stream or to a water body such as a lake.”¹¹ A watershed-based approach to natural resource management is considered by state and national agencies to be the most appropriate unit for managing complex environmental problems.

The NJDEP has divided the state of New Jersey into Watershed Management Areas (WMAs). Every WMA is composed of multiple watersheds and sub-watersheds. The U.S. Geological Survey (USGS) has mapped and identified watersheds using hierarchical numbering systems. This system identifies watersheds using a hydrological unit code (HUC) consisting of up to 14 digits for the smallest watersheds¹².

The Borough of Ringwood falls within the Wanaque River watershed and a portion of the eastern border is encompassed within the Ramapo watershed. The watershed boundaries used for this analysis are 14-digit Hydrologic Units (i.e., sub-watersheds or HUC14s). Ringwood includes portions, or the entirety of nine HUC14 sub-watersheds as identified in **Table 1** and **Figure 6**.

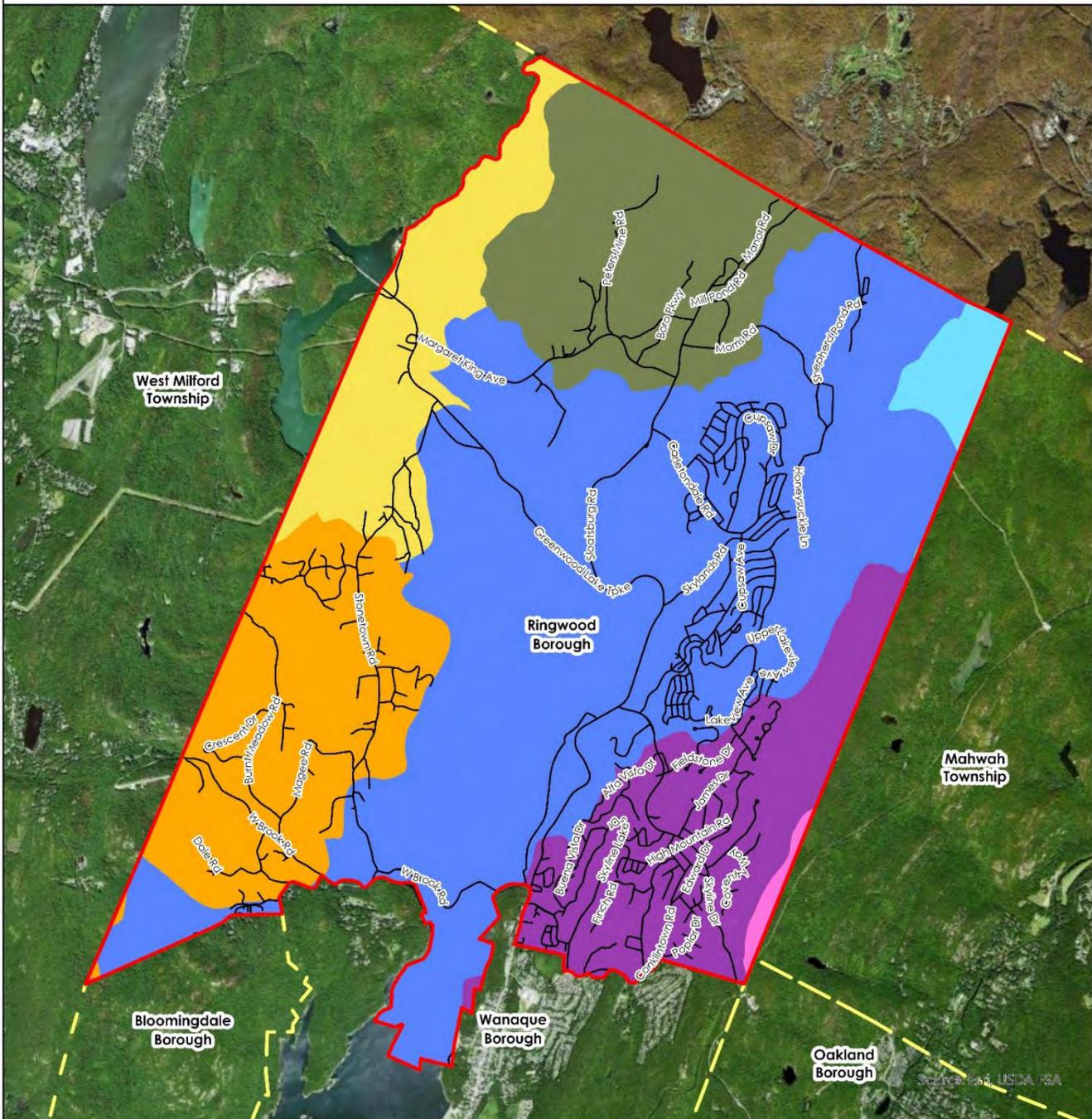
Table 1. HUC14 Sub-Watersheds

HUC14 Sub-Watersheds	HUC14 Sub-Watershed Name	Acres	Percent
0203010300010	Ramapo River (above 74d 11m 00s)	319	1.7%
02030103070030	Wanaque River/Greenwood Lake (above Monks gage)	1,583	8.7%
02030103070040	West Brook/Burnt Meadow Brook	2,564	14.1%
02030103070050	Wanaque River/Posts Bk (below Monks gage)	8,896	48.8%
02030103070060	Meadow Brook/High Mountain Brook	2,376	13.0%
02030103070070	Wanaque River/Posts (below reservoir)	1	0.005%
02030103070080	Ringwood Creek	2,401	13.2%
02030103100040	Ramapo River (Bear Swamp Bk thru Fyke Bk)	2	0.01%
02030103100050	Ramapo River (Crystal Lk Br to Bear Swamp Bk)	83	0.5%
Total:		18,231	100.00%

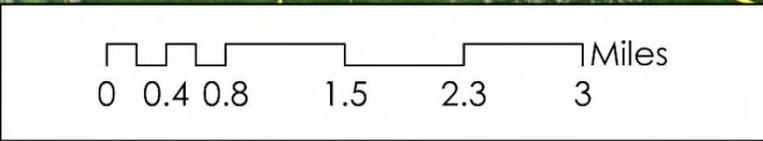
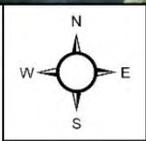
¹¹ Omernick, James M and Bailey, Robert G., “Distinguishing Between Watersheds and Ecoregions,” (1997). Retrieved from http://dusk.geo.orst.edu/prosem/PDFs/watersheds_and_ecoregions.pdf

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Figure 6. HUC-14 Subwatersheds.



- Ringwood
- Municipal Boundaries
- Street Centerlines
- HUC14 Subwatersheds
- Meadow Brook/High Mountain Brook
- Ramapo R (Bear Swamp Bk thru Fyke Bk)
- Ramapo R (Crystal Lk br to Bear Swamp Bk)
- Ramapo R (above 74d 11m 00s)
- Ringwood Creek
- Wanaque R/Greenwood Lk (above Monks gage)
- Wanaque R/Posts Bk (below reservoir)
- Wanaque Reservoir (below Monks gage)
- West Brook/Burnt Meadow Brook



Prepared November 2023

J Caldwell & Associates, LLC
 Community Planning Consultants

Data:
 This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by the NJDEP and is not endorsed. Municipal Boundaries, Street Centerlines: NJ Office of Information Technology, Office of GIS (OGIS)

Surface Water

Surface water is water that collects on the ground or in a stream, river, lake, wetlands, or ocean. There are about 23 miles of streams in Ringwood and about 3,257 acres of waterbodies in Ringwood. The following is a list of all surface water resources in the Borough (**Table 2**).

Monksville Reservoir. Photo credit: NJHiking.com.



Table 1. Available Surface Water Resources

Brooks/Streams/Rivers	Ponds/Lakes/Reservoirs
Beech Brook UNT	Brushwood Pond
Blue Mine Brook	Cupsaw Lake
Blue Mine Brook UNT	Erksine Lake
Burnet Meadow Brook	Harrison Mountain Lake
Burnt Meadow Brook UNT	Lake Rickonda
Cupsaw Brook	Monksville Reservoir
Cupsaw Brook UNT	Ringwood Mill Pond
Erksine Brook	Shepherd Lake
High Mountain Brook	Upper Erskine Lake
High Mountain Brook UNT	Wanaque Reservoir
Lake Rickonda Outlet Stream	Skyline Lakes
Meadow Brook	Sally's Pond
Meadow Brook UNT	
Ringwood Creek	
Ringwood Creek UNT	
Uncoded Tributary	
Wanaque Reservoir UNT	
Wanaque River	
Wanaque River UNT	
West Brook	
West Brook UNT	
Park Brook	

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New Jersey's Surface Quality Standards (SWQS) (N.J.A.C. 7:9) view Fresh Water 1 (FW1) as the most protected level of classification, which is defined as:

"...those freshwaters, as designated in N.J.A.C. 7:9B-1.15(j), that are maintained in their natural state of quality (set aside for prosperity) and not subject to any manmade wastewater discharges or increased runoff from anthropogenic activities. These waters are set aside for prosperity because of their clarity, color, scenic setting, other characteristics of aesthetic value, unique ecological significance, or exceptional fisheries resource(s)." ¹³

Ringwood State Park. Photo credit: National Parks with T.



The general classification for other freshwater in the State of New Jersey is Fresh Water 2 (FW2). The presence of trout in a stream means that the waters are relatively free of chemical or biological contaminants and is used to further define designated uses. A stream can be classified as Trout Production (TP), Trout Maintenance (TM), or Non-Trout (NT).

- Trout Production (TP) waters are designated for use by trout spawning or nursery purposes during their first summer;
- Trout Maintenance (TM) waters support trout throughout the year;
- Waters classified as Non-Trout do not support trout, either because of their physical nature or due to biological or chemical characteristics (SWQS, N.J.A.C. 7:9B); and
- Some waters have dual classification (e.g., FW2-NTC1).

Category One (C1) waters are protected from any measurable changes to the existing water quality. C1 can be applied to any of the surface water classifications except FW1 and PL, and is frequently applied to waters flowing through parks, wildlife refuges, and to FW2-TP streams.¹⁴ The surface waters of Ringwood are classified FW2 and NT; TM; NTC1; TMC1; and TPC1 as displayed in **Figure 7**.

Surface water quality is affected by point sources and non-point sources of pollution as well as erosion and sedimentation. Point source means any discernable, confined, and

¹³ NJDEP, "N.J.A.C. 7:9B Surface Water Quality Standards," (2020). Retrieved from https://dep.nj.gov/wp-content/uploads/rules/rules/njac7_9b.pdf

¹⁴ NJDEP, "Surface Water Classifications," (2012). Retrieved from <https://www.greatswamp.org/wp-content/uploads/2017/02/NJDEP-Water-Classifications-RE-2012-8-8.pdf>

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discrete fissure, containers, rolling stock, concentrated animal feeding operation, or vessel or other floating craft from which pollutants are or may be discharged.¹⁵ This includes discharges from sewage treatment plants and factories, stormwater runoff, illegal dumping, and malfunctioning underground storage tanks and septic tanks. This term does not include agricultural stormwater discharges and return flows from irrigated agriculture.

In contrast to point source pollution, non-point source pollution comes from many different sources. As rainfall or snowmelt moves over and through the ground, it picks up and carries natural and human-made pollutants (such as fertilizers, herbicides, and motor oil) and deposits them into surface and groundwater. The effects of pollutants on specific waterways can vary but eventually all are manifested into negative outcomes for drinking water supplies, recreation, fisheries, and wildlife.¹⁶ One of these effects is eutrophication, which, in freshwater systems, is the addition of substances, either man-made or natural, to a water body affecting the primary productivity of that body of water. This can include clouding of the water which limits sunlight penetration and stops the growth of plants deeper in the water. Furthermore, eutrophication can lead to anoxia, a condition where a water body has depleted levels of oxygen, which results from the decomposition of dead phytoplankton.¹⁷ Nitrates and phosphates promote excessive algae growth. This growth can lead to Harmful Algal Blooms (HABs) that may require the lakes to close to swimmers and possibly all recreational activity. This growing problem has been felt across the state and Ringwood will continue to take steps to reduce the occurrence of HABs. In 2020, Princeton Hydro worked with the Borough on ways to change the watershed to reduce the nutrient loading that can exacerbate HABs. The Borough is already working on a recommendation to construct a rain garden at Ryerson school to catch nutrients and educate the students on the importance of watershed management.

Water quality can also be negatively impacted by sedimentation, which is the transportation and deposition of eroded materials. A primary cause of sedimentation is development near streams and on steep slopes that reduce vegetative cover and results in exposed soil. The vegetative cover can typically absorb the impact of raindrops, but when it is removed, the exposed soil easily becomes eroded. Many of Ringwood's storm drains go straight to the lake and cause sedimentation issues. The road salt in winter can also affect the lakes. The eroded soil can then be transported to surface waters where it could contaminate and increase the cloudiness of the water, effectively blocking sunlight to plant species and negatively affecting the health of the aquatic ecosystem.

¹⁵ Environmental Protection Agency (EPA), "Clean Water Act. 33 U.S.C. § 1251 et seq. 1972," (2023). Retrieved from <https://www.epa.gov/laws-regulations/summary-clean-water-act>

¹⁶ U.S. Environmental Protection Agency, "Polluted Runoff: Nonpoint Source (NPS) Pollution," (2022). Retrieved from <https://www.epa.gov/nps/basic-information-about-nonpoint-source-nps-pollution#:~:text=NPS%20pollution%20is%20caused%20by,over%20and%20through%20the%20ground.>

¹⁷ Ecological Society of America, "Number 3: Nonpoint Pollution of Surface Waters with Phosphorous and Nitrogen," (1998). Retrieved from <https://www.esa.org/esa/wp-content/uploads/2013/03/issue3.pdf>

Groundwater

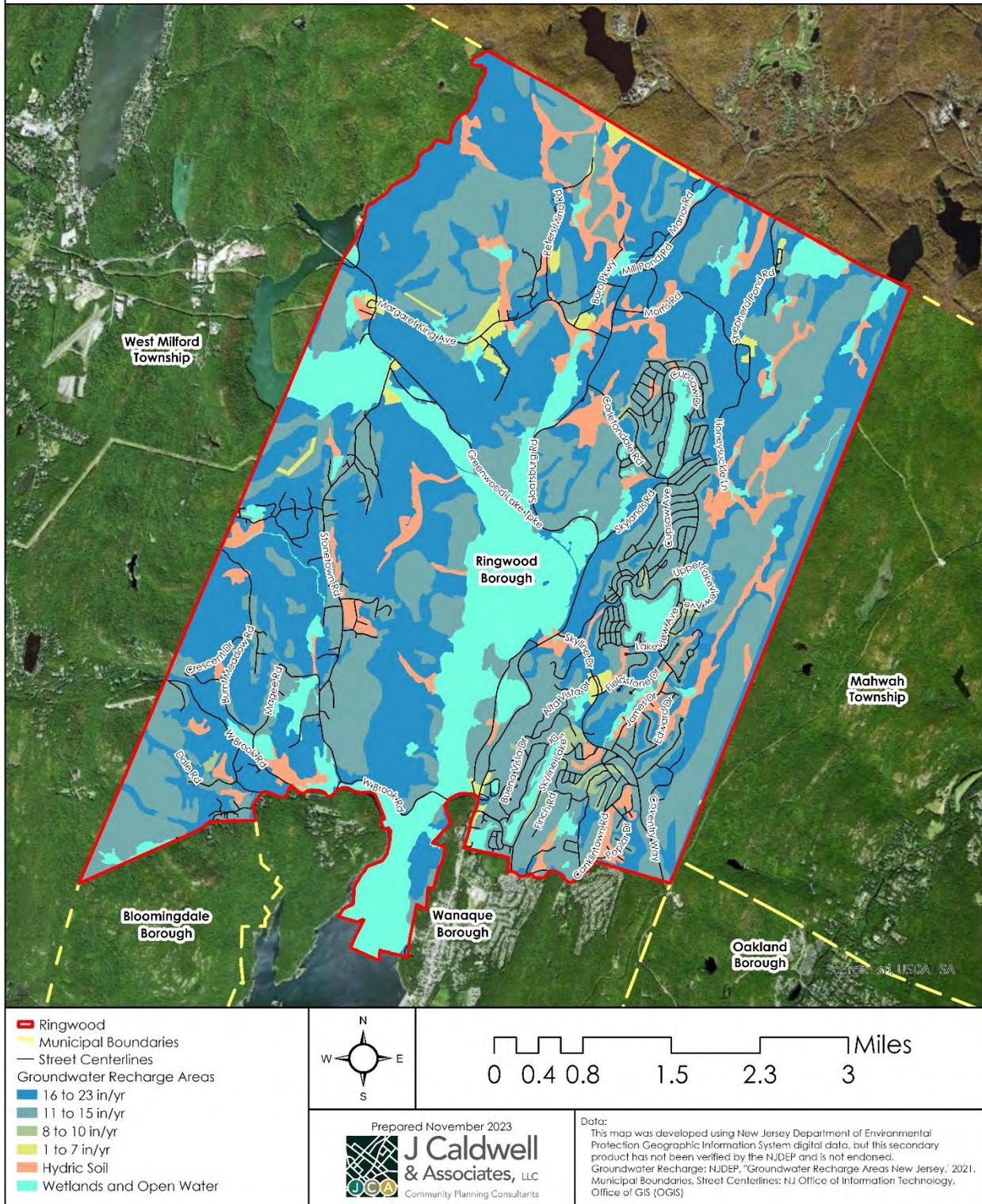
Roomy mine shaft. Photo credit: Juan Bonilla-Sanchez via AllTrails.com.



Groundwaters are subsurface waters which fill the space between rock and soil. Groundwater recharge refers to the process through which water enters an aquifer and replenishes it. **Figure 8** identifies the various groundwater recharge areas in Ringwood. Most of the groundwater recharge areas within the municipality recharge between 16 to 23 inches of water per year, though a large portion of land recharges between 11 to 15 inches per year. Ringwood also contains approximately 979.06 acres (5.37%) of wetlands and 2,237.5 acres (12.27%) of open water, where groundwater recharge is zero.

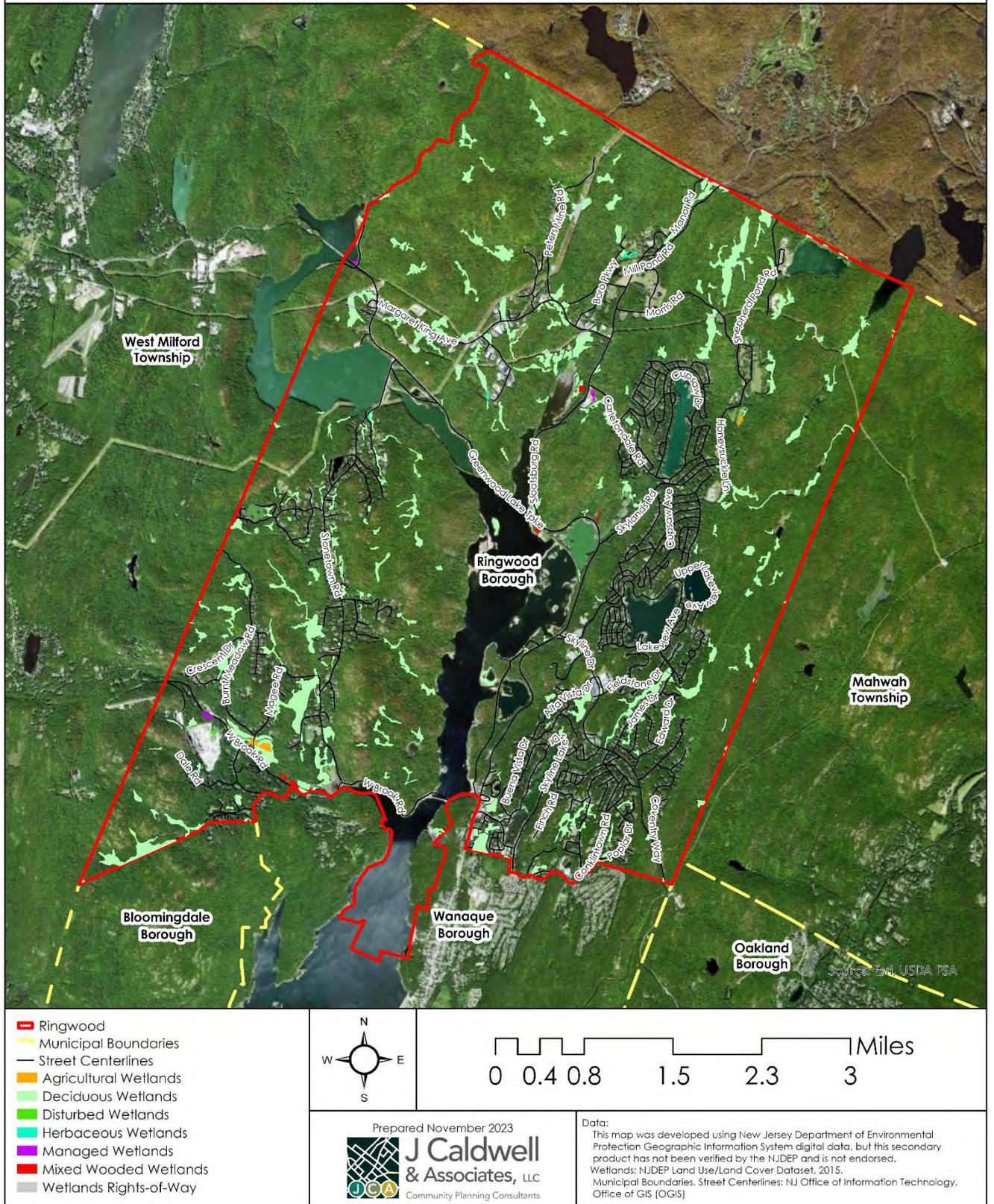
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Figure 8. Groundwater Recharge



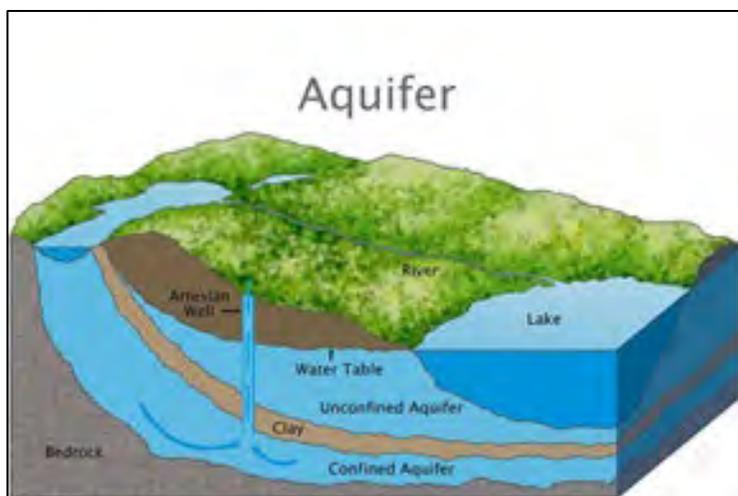
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Figure 9. Wetlands.



Aquifers

Aquifer. Photo credit: Spokane County Public Works.



An aquifer is an underground formation of permeable rock or unconsolidated materials that can yield significant quantities of water to wells or springs. Water is generally dispersed through rain and stormwater, which infiltrates soils. The rate of recharge is not the same for all aquifers, and that must be considered when pumping water from a well as pumping too much water too quickly decreases the water supply in the aquifer and eventually causes a well to run dry.

Aquifers are typically equated to the type of geologic formation in which they exist. Aquifers in New Jersey are classified as either bedrock or surficial. Bedrock aquifers consist of rock formations while surficial aquifers are formed from unconsolidated materials such as sand or gravel or glacial sediment. Bedrock aquifers in the Highlands Preservation Area are predominantly crystalline, e.g., igneous and metamorphic rock such as gneiss, granite, schist, and marble. Here, groundwater is transmitted and stored in fractures, which may be enlarged due to chemical weathering.¹⁸

The Borough of Ringwood is underlain by the Igneous and Metamorphic Rocks bedrock aquifer (Rank D). Rank D aquifers have well yield values between 25 and 100 gallons per minute (gpm). In addition, there are two (2) surficial aquifer types in Ringwood – sand and gravel (Rank B), which has a well yield between 250 and 500 gpm and Till (Rank D), which has a well yield between 25 and 100 gpm (**Figure 10**).

¹⁸ NJDEP, "Basis & Background of the Septic Density Standard of the Highlands Water Protection and Planning Act Rule at N.J.A.C. 7:38-3.4," n.d. Retrieved from <https://www.nj.gov/dep/highlands/docs/septicdensity.pdf>

Known Contaminated Sites

There are nine (9) Known Contaminated Sites (KCS) present in Ringwood that have an active status¹⁹ (**Figure 11**), which are sites having one (1) or more active cases or remedial action permits where contamination has been confirmed; these sites may have any number of pending and/or closed cases.²⁰ The NJDEP designates a remediation level to each KCS as follows:

Table 2. NJDEP KCS Remediation Levels.

Remediation Level	Definition
B	Single phase remedial action; and Single contamination affecting only soils.
C1	No formal design; Source known or identified; and Potential groundwater contamination.
C2	Formal design; and Known source or release with groundwater contamination.
D	Multi-phased remedial action; and multiple sources or releases of contamination.

Of these, two (2) are Remedial Level D – the Skyline Service Center, Inc. (236 Skyline Drive) site and the Ringwood Mines Landfill site (Peter’s Mine Road); there is one (1) KCS which is ranked as Remedial Level C2 – Ringwood State Park (1304 Sloatsburg Road; and three (3) KCS with a Remedial Level B – Patiala Gas, LLC (17-19 Carletondale Road), 128 Margaret King Avenue, and Skyline Tank 792 (Skyline Drive).²¹ There are zero (0) pending known contaminated sites²² within the Borough.

Ringwood Mines Landfill

The 500-acre Ringwood Mines Landfill site located at Peter’s Mine Road, is in a historic iron mining district of the Borough of Ringwood. The site also contains whole or portions of properties such as Peter’s Mine and Ringwood State Park. Site features include abandoned mine shafts and pits; inactive landfills; and open waste dumps. Magnetite mines operated on the site property as early as the 1700s. Entities including the Ford Motor Company and the Borough of Ringwood disposed waste at the site since the 1960s. The

¹⁹ NJDEP, “Active Sites with Confirmed Contamination,” (October, 2023). Retrieved from <https://njems.nj.gov/DataMiner/Report/ReportCriteria?isExternal=y&showHeader=y&APIKEY=NDEP&BOReportName=Active+Sites+with+Confirmed+Contamination&getCriteria=y0be98f4bb9aa5c3f99dbfd025ec153b4712dd752>

²⁰ NJDEP, “Site Remediation Program,” (June 29, 2022). Retrieved from <https://www.nj.gov/dep/srp/kcsnj/>

²¹ NJDEP, “Active Sites with Confirmed Contamination,” (October 2023). Retrieved from <https://njems.nj.gov/DataMiner/Report/ReportCriteria?isExternal=y&showHeader=y&APIKEY=NDEP&BOReportName=Active+Sites+with+Confirmed+Contamination&getCriteria=y0be98f4bb9aa5c3f99dbfd025ec153b4712dd752>

²² NJDEP, “Pending Sites with Confirmed Contamination,” (October 2023). Retrieved from <https://njems.nj.gov/DataMiner/Report/ReportCriteria?isExternal=y&showHeader=y&APIKEY=NDEP&BOReportName=Pending+Sites+with+Confirmed+Contamination&getCriteria=y>

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site is about a half-mile wide and 1.5 miles long. It consists of rugged forested areas; open areas overgrown with vegetation; abandoned mine shafts and surface pits; an inactive landfill; and an industrial refuse disposal area. Also on the site are small surface-level dumps, a municipal recycling center, the Ringwood Borough garage, and about 50 private residential dwellings.

Mining ended at the site in the early 1900s. The history of the site between 1900 and the late 1930s is unclear. The U.S. Government purchased the site property just prior to 1940 and the site was later sold to a series of owners. Ringwood Realty, a Ford subsidiary, owned the property from 1965 until 1974.

During this period, Ford disposed of waste including car parts and paint sludge, on the ground and in abandoned mine pits. A Ford contractor used the 500-acre area to dispose of paint sludge and other wastes from Ford's Mahwah facility. Ford also disposed of wastes in the Peter's Mine Pit and in Cannon Mine. Peter's Mine contains paint sludges; solvents; and scrap metal, whereas several drums containing chemical waste were found in Cannon Mine.

Ringwood Realty donated 290 acres in the southern portion of the site in 1970 to the Ringwood Solid Waste Management Authority, which operated a permitted municipal disposal area from 1972 to 1976. After site contaminants were discovered, Ford took actions to remove contamination to protect human health and the environment under EPA oversight. Site investigations and long-term cleanup activities continue.

Following immediate cleanup actions and site investigations, the EPA originally placed the site on the Superfund program's National Priorities List (NPL) in September 1983. The site was deleted from the NPL in 1994 and in 2006, the site was placed back on the NPL for a second time after discovering additional contamination.

The NJDEP began investigating residential properties at the site in October 2005 and residential sampling collected in 2011 found high levels of lead in soil on some residential properties. In response, the EPA removed lead-contaminated soil from 23 residences at the site from 2011 through 2014.

The EPA began a long-term sampling of groundwater and surface water in 1989. That sampling continues, as Ford regularly samples surface water at the site annually, including as recently as February 2023.²³ Results continue to show that contamination at the site is not affecting the Wanaque Reservoir, which is a source of drinking water. Groundwater sampling shows scattered high levels of some contaminants, including arsenic and lead. Sampling also detected benzene and 1,4-dioxane in groundwater at the site. The EPA issued a Record of Decision (ROD) in September 2020 to select a cleanup plan for groundwater contamination at the site.

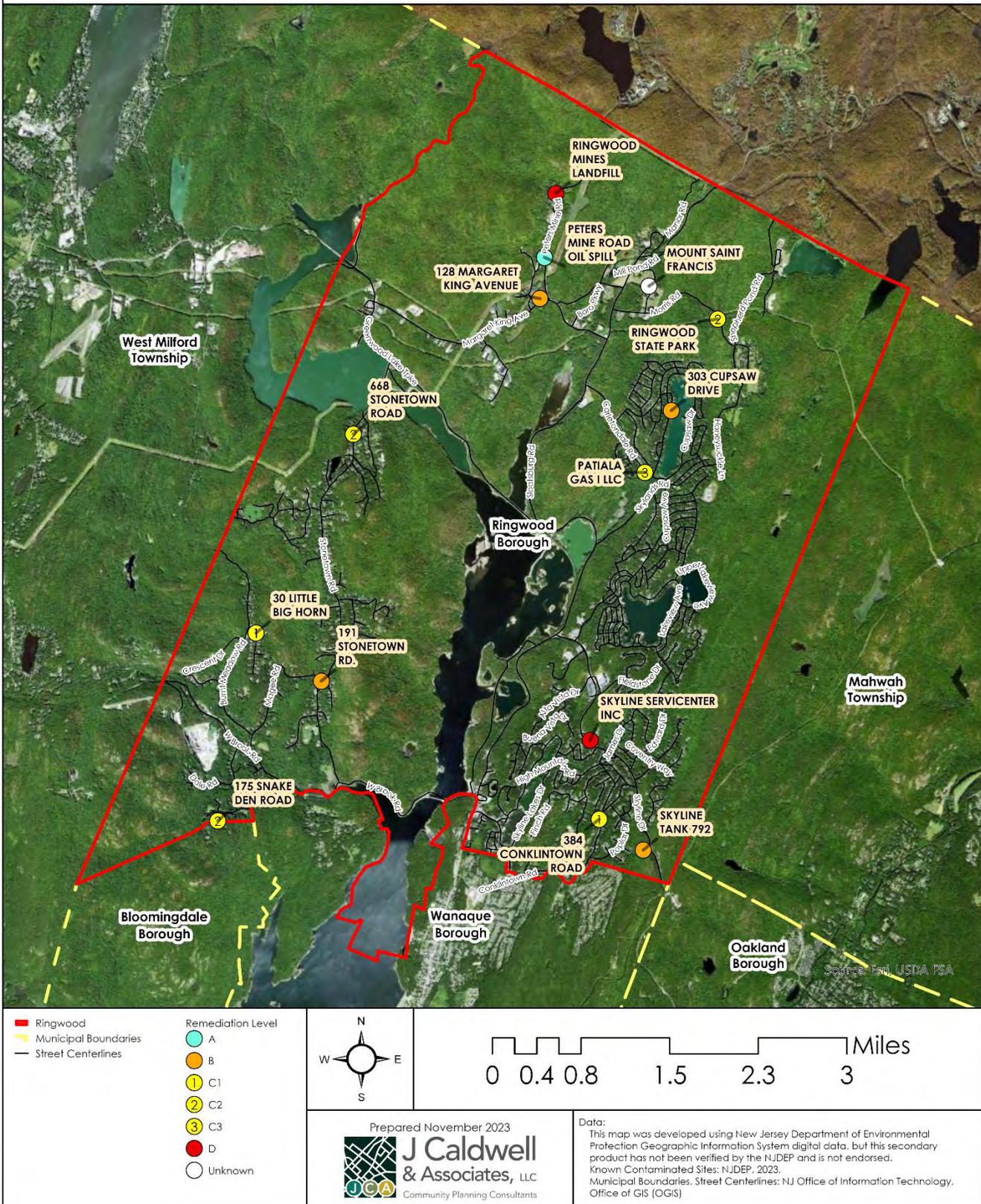
²³ US EPA, "Ringwood Mines/Landfill Ringwood Borough, NJ," (October 2023). Retrieved from <https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.cleanup&id=0200663#:~:text=Site%20features%20include%20abandoned%20mine,the%20site%20since%20the%201960s>.

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At the time this ERI is being prepared, the EPA is addressing the site in two stages. The first stage is to address the surface contamination and that is almost complete. The second stage to address groundwater contamination is expected to begin a year or two after the surface contamination stage is complete.

Ford's removal of large amounts of paint sludge and contaminated soil from the site reduced the potential for exposure to hazardous materials. In addition, Ford, under EPA oversight, removed 113 drums of waste materials from non-residential areas off-site. Since the discovery of additional paint sludge at the site in 2004, Ford continues to conduct groundwater sampling under EPA oversight. The remaining landfill areas are fenced off to reduce the potential for exposure to site-related contaminants until cleanup actions for these areas are completed.

Figure 11. Known Contaminated Sites.



IV. Flood-Prone Areas

FEMA Flood Hazard Area and Special Flood Hazard Areas

Figure 12 identifies the Special Flood Hazard Area (SFHAs) which are present in Ringwood Borough. Specifically, Zones A, AE, and X are present. Zones A and AE are considered high-risk areas for flooding and fall within the 100-year floodplain. Zone A areas have a one (1) percent annual chance of flooding and Zone AE areas are the base floodplain areas. Areas that are classified as Zone X have a minimal chance of flooding and are located within the 500-year floodplain.

Zone A is located almost entirely over the Monksville Reservoir in the northwest portion of the Borough. The tributary connecting the Monksville Reservoir to, and including, Lake Rickonda, are also classified as Zone A. Most other waterbodies in the Borough fall under the Zone AE category, which is still at high-risk for flooding.

Residential areas of particular concern are lake communities. Specifically, those communities which are established around Cupsaw Lake, Lake Erskine, Upper Erskine Lake, and Skyline Lakes. Flooding and other hazardous events that occur or are intensified due to the climate change pose threats to the health, safety, and public welfare in the Borough and the areas listed above should be aid careful attention when it comes to preparing for weather events. Although the NJDEP regulates development within flood areas, the Borough should consider flood-prone areas when planning for evacuation from these sites on short notice during weather events.

IV. Habitats

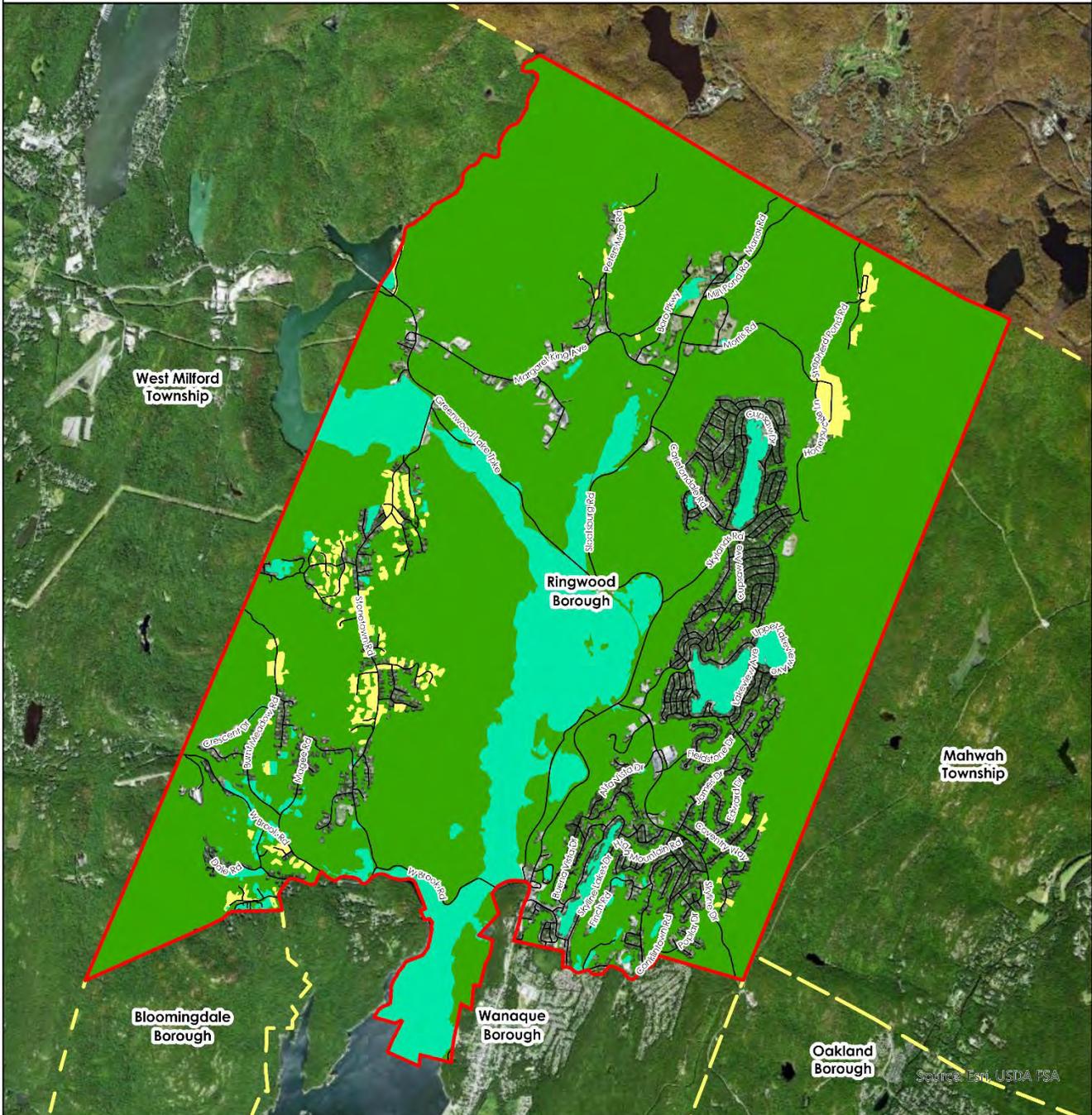
Habitat Rankings

Ringwood is home to various important wildlife and plant species. The Critical Wildlife Habitat dataset is a product of the Landscape Project, which is a tool prepared by the New Jersey Department of Environmental Protection (NJDEP), Division of Fish and Wildlife (DFW), Endangered Nongame Spaces Program (ENSP), combined with the NJDEP's 2015 Land Use/Land Cover (LULC) dataset with documented wildlife locations to delineate imperiled and special concern species habitats (**Figure 13**). The NJDEP Landscape Project 3.3 ranks patches of habitat using a numeric system (0 through 5) for the purpose of identifying habitat which may be suitable for threatened and endangered species. Habitat identified as Rank 3 through Rank 5 are considered environmentally significant by the NJDEP:

- **Rank 5:** Species-specific patches containing one or more occurrences of wildlife listed as endangered and threatened pursuant to the *Federal Endangered Species Act of 1973*.
- **Rank 4:** Species-specific patches with one or more occurrences of State Endangered species.
- **Rank 3:** Species-specific patches containing one or more occurrences of State Threatened species.
- **Rank 2:** Species-specific patches containing one or more occurrences of species considered to be Species of Special Concern.
- **Rank 1:** Species-specific patches that meet habitat-specific suitability requirements such as minimum size criteria for endangered, threatened, or priority wildlife species, but that do not intersect with any confirmed occurrences of such species.
- **Rank 0:** Species-specific patches that do not contain any species occurrences and do not meet any habitat-specific suitability requirements.

Ringwood contains habitats Ranked 1, 2, and 3 as highlighted in **Figure 13**.

Figure 13. Habitat Rankings.



<ul style="list-style-type: none"> Ringwood Municipal Boundaries Street Centerlines 		
<p>Habitat Patch Rankings</p> <ul style="list-style-type: none"> Rank 1 Rank 2 Rank 3 	<p>Prepared November 2023</p>	<p>Data: This map was developed using New Jersey Highlands Council Geographic Information System digital data, but this secondary product has not been verified by the Highlands and is not endorsed. Habitat Rankings: New Jersey Department of Environmental Protection (NJDEP), Division of Fish Wildlife, Endangered Nongame Species Program (ENSP) New Jersey Highlands Council (NJHWPPC) "NJ Critical Wildlife Habitat," Version 3.3, 2023. Municipal Boundaries, Street Centerlines: NJ Office of Information Technology, Office of GIS (OCIS)</p>

Wildlife and Plant Species Present

Ringwood contains 14,936 acres (82% of the Borough) of Critical Wildlife Habitat suitable to support populations of rare, threatened, and endangered species. **Table 4** displays species that are known to or are believed to occur in Ringwood, based on the species current range, as defined by the United States Fish and Wildlife Service (USFWS).¹⁷

Bog turtle. Photo credit: NJDEP.



Table 3. Wildlife and Plant Species Present in Ringwood, NJ.

Group	Common Name	Scientific Name	Status
Flowering Plants	Small Whorled Pogonia	Isotria Medeoides	Threatened
Insects	Monarch Butterfly	Danaus Plexippus	Candidate
Mammals	Indiana Bat	Myotis Sodalis	Endangered
Mammals	Northern Long-Eared Bat	Myotis Septentrionalis	Endangered
Mammals	Tricolored Bat	Perimyotis Subflavus	Proposed Endangered
Reptiles	Bog Turtle	Glyptemys Muhlenbergii	Threatened

Source: U.S. Fish and Wildlife Service – Information for Planning and Consultation (IPaC)

Bald and Golden Eagles are protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. Although Bald and Golden Eagles are not considered a Bird of Conservation Concern (BCC) in the Borough, but they warrant attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development activities.²⁴

²⁴ USFWS, “Environmental Conservation Online System,” (2023). Retrieved from <https://ecos.fws.gov/ecp/report/species-listings-by-current-range-county?fips=34031>

Vernal Habitats

Vernal pool in New Jersey. Photo Credit: NJDEP.



Vernal habitats, also known as vernal pools, are natural wetland depressions that fill with water during the rainy season in the fall and remain ponded until the dry weather in early summer causes them to dry out. Vernal pools provide habitat for a wide variety of amphibians, reptiles, invertebrates, and many species of wetland vegetation, but cannot support a fish population because of the pools' brief dry period. Certain wildlife species, referred to as "obligate" vernal pool breeders, have evolved with reliance upon these fish-free breeding sites and cannot

successfully produce elsewhere. Other wildlife species, referred to as "facultative" vernal pool species, also take advantage of vernal habitats for breeding and/or feeding purposes, but are not limited to performing these functions solely in vernal pools.²⁵

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

- The wetland must consist of or contain a confined basin or depression without a permanently flowing outlet;
- The pool must feature evidence of breeding by at least one obligate or two facultative vernal habitat species (these species are identified in N.J.A.C. 7:7A, Appendix 1);
- The area must maintain ponded water for at least two continuous months between March and September of a normal rainfall year; and
- The area must remain free of fish populations throughout the year, or it must dry up at some time during a normal rainfall year.

Wetland areas featuring a confined basin depression exhibiting the hydrologic and biological criteria established above are said to meet "certification" requirements and may be referred to as "certified vernal habitats" or "vernal habitat areas." **Figure 14** uses data from New Jersey's Landscape Project and depicts a 1,000-foot radius circle over the estimated center of both "certified" and "potential" vernal habitats. The 1,000-foot buffer is intended to account for the varying sizes of individual pools, the likely presence of adjacent wetland areas, and adjacent dispersal habitats which are typically utilized by a variety of amphibian species. The Landscape Project defines vernal habitats as follows:

²⁵ New Jersey Division of Fish and Wildlife, "New Jersey's Vernal Pools," n.d. Retrieved from <https://www.state.nj.us/dep/fgw/vpoolart.htm>

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Potential Vernal Habitat Areas

The areas identified as possibly containing a vernal pool that meets the criteria of a “vernal habitat” pursuant to N.J.A.C. 7:7A-1.4. These sites include sites that have been field inspected and have been found to meet the physical characteristics of a vernal habitat, but for which biological criteria have not yet been measured, as well as sites that have not been checked by NJDEP staff.²⁶

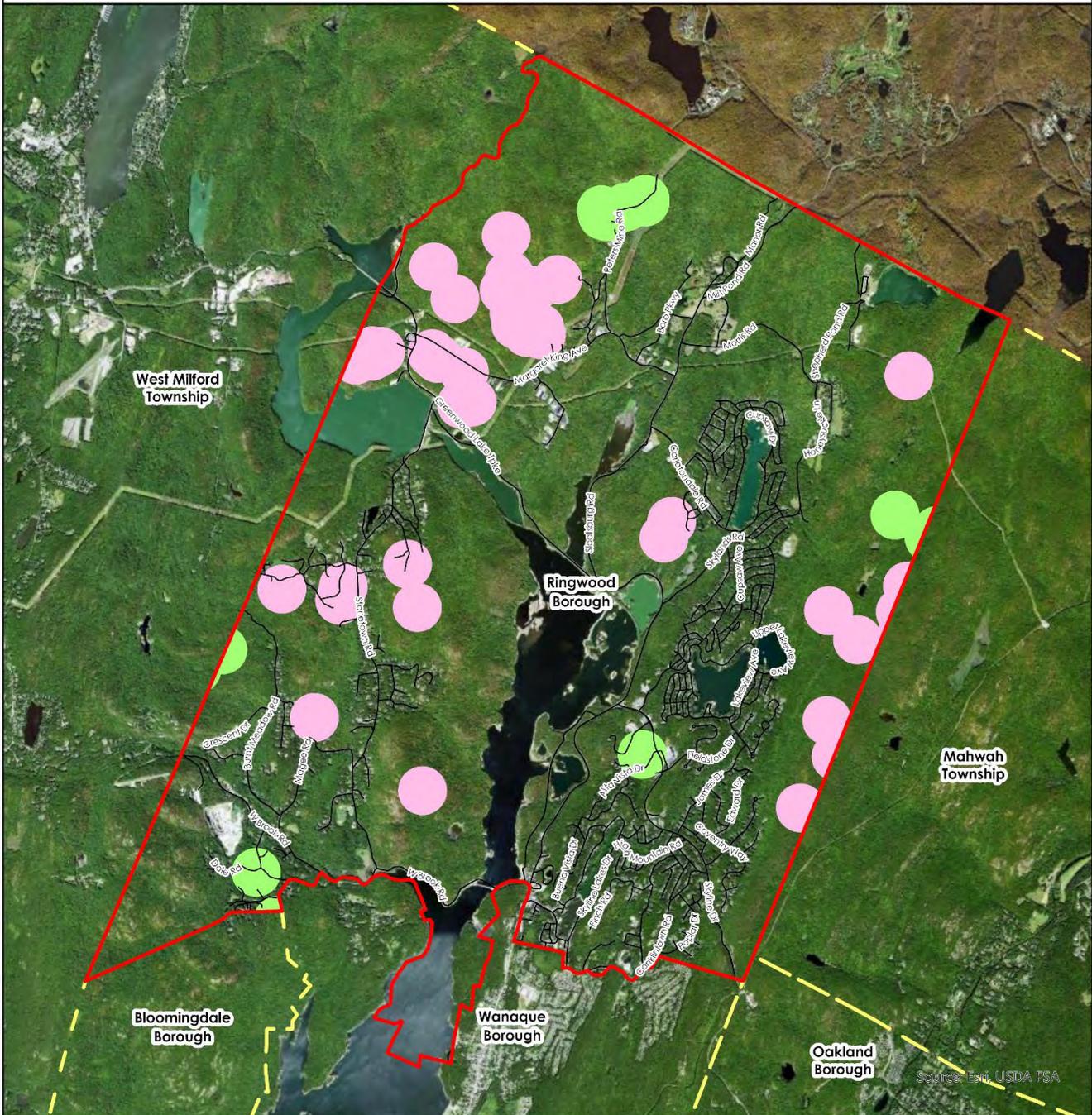
Vernal Habitat Areas

These are areas that contain pools that have been field-verified by the NJDEP and have been determined to meet both physical and biological characteristics of a vernal habitat in accordance with N.J.A.C. 7:7A-1.4. The Freshwater Wetlands Protection Act Rules (N.J.A.C. 7:7A) protects vernal habitats as wetland areas requiring a 50-foot buffer, or a 150-foot buffer if the pool supports a State Threatened or Endangered Species.¹⁶

Ringwood Borough has a total of 21 vernal pool habitat areas within the municipality as shown in **Figure 14**. Of the 21 vernal pools, 14 are identified as a “Potential Vernal Habitat Area” and 7 are identified as “Vernal Habitat Areas.”

²⁶ NJDEP Bureau of GIS, “Landscape 3.3 Data for Vernal Habitats of New Jersey,” 2021. Retrieved from <https://gisdata-njdep.opendata.arcgis.com/datasets/njdep::landscape-3-3-data-for-vernal-habitats-of-new-jersey/about>

Figure 14. Vernal Habitats.



<ul style="list-style-type: none"> Ringwood Municipal Boundaries Street Centerlines 		
<p>Vernal Pool Habitat Type</p> <ul style="list-style-type: none"> Potential vernal habitat area Vernal habitat area 	<p>Prepared November 2023</p>	<p>Data: This map was developed using New Jersey Highlands Council Geographic Information System digital data, but this secondary product has not been verified by the Highlands and is not endorsed. Vernal Habitats: New Jersey Department of Environmental Protection (NJDEP), "Landscape Project - Vernal Habitats," 2023. Municipal Boundaries, Street Centerlines: NJ Office of Information Technology, Office of GIS (OGIS)</p>

Forest Core

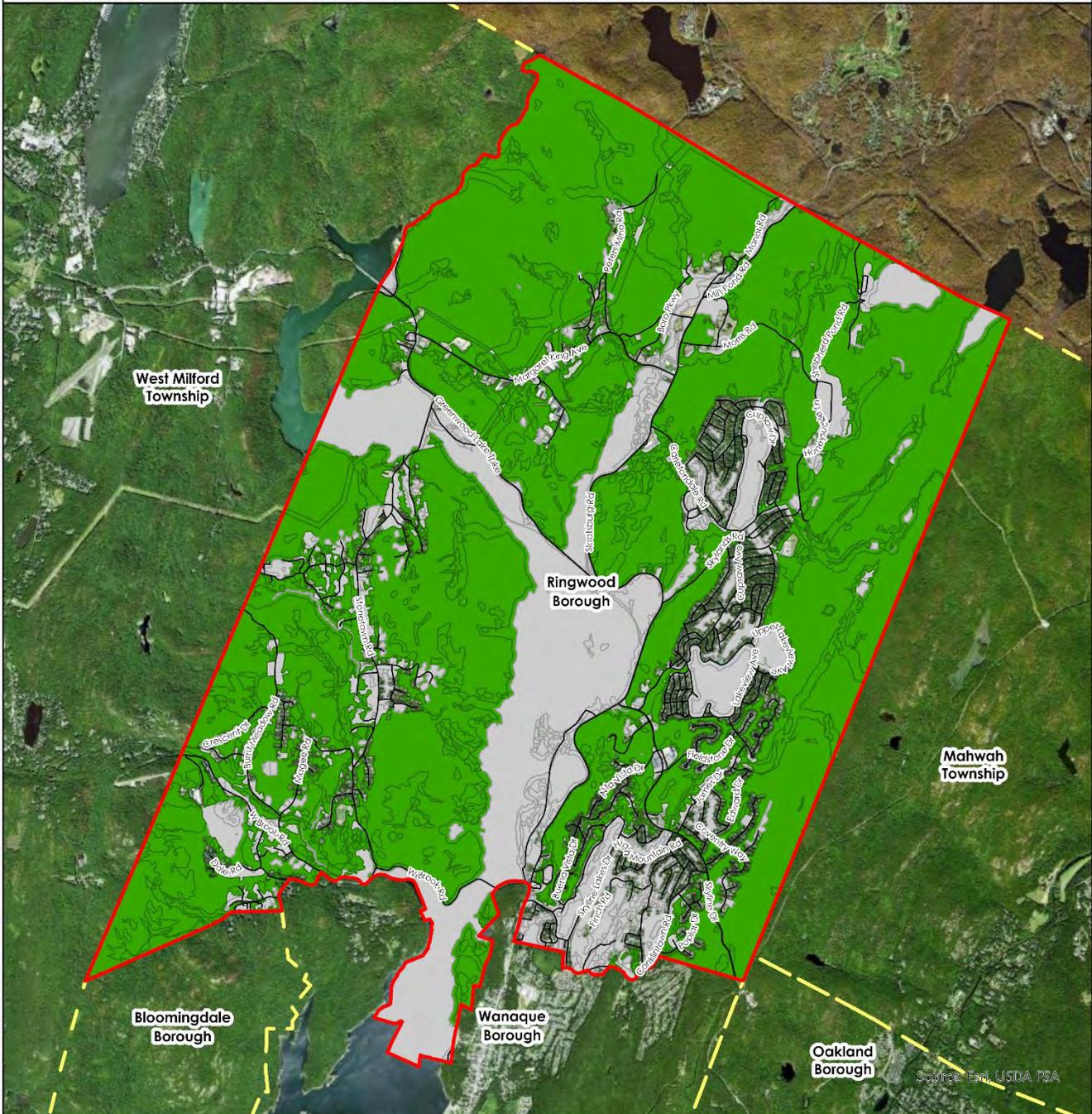
Norvin Green State Forest. Photo credit: Marie D. via Yelp.com.



The Landscape Project, described above, also identified areas known as “forest core” (**Figure 15**). These areas are large, contiguous swaths of forest which are at least 10 hectares, or about 25 acres. Forest core metrics assist in determining the prioritization of forested habitat patches. Approximately 12,145.6 acres (67%) are within a forest core area and 4,082.8 acres (22%) are not situated within a forest core area.²⁷

²⁷ State of New Jersey Department of Environmental Protection (NJDEP), Division of Information Technology (DOIT), Bureau of Geographic Information Systems (BGIS), “NJDEP Species Based Habitat, Skylands Region, Version 3.3, 20170509.” 2017.

Figure 15. Forest Core.



Source: Esri, USDA, FSA

<ul style="list-style-type: none"> ▭ Ringwood - - - Municipal Boundaries — Street Centerlines 		
<p>Forest Core</p> <ul style="list-style-type: none"> ■ Yes ■ No 	<p>Prepared November 2023</p> <p>J Caldwell & Associates, LLC Community Planning Consultants</p> <p><small>Data: This map was developed using New Jersey Highlands Council Geographic Information System digital data, but this secondary product has not been verified by the Highlands and is not endorsed. Forest Core: State of New Jersey Department of Environmental Protection (NJDEP), Division of Information Technology (DOIT), Bureau of Geographic Information Systems (BGIS). "NJDEP Species Based Habitat, Skylands Region, Version 3.3, 20170509." 2017. Municipal Boundaries, Street Centerlines: NJ Office of Information Technology, Office of GIS (OCIS)</small></p>	

V. Historic and Cultural Resources

Native American History



Prehistoric artifacts found in the Borough of Ringwood confirm Native American occupation of the area dating back to the Archaic and Woodlands periods of prehistory. The Ramapo Lenape Nation were Munsee-speaking Lenape peoples that lived in a hunting and farming paradise at the head of the “Topomopack” or Ringwood River Valley and traded with other natives in the Pompton area.²⁸

The Ramapo Lenape Nation are a group of approximately 5,000 people living in and around the Ramapo Mountains of Bergen and Passaic counties in northern New Jersey, with ancient territories in the Ringwood River Valley. The Ramapo Nation were recognized in 1980 by the State of New Jersey as the Ramapo Lenape Nation but are not recognized federally²⁹. The group of Ramapo Lenape Nation from the Ringwood area refer to themselves as the Turtle Clan.

In 2021, the Ramapo Nation worked with the New Jersey Land Conservancy to form the Ramapo Munsee Land Alliance, a nonprofit land trust that will allow the Ramapo to begin assembling land for the Ramapo Nation. The first purchase was 54 acres in Mahwah Township, New Jersey and Rockland County New York, known as Split Rock Mountain. The land trust allows the Ramapo Nation to have full ownership and decision making on their lands, allowing them to honor their culture and traditions³⁰.

²⁸ North Jersey Highlands Historic Society, “Brief History,” (2014). Retrieved from <http://www.ringwoodmanor.org/north-jersey-highlands-historical-society.html>

²⁹ Kraft, Herbert C. (1986), *The Lenape: Archaeology, History, and Ethnography*, New Jersey Historical Society, Newark, NJ. p. 241, ISBN 978-0-911020-14-4

³⁰ *The Land Conservancy of New Jersey website* - <https://www.tlc-nj.org>

Mining Settlement History



In the mid-16th century, the Ringwood area was recognized to have large deposits of iron ore sparking settlements founded around mining operations. The Ogden family of Newark built a blast furnace around 1742 creating a burgeoning iron industry in the Ringwood area. The Ogden furnace was the first of many blast furnaces that would eventually be built in the area. In 1764, a British firm called the American Iron Company bought the ironworks and brought in Peter Hasenclever to run it. Hasenclever built more furnaces in the immediate area and established Ringwood Manor. Miners and workers of the forges and furnaces lived on the manor, and surrounding lands were rented to farmers and woodsmen.³¹ The London, Roomy and Hope mines were built by the American Iron Company.

In 1767, Hasenclever was relieved of his duties by the American Iron Company, and in 1771 a Scotsman named Robert Erskine was brought in to become the new manager of the ironworks. When the Revolutionary war broke out, Erskine sided with the colonists, and he was commissioned as Surveyor-General of the Continental army by George Washington. In 1782, the New Jersey Legislature expropriated the mines and furnaces from the American Iron Company, but they laid idle until after the war. In 1807, Martin J. Ryerson bought the mines and furnaces in Ringwood and ran a profitable business. However, in 1839, after his death, the company went into bankruptcy.

In 1853, the Ringwood mines and furnaces (the furnace was at the Long Pond Ironworks, which today lies in West Milford) were bought by Peter Cooper of New York. Cooper was a New York industrialist who founded the Cooper Union, and operated the Trenton Iron Company. Cooper brought in Abram S. Hewitt as secretary and business manager for the operation. During the Civil War Cooper, Hewitt, and Company supplied gun carriages, and the Union Army's mortars.

In 1875, the Montclair Railway Company built a line from Pompton to Greenwood Lake with a spur to Ringwood (the railroad would become the Erie's Greenwood Lake Branch), but it was too late. By the 1880s, iron ore from the Ramapos was replaced by ore from Minnesota. Peter's Mine, the largest of the Ringwood mines, was worked on and off until 1931. During World War II, Peter's Mine was refurbished by the federal government and was to be used as a defense resource, but no ore was actually mined. After the war, the mine was sold to private interests, and passed through several companies before its closure in the early 1960's. After passenger service was discontinued, the rail line was abandoned, and removed.

³¹ Ringwood, New Jersey, "The Iron Industry," n.d. Retrieved from <http://www.westfieldnj.com/whs/history/ringwood>
Photo: Peter's Mine in the early 1800s

BOROUGH OF RINGWOOD, PASSAIC COUNTY
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In 1918, Ringwood Borough was incorporated by an act of the New Jersey Legislature from portion of the Township of Pompton. The Borough covers 28 square miles of land and lakes and is known as the “heart of the highlands” in Passaic County.

The Mansions

Ringwood Manor. Photo credit: Daniel Case.



During the 19th century, several wealthy families owned large estates in Ringwood. Abram S. Hewitt married Peter Cooper’s daughter, and built the present Ringwood Manor in 1878 on the site of the first manor house built by Hasenclever. The house still stands today and is a major attraction in the area. In addition, Hewitt built another manor house on an adjoining property as a wedding gift for his daughter. This house

was sold in 1930 to the Franciscan Sisters as a convent and was occupied until 2015. The property was sold to a private developer in 2016. The Borough is currently reviewing this area for potential redevelopment opportunities.

Ringwood Manor is a National Historic Landmark District, having historical importance spanning from Native American occupation through the early 20th century. The surrounding Ramapo Mountains’ rich magnetite iron deposits made the area a crucial iron supplier and became the home to a succession of ironmasters for over two hundred years. During the Gilded Age, Ringwood Manor became a large summer estate for partners Peter Cooper and Abram S. Hewitt and their families. In 1938, the house, and its contents, and the surrounding property were donated by the family to the State of New Jersey as a museum and a state park. With original historical structures, gardens, and landscapes on 582 acres and extensive historical collections illustrative of family life, community, industry and culture, Ringwood Manor is a unique repository of American history. Today, Ringwood Manor is a central part of Ringwood State Park and administered by the NJ Department of Environmental Protection, Division of Parks and Forestry.³² Ringwood Manor and its grounds are examples of Victorian wealth and lifestyle.

In the early part of the 20th century, Francis Lynn Stetson, a wealthy corporate lawyer for J.P. Morgan bought 1,705 acres on the slopes of the Ramapos in Ringwood and built a farm estate and mansion called Skylands Manor. This manor was rebuilt in 1924 by Clarence Lewis, who acquired the property after Stetson’s death. In 1966, Skylands Manor was bought by the State of New Jersey under the Green Acres program. Today, Skylands Manor is a state botanical garden (Lewis was an avid gardener, and turned Skylands

³² North Jersey Highlands Historical Society, “Ringwood Manor,” (2014). Retrieved from <http://www.ringwoodmanor.org/north-jersey-highlands-historical-society.html>

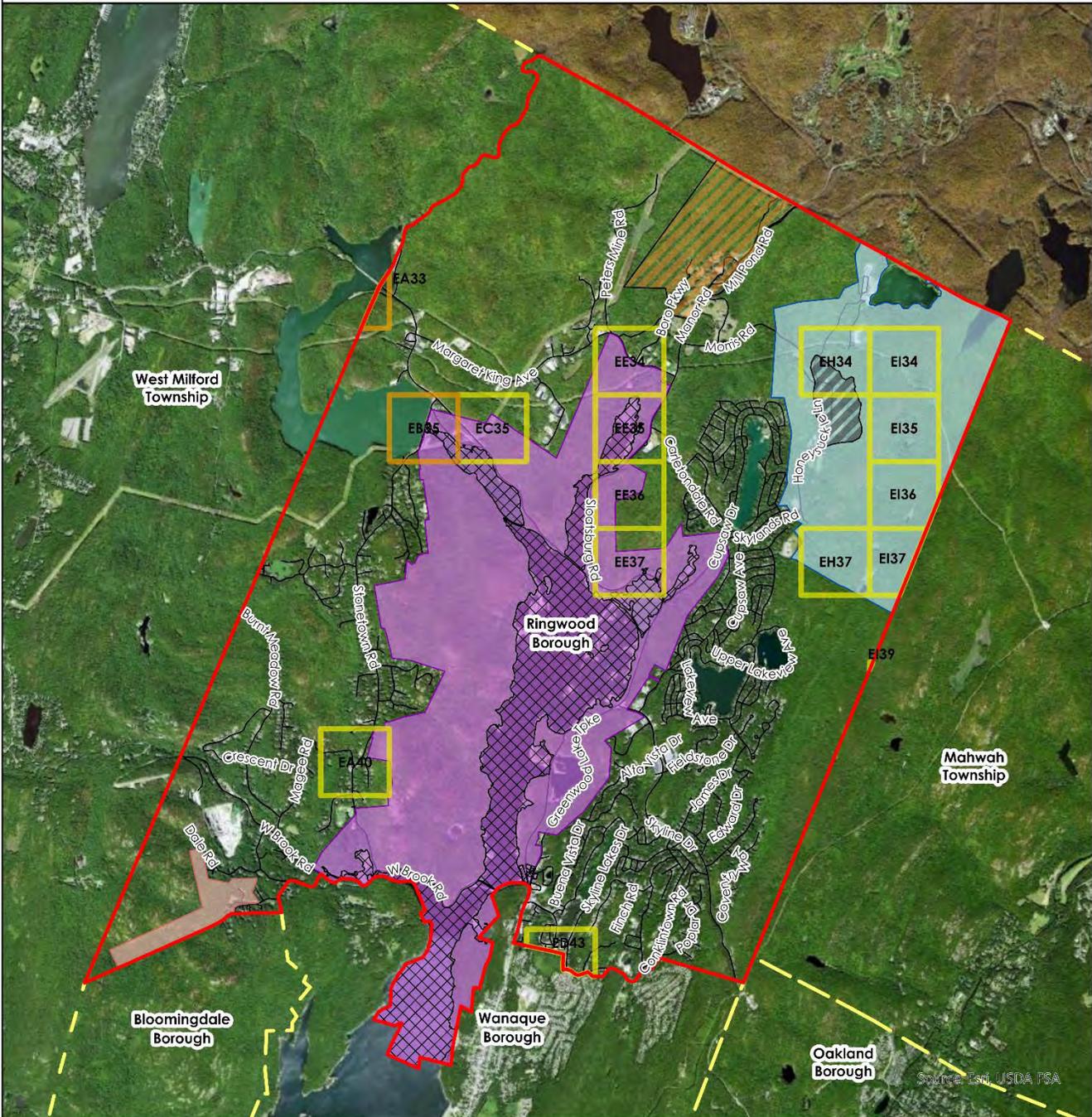
Manor into a living showplace during his lifetime). The 1924 mansion still stands, and is open to the public several times a year.

Highlands Regionally Recognized Historic & Cultural Sites

The Highlands Regional Master Plan (RMP) identified protection and preservation of the historic, cultural and archaeological resources of the Highlands as a resource protection goal. In compliance with the directive of the Highlands Act, to assess the “scenic, aesthetic, cultural, historic, open space, farmland, and outdoor recreation resources of the region. The Highlands Region Historic, Cultural, and Archaeological Resources data layer for Ringwood, as of November 2023, is depicted in **Figure 16**. According to the RMP there are 13 historic properties and sites and 5 archeological grids. Sites listed in the Highlands Region Cultural Resources Inventory include:

1. Magee Road Bridge (SI&A #1600404) (ID#2402), Magee Road over West Brook
2. Ringwood Manor (NHL, ID#2403), Ringwood State Park and Long Pond Ironworks
3. Ringwood Municipal Building (ID#2404), Margaret King Road
4. Skylands (NJ State Botanical Garden) (ID#2405), Ringwood State Park
5. Wheeler Saw and Feed Mill Archaeological Site (28-Pa-140) (ID#2406)

Figure 16. Archaeological Site Grid and Historic Sites.



<ul style="list-style-type: none"> Ringwood Municipal Boundaries Street Centerlines Archaeological Site Grid Designation Status Eligible Identified Historic Properties Designation Status Eligible - Historic District Eligible - Individual 	<ul style="list-style-type: none"> Listed - Individual NHL - Individual Historic Districts (all eligible, none listed) Camp Midvale, Nature Friends of America Historic District Skylens Farm Cultural Landscape Wanaque Reservoir Historic District 		
<p>Prepared November 2023</p>		<p>Data: This map was developed using New Jersey Department of Environmental Protection (NJDEP) Geographic Information System digital data, but this secondary product has not been verified by the NJDEP and is not endorsed. Archaeological Grid: NJDEP, Natural and Historic Resources (NHR), Historic Preservation Office (HPO), "Archaeological Site Grid of New Jersey," ed. 20231002, 2023. Municipal Boundaries, Street Centerlines: NJ Office of Information Technology, Office of GIS (OGIS)</p>	

Five Distinct Neighborhood Sections of Ringwood

The Borough of Ringwood has five distinct neighborhood sections that are loosely defined by their location. Three of these neighborhood sections are related to the lake they surround and residents living in those neighborhoods have the option of joining the local lake association. The two other sections are in the more mountainous areas of the Borough.

The oldest neighborhood section of Ringwood is called Upper Ringwood and lies to the very north of the Borough. This is where the first mining operations were started and it is the first known location in Ringwood where European settlers arrived. This is where many members of the Ramapo Lenape Nation's Turtle Clan reside today.

The neighborhood section of Ringwood west of the Wanaque Reservoir is called Stonetown. There are a few small lakes in this section of town. The landscape is very hilly and the entire neighborhood is surrounded by preserved open space. There is a quarry located in this section of town that has been run by Braen Stone since 1990. The quarry sells crushed granite to various customers. There are occasional blasts that can be heard and felt throughout the area.

The lake neighborhood sections, going from south to north start with Skyline Lakes. Skyline lakes are two lakes that are separated by a small dam. Both the upper and lower portions of the lake are narrow "finger" lakes with homes on either side. Further north are the two lakes in the Erskine Lakes community, Upper Erskine and Erskine lakes. A little further north is Cupsaw Lake. Cupsaw used to be part of the Erskine Lakes Homeowner Association, but separated from Erskine in the 1940's to form its own association. All three lakes are private associations that charge for membership. Residents in each area can join the lake associations, but membership is not a requirement.

The Wanaque Reservoir

View of Wanaque Reservoir from the Wanaque Ridge Trail in Ramapo Mountain State Forest, New Jersey. Photo credit: Famartin.



In 1908, the State Water Supply Commission began work on a comprehensive project to develop water sources in North Jersey. By 1915, seven towns had joined the cause, and in 1916, the North Jersey District Water Supply Commission was created. Ringwood was slated as their target for a reservoir, so in 1920, construction began. During construction, properties had to be acquired and demolished, roadways

were moved, seven dams were built, a railroad was realigned, and cemeteries were relocated. In 1928, the project was completed, and it took another year for the works to fill. During this period, Ringwood's appearance took on a new look as sections of the municipality disappeared under the newly built reservoir. By 1930, the reservoir was full, and became known as the Wanaque Reservoir. The area covered is 1.5 miles at its widest point, and is six miles long. The average depth is 37 feet, and the deepest section is 90 feet.³³

In the 1980's a second reservoir was built in Ringwood above the current one in order to expand the region's water supplies even further. This new reservoir is smaller than the Wanaque Reservoir, being about two (2) miles long, and 0.75 miles wide. It is held back by a single 300-foot-high damn built between two (2) mountains. It was named the Monksville reservoir after the name of the section of the Borough that was deconstructed.

³³ Ringwood, New Jersey, "The Iron Industry," n.d. Retrieved from <http://www.westfieldnj.com/whs/history/ringwood>

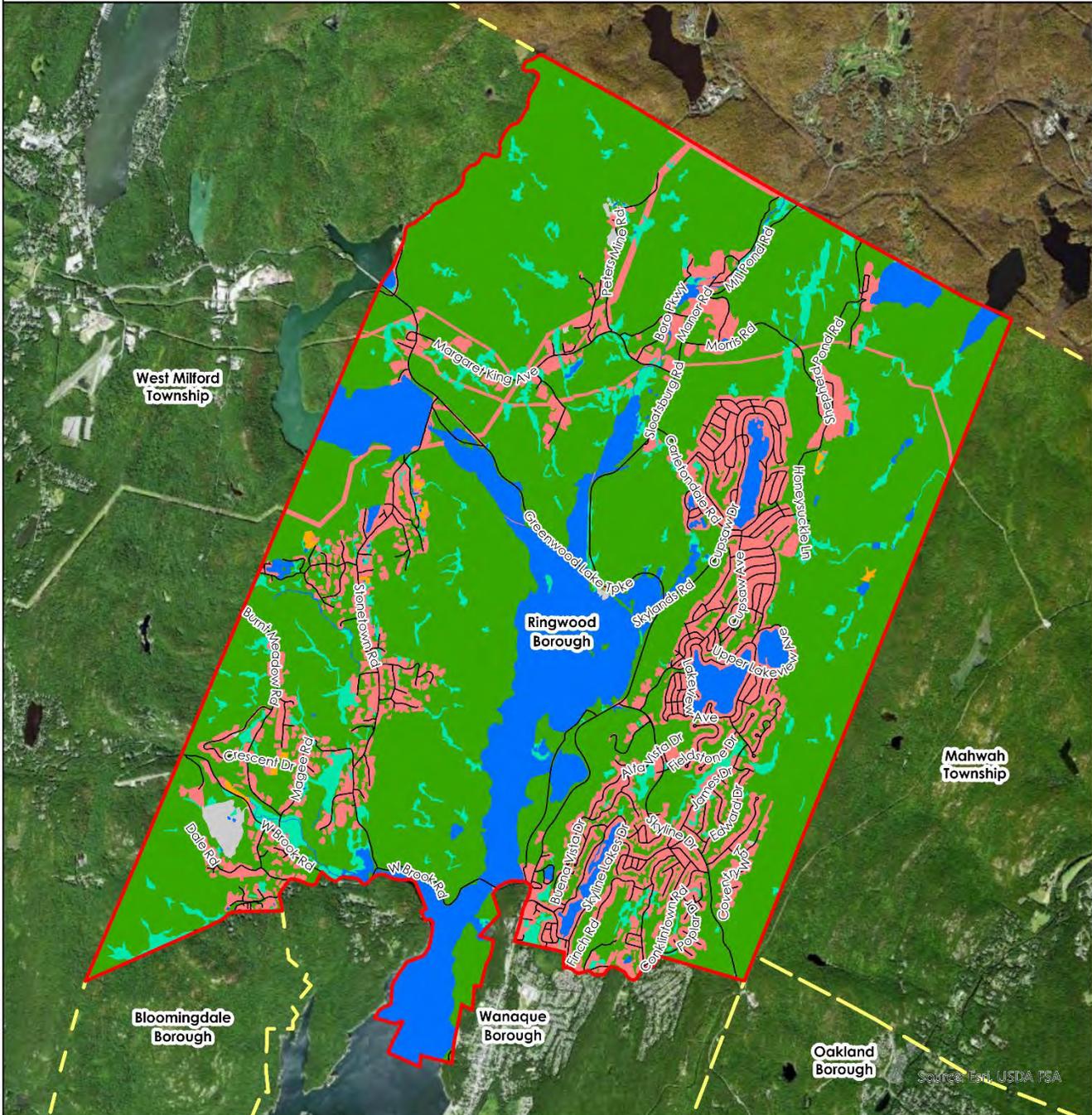
VI. Land Use

Existing Land Use

Figure 17 illustrates the existing land uses in Ringwood. Forested land comprises the majority of the Borough's land, with approximately 11,805.3 acres of land, or about 64.7 percent of the total land in the Borough. With respect to acreage, the next largest uses within the Borough are those that fall into the urban category (3,149.8 acres, or 17.3%), and water (2,240.1 acres, or 12.3%). Agricultural uses comprise approximately 35.3 acres (0.2%) of Ringwood's land while barren land comprises 78.7 acres (0.4%). **Figures 18** through **21** are zoomed-in maps of **Figure 17**.

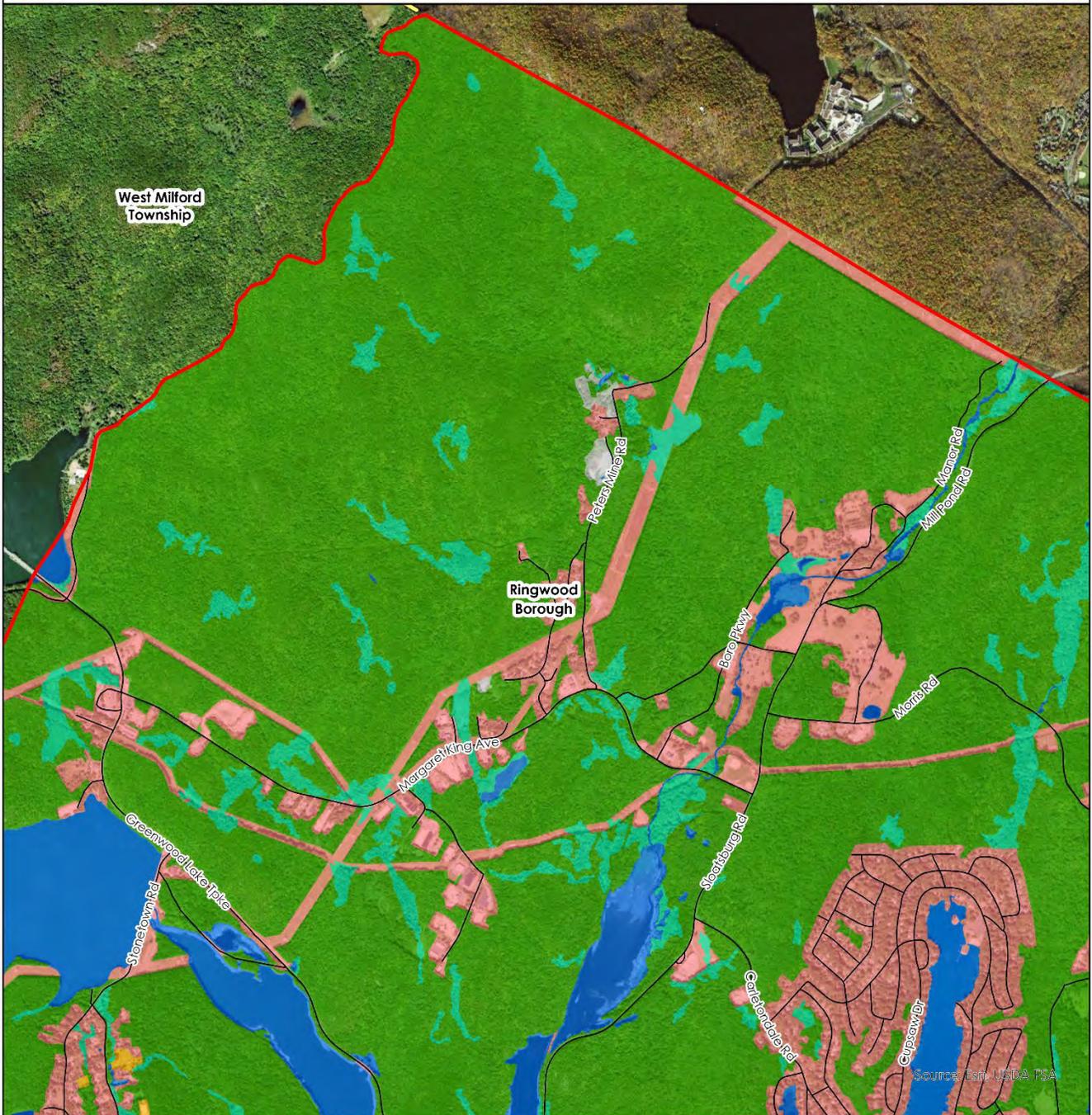
BOROUGH OF RINGWOOD, PASSAIC COUNTY
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Figure 17. Existing Land Use / Land Cover.



<ul style="list-style-type: none"> █ Ringwood █ Municipal Boundaries — Street Centerlines 2015 Land Use / Land Cover █ Agriculture █ Barren Land █ Forest █ Urban █ Water █ Wetlands 		
<p>Prepared November 2023</p>	<p>Data: This map was developed using New Jersey Highlands Council Geographic Information System digital data, but this secondary product has not been verified by the Highlands and is not endorsed. Land Use/Land Cover: State of New Jersey Department of Environmental Protection (NJDEP), "Land Use / Land Cover Dataset," 2015. Municipal Boundaries, Street Centerlines: NJ Office of Information Technology, Office of GIS (OGIS)</p>	

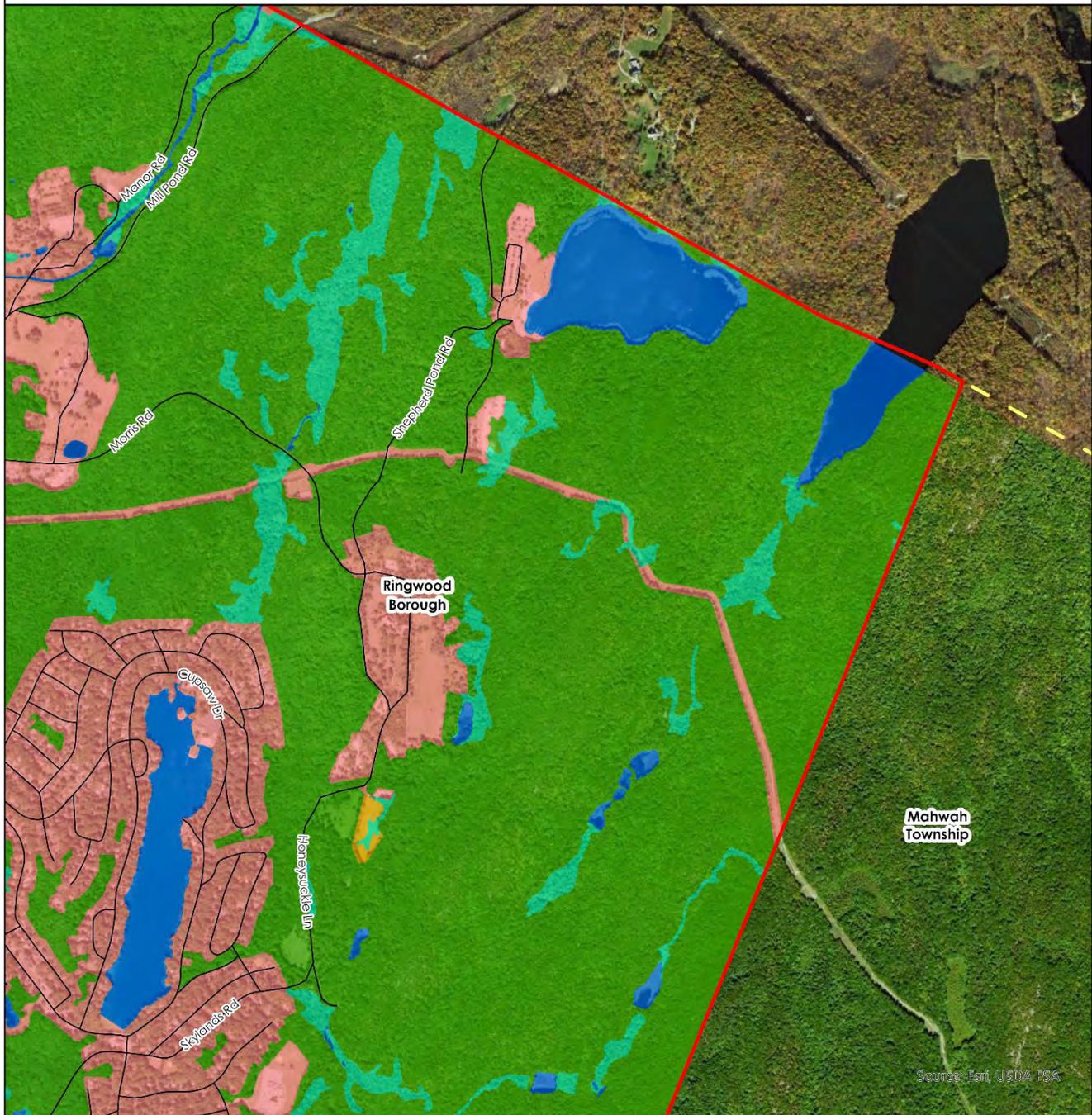
Figure 18. Land use in northwest Ringwood.



Source: Esri, USDA FSA

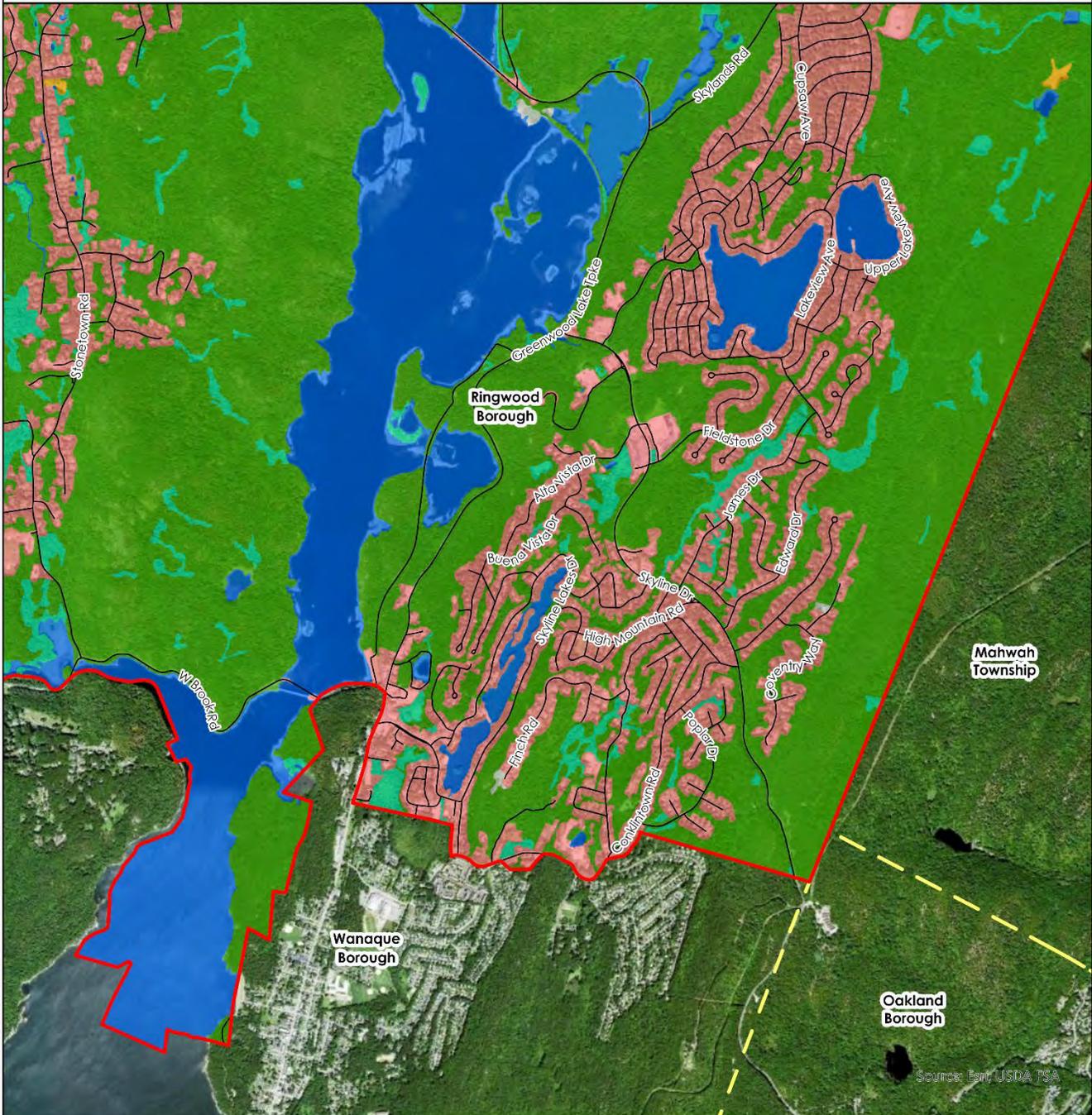
<ul style="list-style-type: none"> — Ringwood — Municipal Boundaries — Street Centerlines 2015 Land Use / Land Cover ■ Agriculture ■ Barren Land ■ Forest ■ Urban ■ Water ■ Wetlands 			
<p>Prepared November 2023</p>	<p>Data: This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by the NJDEP and is not endorsed. Land Use: State of New Jersey Department of Environmental Protection (NJDEP), "Land Use / Land Cover Dataset," 2015. Municipal Boundaries, Street Centerlines: NJ Office of Information Technology, Office of GIS (OGIS)</p>		

Figure 19. Land use in northeast Ringwood.



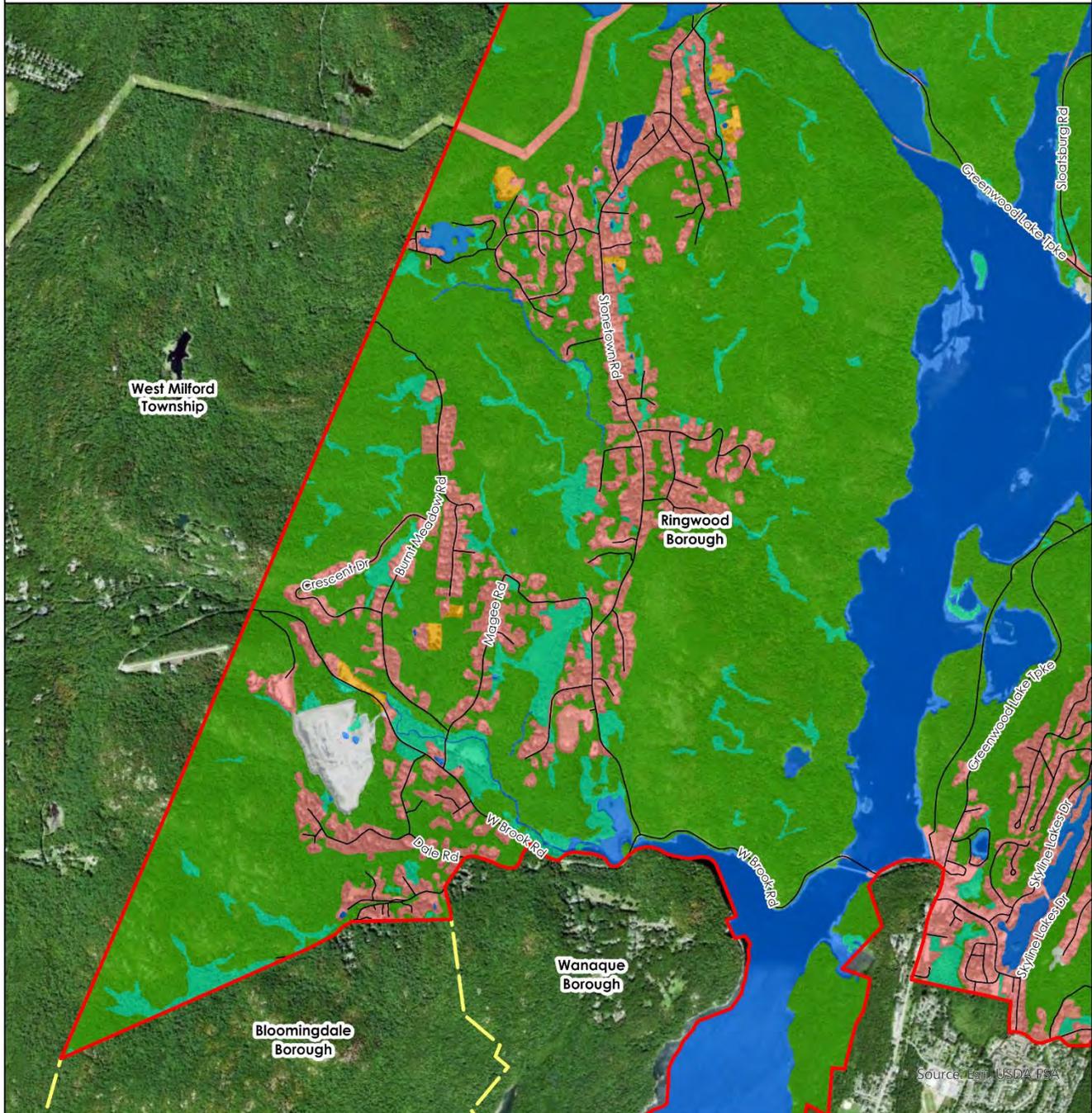
<ul style="list-style-type: none"> ▬ Ringwood ▬ Municipal Boundaries ▬ Street Centerlines 2015 Land Use / Land Cover ■ Agriculture ■ Barren Land ■ Forest ■ Urban ■ Water ■ Wetlands 			
<p>Prepared November 2023</p>		<p>Data: This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by the NJDEP and is not endorsed. Land Use: State of New Jersey Department of Environmental Protection (NJDEP), "Land Use / Land Cover Database," 2015. Municipal Boundaries, Street Centerlines: NJ Office of Information Technology, Office of GIS (OGIS)</p>	

Figure 20. Land use in southeast Ringwood.



<ul style="list-style-type: none"> ▬ Ringwood ▬ Municipal Boundaries ▬ Street Centerlines 2015 Land Use / Land Cover ■ Agriculture ■ Barren Land ■ Forest ■ Urban ■ Water ■ Wetlands 			
<p>Prepared November 2023</p>		<p><small>Data: This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by the NJDEP and is not endorsed. Land Use: State of New Jersey Department of Environmental Protection (NJDEP), "Land Use / Land Cover Dataset," 2015. Municipal Boundaries, Street Centerlines: NJ Office of Information Technology, Office of GIS (OGIS)</small></p>	

Figure 21. Land use in southwest Ringwood.



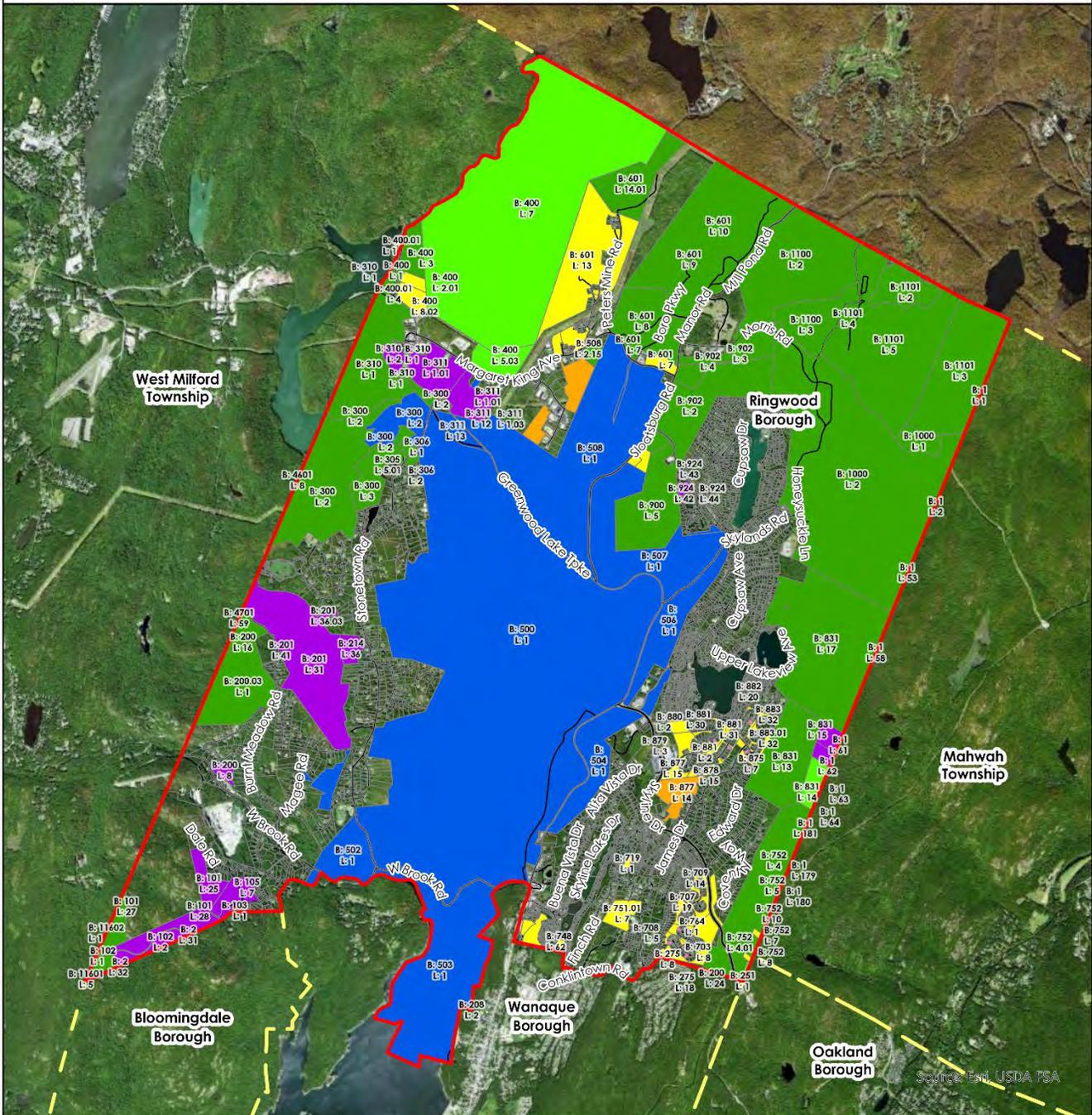
Source: Esri, USDA, FSA

<ul style="list-style-type: none"> ▬ Ringwood - - - Municipal Boundaries — Street Centerlines 2015 Land Use / Land Cover ■ Agriculture ■ Barren Land ■ Forest ■ Urban ■ Water ■ Wetlands 			
<p>Prepared November 2023</p>		<p>Data: This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by the NJDEP and is not endorsed. Land Use: State of New Jersey Department of Environmental Protection (NJDEP), "Land Use / Land Cover Dataset," 2015. Municipal Boundaries, Street Centerlines: NJ Office of Information Technology, Office of GIS (OGIS)</p>	

Open Space

Ringwood contains preserved open space under state, county, municipal, private, non-profit, Transfer of Development Rights (TDR), and Watershed Management Area (WSMA) ownership (**Figure 22** and **Table 5**). The majority of preserved open space is under WSMA ownership – the North Jersey District Water Supply Commission (NJDWSC) operates the Wanaque Reservoir and associated water utilities (6,255.02 acres, or 34.31% of all open space in the Borough). The State of New Jersey owns 5,255.63 acres (28.83%), while the Borough only owns 506.64 acres (2.78%). Furthermore, approximately 1,366.79 acres (7.5%) is under the ownership of Passaic County, and about 664.64 acres (3.65%) is owned by non-profit organizations. Just less than one percent (0.55%) or 101.14 acres of all preserved open space within Ringwood are designated as TDRs.

Figure 22. Preserved Lands.



<ul style="list-style-type: none"> ■ Ringwood Municipal Boundaries Street Centerlines Parcels 	<p>Open Space Type</p> <ul style="list-style-type: none"> State County Municipal Private Non-profit TDR WSMA 		
<p>Prepared November 2023</p>		<p>Data: This map was developed using New Jersey Highlands Council Geographic Information System digital data, but this secondary product has not been verified by the Highlands and is not endorsed. Preserved Lands: New Jersey Highlands Council, "Preserved Lands," 2008, updated 2023. Municipal Boundaries, Street Centerlines: NJ Office of Information Technology, Office of GIS (OGIS)</p>	

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Table 4. Preserved Lands by Ownership.

Type	Block	Lot	Open Space Name	Acres
STATE	101	27	Norvin Green State Forest	30.84
	102	1	Norvin Green State Forest	17.25
	200.03	1	Norvin Green State Forest (QFarm)	158.93
	200.03	16	Norvin Green State Forest	29.25
	300	2	Long Pond Ironworks State Park	290.098
	300	3	Long Pond Ironworks State Park	65.28
	305	5.01	Long Pond Ironworks State Park	4.44
	306	1	Long Pond Ironworks State Park	14.62
	306	2	Long Pond Ironworks State Park	0.22
	307.01	2	Long Pond Ironworks State Park	3.91
	307.01	3	Long Pond Ironworks State Park	0.62
	310	1	Long Pond Ironworks State Park	213.97
	310	3.01	Long Pond Ironworks State Park	2.09
	310	4	Long Pond Ironworks State Park	0.79
	311.01	15	Long Pond Ironworks State Park	2.46
	311.02	15	Long Pond Ironworks State Park	0.86
	400	1	Long Pond Ironworks State Park	3.65
	400	3	Long Pond Ironworks State Park	38.93
	400.01	1	Long Pond Ironworks State Park	10.82
	400.01	4	Long Pond Ironworks State Park	0.09
	508	2.15	Ringwood State Park	10.68
	601	5	Ringwood State Park	0.13
	601	8	Ringwood State Park	146.58
	601	9	Ringwood State Park	2.61
	752	4	Ramapo Mountain State Forest	199.05
	752	4.01	Ramapo Mountain State Forest	0.22
	752	5	Ramapo Mountain State Forest	5.03
	752	10	Ramapo Mountain State Forest	2.59
	753	3	Ramapo Mountain State Forest	25.24
	831	13	Ramapo Mountain State Forest	171.89
831	17	Ramapo Mountain State Forest	450.28	
STATE	900	1	Ringwood State Park	13.6
	900	5	Ringwood State Park	171.50
	902	2	Ringwood State Park	190.55
	902	3	Ringwood State Park	70.28
	902	4	Ringwood State Park	17.06
	1000	1	Ringwood State Park	31.24
	1000	2	Ringwood State Park	1,035.39
	1100	2	Ringwood State Park	332.84
	1100	3	Ringwood State Park	107.20
	1101	2	Ringwood State Park	72.95
	1101	3	Ringwood State Park	271.50
	1101	4	Ringwood State Park	5.97
1101	5	Ringwood State Park	451.93	
COUNTY	400	5.03	Tranquility Ridge Addition	51.77
	400	7	Tranquility Ridge	1,281.36
	752	9	Ramapo Mtn Add. / Glen Gray	2.37
	831	14	Ramapo Mtn Add. / Glen Gray	31.27
MUNICIPAL	400	2.01	(QFarm)	10.50
	400	8.02	(QFarm)	23.41
	507	2	--	8.65

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Type	Block	Lot	Open Space Name	Acres
MUNICIPAL	507	3	--	3.60
	600	13	--	0.87
	601	7	Baseball Field Lighting	12.94
	601	12	--	6.87
	601	13	--	188.99
	601	14	--	35.65
	603	2	--	0.44
	603	13	--	15.61
	604	1	--	0.58
	604	2	--	0.97
	400	8	Painted Forest	10.66
	707	19	Pioneer Park	7.43
	708	5	Painted Forest	4.69
	709	14	Pioneer Park	14.18
	719	1	Martini Field	2.45
	748	1	--	13.54
	748	62	Skyline Field	3.04
	748	82	--	4.33
	751.01	7	--	26.92
	752	1	--	7.88
	752	6	Fieldstone - Comp	1.99
	752	8	Fieldstone - Comp	1.74
	753	1	Painted Forest	21.65
	764	1	Painted Forest	4.85
	877	14	Fieldstone	3.19
	877	15	Skyline Vista	7.22
	878	7	Fieldstone	6.05
	878	15	Fieldstone	5.14
	878	16	Fieldstone	1.94
	879	3	Fieldstone	12.17
	880	2	Fieldstone	9.81
	881	2	Fieldstone	1.3
881	30	Fieldstone	7.48	
881	31	Fieldstone	3.46	
882	20	Fieldstone	3.71	
883	32	Fieldstone - P/Div	5.68	
883.01	32	Fieldstone	4.51	
NON-PROFIT	101	25	Weis Ecology Center	36.51
	101	28	Weis Ecology Center	50.27
	102	2	Weis Ecology Center	26.50
	103	1	Weis Ecology Center	0.24
	105	7	Weis Ecology Center	34.89
	105	7.01	--	4.93
	200	8	Wuester	11.56
	201	31	Tory Rocks / Levkovitz-Wyznoke Highlands	298.57
	201	36.03	Burnt Meadow Brook	3.51
	201	41	Tory Rocks / Levkovitz-Wyznoke Highlands	1.03
	214	36	Twin Brooks	19.21
	310	2	Highlands Meadow / Passaic River Preservation	16.58

BOROUGH OF RINGWOOD, PASSAIC COUNTY
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Type	Block	Lot	Open Space Name	Acres
	311	1.01	Waterview	68.94
	311	1.03	Waterview 2	48.73
	311	12	--	2.11
	311	13	--	8.65
	311	14	Waterview 2	2.32
	831	15	--	11.96
	831	16	--	18.77
	924	42	Hickory Road / Passaic River Preservation	0.83
	924	43	Hickory Road / Passaic River Preservation	1.45
	924	44	Hickory Road / Passaic River Preservation	3.60
TDR	508	2	--	39.42
	508	2.29	--	19.36
	877	16	--	42.35
WISMA	100	16	--	29.75
	106	1	Wanaque Reservoir	1,561.66
	300	3.01	Long Pond Ironworks State Park	74.79
	311	6.01	--	3.72
	500	1	Wanaque Reservoir	2,899.67
	501	1	Wanaque Reservoir	5.04
	502	1	Wanaque Reservoir	90.67
	503	1	Wanaque Reservoir	467.86
	504	1	Wanaque Reservoir	127.65
	505	1	Wanaque Reservoir	16.53
	506	1	Wanaque Reservoir	127.37
	507	1	Wanaque Reservoir	278.94
	508	1	Wanaque Reservoir	628.04
	508	5		4.79
	508.01	1	Wanaque Reservoir	24.68
	601	2	Ringwood State Park	0.30
924	22		4.17	

Data retrieved from New Jersey Highlands Council dataset, "Preserved Lands" prepared in 2008 and updated in 2023; 2023 MOD-IV tax data.

Ringwood Trails and Viewpoints

Ringwood is home to many state, county, and local parks as well as just under 70 miles of trails that connect regionally via the Highlands Trail and even provide the opportunity to connect to the Appalachian Trail. The Borough also has many viewpoints on hills and near other scenic areas. This section of the ERI will focus on those recreational assets both in Ringwood and a short hike from Ringwood trailheads.

Any development in Ringwood should take into consideration the many trail corridors that connect Ringwood with each town it borders. **Figure 23** illustrates the vast trail system that exists within the Borough. Trails range from portions of the Appalachian Trail, the Highlands Trail, to smaller, local trails at municipal and county parks.

The Commission should also reference viewpoints and consider if the development will degrade the view with a human-made structure that contrasts with the existing natural state.

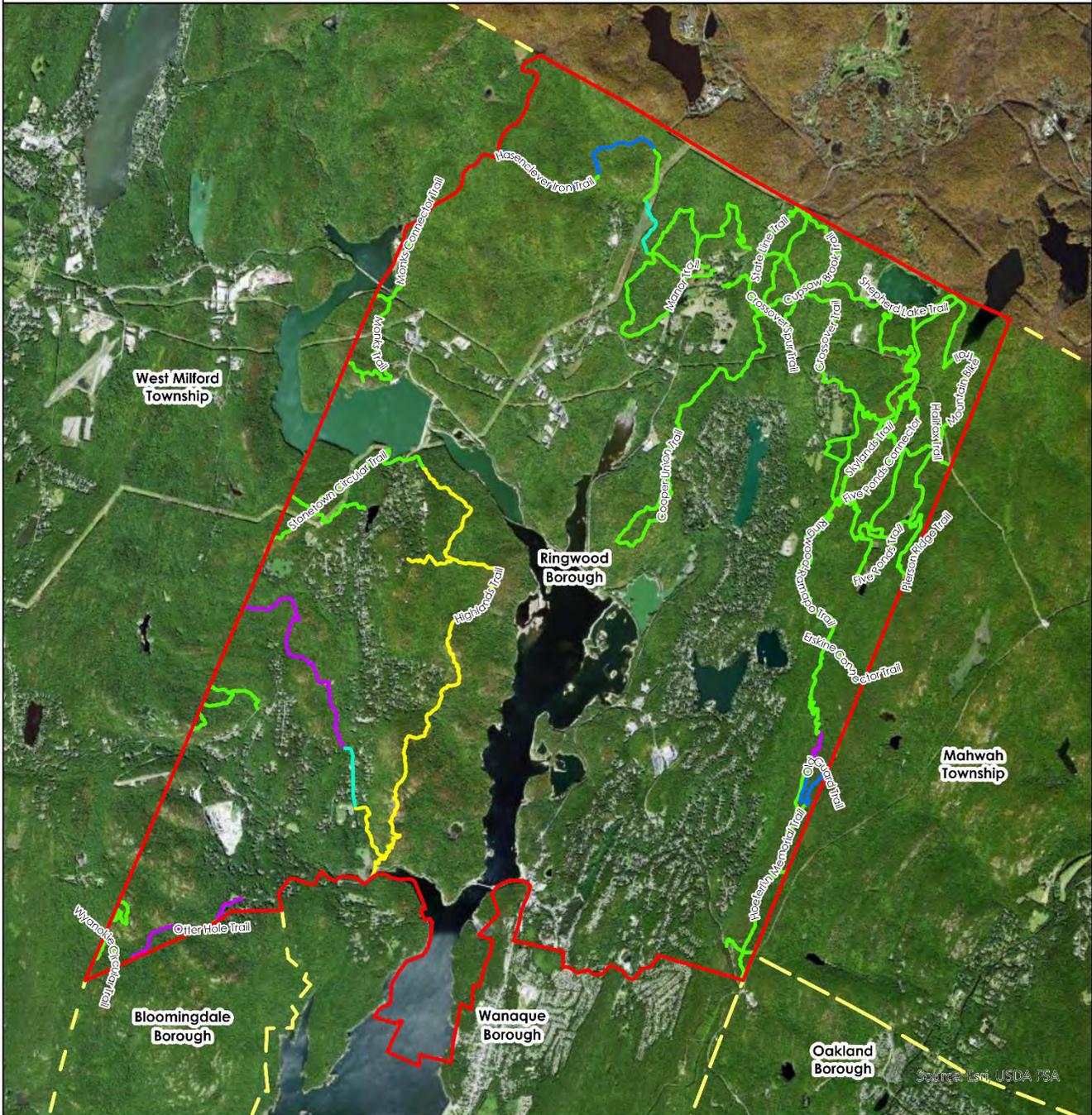
The main parks in Ringwood starting from the northwest corner and going clockwise are:

- Tranquility Ridge County Park;
- Ringwood State Park;
 - Ringwood Manor;
 - Shepherd Lake;
 - New Jersey State Botanical Gardens;
- Ramapo Mountain State Forest;
- Norvin Green State Forest;
- Stonetown Circular Trail on the North Jersey District Water Supply Commission Land; and
- Long Pond Ironworks State Park.

In addition to these parks, the Monksville Reservoir and the Wanaque Reservoir add to the many lakes provide lake views for almost every viewpoint in Ringwood.

BOROUGH OF RINGWOOD, PASSAIC COUNTY
 ENVIRONMENTAL RESOURCE INVENTORY

Figure 23. Trails.



<ul style="list-style-type: none"> ▭ Ringwood ▭ Municipal Boundaries Trails — Regional — State — County — Non Profit — Private 		
<p>Prepared November 2023</p>		<p>Data: This map was developed using New Jersey Highlands Council Geographic Information System digital data, but this secondary product has not been verified by the Highlands and is not endorsed. Trails, Municipal Boundaries, Street Centerlines: NJ Office of Information Technology, Office of GIS (OGIS)</p>

Tranquility Ridge County Park

Tranquility Ridge County Park is a vast track of undeveloped land that was once part of the Sterling Forest Corporation. The park is best accessed from the end of Beech Road adjacent to the Monksville Reservoir northwest end. The yellow-marked Hasenclever Iron Trail is the only marked trail in the Ringwood section of the park, but just over the West Milford border is the Sterling Ridge Trail that leads to Beech Mountain, part of the namesake Tranquility Ridge.

Besides the marked trails, there are many forest roads in various conditions from frequently used to barely perceptible. Right on the New York border is a viewpoint with expansive south views. The viewpoint is in Ringwood, but the easiest path is to approach it from New York.

Mountain view by New York border, facing south. December 2020.



Further south in Tranquility Ridge County Park, a hiker can easily get lost as some roads dead end and others just fade away into the brush. This area is a prime spot for future trail development. Traces of Native American activity can be found here as well as abandoned mines and, more recently, utility rights-of-way.

Another unmarked viewpoint is approximately ½ mile east of the north reach of Monksville Reservoir. This would make a nice addition to the future trail and is already serviced by an active forest road.

Mountain view in southern part of Tranquility Ridge County Park, facing west. June 2023.



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Abandoned Mine in Tranquility Ridge. June 2023.



Ringwood State Park

Ringwood State Park stretches across the northern part of Ringwood, providing trails, boating, active estates, the state's botanical gardens, hunting, fishing, and camping, as well as many other outdoor activities and features. The Hasenclever Iron Trail connects from Tranquility Ridge County Park into the Ringwood Manor section of Ringwood State Park.

Ringwood Creek in the Autumn. October, 2021.



Ringwood Manor

Ringwood Manor is a National Historic Landmark District, having historical importance spanning from Native American occupation through the early 20th century. The manor itself was owned by Peter Cooper and Abram S. Hewitt, whose family eventually donated the Estate and surrounding property to the state of New Jersey. The manor and grounds host iron artifacts, tours, special events, old-time baseball games as well as art shows in the adjacent carriage house.

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The park is also adjacent to the Borough fields behind the Ringwood Borough Hall, the blue manor trail will allow hikers to see the less travelled parts of the estate before coming to the manor house and Sally's Pond. Venturing behind the manor and its sculpted gardens the visitor will find fields, a large playground and plenty of riverside picnicking spots along Ringwood Creek.

Sallys Pond Waterfall. April 2022.



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Shepherd Lake

The Shepherd Lake section of the Ringwood State Forest begins on the east side of Sloatsburg Road. Hikers can use the Ringwood-Ramapo Trail or Crossover Trail to journey from Ringwood Manor into the Shepherd Lake Section. This begins a continuously wooded area stretching from New York into Ringwood and down to Oakland. There are dozens of trails and forest roads for people to follow. This section of the park is known around the state as one of the best mountain biking areas.

The western section is anchored by Cupsaw Mountain. It offers one of the rare east-facing viewpoints within Ringwood. This can be found up the Cooper Union Trail (yellow) about 10 minutes from its intersection with Morris Road.

Eastern view from Cooper Union Trail. January 2018.



Three miles down the Cooper Union Trail is a lollipop loop that takes one to the summit of Governor Mountain. This is a very popular viewpoint offering expansive views of the Wanaque Reservoir and the three peaks of Stonetown. Much of this property is protected by the North Jersey District Water Supply Commission, resulting in views that are relatively free of buildings or structures. This section of the trail can be accessed from Carltondale Road and is popular with local residents.

A hiker relaxing at the Governor's Mountain viewpoint. October 2022.



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Back up to the north, at Shepherd Lake itself, plenty of activities are available to connect one to nature. There are boating concessions with a public launch, large fields, a playground, and a shooting range. Many trails connect through this area and viewpoints abound along the southern edge of Shepherd Lake. The Borough as well as groups such as mountain bikers and the Boy Scouts of America host events in this area.

Hikers can take wide trails over to Potake Pond. During winter, these trails are excellent for cross country skiing, offering miles of beautiful scenery far from the crowds typically found at commercial ski resorts. Walking along Pearson Ridge, one feels like they could be in a primitive forest. There are no human structures in the western view. Further up from the ridge just across the Mahwah border is Ilgenstein Rock, offering views of New York City.

New Jersey State Botanical Gardens (Skylands Manor)

Just south of Shepherd Lake is the New Jersey State Botanical Gardens and the Skylands Manor. The sprawling estate and gardens is one of the gems of the Highlands Preservation Region. Large gardens have something to offer in every season. The manor is frequently rented for special events due to its excellent remote location. Miles of trails

Warm Puppy Rock, facing south. May 2021.



can accommodate the beginner hiker up to the expert hiker looking for a challenge. Warm Puppy Rock is an easily accessible viewpoint from the gardens.

While there is plenty of parking for out-of-town visitors, many Ringwood residents take advantage of the open space behind their houses to walk and bike into the beauty of the gardens. These paths are available through some private and public land. Any development planned in the border areas should be carefully weighed against the benefit of access enjoyed by the adjacent properties.

Ramapo Mountain State Forest

In Ringwood, the Ramapo Mountain State Forest provides a trail corridor to Ramapo Lake in Oakland and on to Wanaque to the south. There are miles of quiet trails with little sign of human development until one has to cross Skyline Drive. Along the route are scenic views to the east and west as one follows this north-south route. Many of these west-facing views overlook the Erskine Lakes area of the Borough.

Viewpoint over Erskin Lakes. November 2022.



As with other areas, many footpaths connect the residents to this corridor and there is even a pathway into the main commercial district on Skyline Drive. A little further down the road is a park and ride offering access to people that may not be able to drive to one of the parks. There is also a wonderful viewpoint over the Wanaque Reservoir that is a short 0.7-mile hike from the park and ride via the Library Trail.

Norvin Green State Forest

In the southwest corner of Ringwood is the New Weis Center that offers nature programs for people of all ages. Just past the Weis Center, hikers can walk up Snake Den Road to a series of trails that connect into Norvin Green State Forest. High Point, just south of the center, is a popular hiking destination with panoramic views of neighboring towns, the reservoir, and New York City. Trails connect further north to a loop around the Monksville Reservoir and into the Long Pond Ironworks State Park. These trails connect to many homes in Stonetown as well as Long Pond Ironworks to the north.

Liberty Trail viewpoint. October 2020.



Stonetown Circular

The Stonetown Circular trail (red blaze) is known throughout the region for its challenging terrain as well as the views that reward the intrepid hiker. Just on the eastern half of the loop, there are three mountains with a view at the top of each. Windbeam Mountain, at the south end of the three, has views in all directions and multiple places to take them in. This route circles the entirety of the Stonetown section of Ringwood and each home located there is a short walk from a trailhead or a foot path connecting to the main trail.

The Stonetown Mountains. From left to right: Windbeam, Bear and Board Mountain. January, 2021.



Long Pond Ironworks State Park

The last park on the clockwise journey around Ringwood is the Long Pond Ironworks State Park. This park starts near the south end of Monksville Reservoir and loops up into West Milford, ending at the New York State border where the protected land continues into the Sterling Forest Park. There are many views along the west side of the Monksville Reservoir, including a panoramic view of the reservoir from Horse Pond Mountain.

Flooded Forest, Monksville Reservoir. October 2022.



The historic area of the park is just over the Ringwood border in West Milford. This park has large swaths of undeveloped land and there are few trails that pass through it. Unmarked forest roads are available for those looking to explore this area and its mines.

Land Use Conservation

With approximately 70 miles of trails, dozens of lakes and ponds, and four State Parks, Ringwood is the perfect town for those who enjoy time in nature. Due to the multiple parks, the reservoirs, and being in the New Jersey Highlands Preservation Area, Ringwood has a natural charm that no other town just 45 minutes from New York City enjoys.

When considering development in the Borough of Ringwood, it is important to make sure it does not impact the overall connection to nature that the Borough offers. This includes protecting access and rights-of-way into the forest and preventing structures from marring the natural views.

Formalization and expansion of the footpaths connecting various parts of the Borough will improve the access to this natural bounty. While mostly enjoyed by residents, careful planning can help out-of-town visitors enjoy the resources while supporting the businesses in the Borough.

Conserving these resources today will ensure that generations to come can continue to be connected to nature without having to leave the tristate area.

VII. Transportation

Ringwood Borough and the Highlands Region is dependent on a variety of transportation modes for work, goods and service transportation and travel. This includes cars, buses, trains, trucks, bicycles and pedestrian activities to carry people and move goods throughout the region. Past development patterns have resulted in a heavy reliance on the automobile, which has adverse impacts on natural resources and overall quality of life. Encouraging and fostering a variety of transportation options in the future will help to alleviate these negative impacts.

Commute

A larger portion of Ringwood residents drove to work alone (79.6%) than the County (64.7%) and the State (60.0%). Workers in the Borough worked from home (11.4%) at a slightly lower rate than the County (14.5%) and the State (22.1%). The Borough carpool rate (5.8%) is about half of rate of the County (10.3%) and the slightly less than the State (7.1%). Less than one percent (1%) of Ringwood's residents walked (0.2%) and used a taxicab, motorcycle, or other transportation means (0.2%), while the County reported 2.9% and 2.5% respectively; and the State reported 2.1% and 2.6% respectively. The Borough has a smaller percentage of residents who opt to take public transportation (excluding taxicabs) (2.5%), whereas the County (4.8%) and the State (5.8%) have larger rates.

There is one (1) bus route – New Jersey Transit Route 196 (New York Skyline Express) – and one (1) bus stop (Ringwood Park and Ride) that reside within the Borough (**Figure 24**). The New York Skyline Express bus route begins in Warwick, with Ringwood being its last stop before ending at the Port Authority in Manhattan, New York. The small percentage of residents who carpool, take public transportation (excluding taxicabs), and work from home reflect the rural nature of Ringwood.

Table 5. Means of Transportation to Work, 2021.

Means of Transportation to Work: 2021						
	Ringwood ⁽¹⁾	%	Passaic County ⁽²⁾	%	New Jersey	%
Workers 16 years and over	6,259	100.0	234,346	100.0	4,390,601	100.0
Car, truck, or van – drove alone	4,987	79.6	151,720	64.7	2,637,504	60.0
Car, truck, or van – carpooled	365	5.8	24,342	10.3	314,368	7.1
Public transportation (excluding taxicab)	158	2.5	11,374	4.8	258,786	5.8
Walked	18	0.2	6,834	2.9	93,985	2.1
Taxicab, motorcycle, or other means	13	0.2	6,032	2.5	114,669	2.6
Worked from home	718	11.4	34,044	14.5	971,289	22.1

Source: U.S. Census Bureau; 2021 American Community 5-Year Estimates

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Compared to the State and County, Ringwood has a smaller portion of residents that work in the state (88.1%) and that work inside the county of residence (41.1%). However, the Borough has a greater percentage of residents who work outside the county of residence (47.1%) as well as those who work outside the state of residence (11.9%) in comparison with the State and County.

Table 6. Place of Work, 2021.

Place of Work: 2021						
	Ringwood ⁽¹⁾	%	Passaic County ⁽²⁾	%	New Jersey	%
Workers 16 years and over	6,259	100.0	234,346	100.0	4,390,601	100.0
Worked in state of residence	5,514	88.1	220,753	94.2	3,986,665	90.8
Worked in county of residence	2,572	41.1	119,047	50.8	2,849,500	64.9
Worked outside county of residence	2,947	47.1	101,706	43.4	1,137,165	25.9
Worked outside state of residence	744	11.9	13,592	5.8	403,935	9.2

Source: U.S. Census Bureau; 2021 American Community 5-Year Estimates

About half (approximately 53.5%) of Ringwood residents who commute to work, have a commute time of less than 34 minutes compared to the county (76.5%). However, approximately 54.7 percent of State residents who commute to work have a commute time of less than 29 minutes. Nearly 30 percent (approximately 29.4%) of the Borough's residents are commuting upwards of 45 minutes to work.

Table 7. Travel Time to Work, 2021.

Travel Time to Work: 2021						
	Ringwood ⁽¹⁾	%	Passaic County ⁽²⁾	%	New Jersey	%
Workers 16 years and over who did not work at home	5,554	100.0	221,068	100.0	3,845,167	100.0
Less than 10 minutes	207	3.7	16,295	7.3	383,750	9.9
10 to 14 minutes	385	6.9	36,526	16.5	474,393	12.3
15 to 19 minutes	620	11.1	34,564	15.6	498,833	12.9
20 to 24 minutes	624	11.2	36,703	16.6	509,038	13.2
25 to 29 minutes	516	9.2	16,911	7.6	248,528	6.4
30 to 34 minutes	637	11.4	28,596	12.9	523,907	13.6
35 to 34 minutes	517	9.3	5,785	2.6	137,848	3.5
40 to 44 minutes	413	7.4	9,788	4.4	190,532	4.9
45 to 59 minutes	801	14.4	14,923	6.7	367,111	9.5
60 or more minutes	834	15.0	20,977	9.4	511,227	13.2

Source: U.S. Census Bureau; 2021 American Community 5-Year Estimates

