Water Supply for Riverdale

Public water supply for Riverdale is divided primarily between municipal wells and private wells. Commercial, industrial, public uses (such as schools) and some residences (primarily high-density developments) are serviced by a Public Community Supply Well. This well (Well 1), is the remaining one of a pair of public community supply wells found within the Borough, and is operated by the Riverdale Borough Water Department. Riverdale's second well was shut down in 2000 due to increasingly lower yields following the flooding of the wellfield in 1984.[20]

Well 1 is located at the terminus of Dalton Drive. Its source is an unconfined aquifer formed of a sediment layer that is made of fine-grained sandstone, mudstone, and siltstone, along with minor dolomitic siltstone and shale.[18] An unconfined aquifer is one that is open to receive water from the surface, and whose water table surface is free to fluctuate up and down, depending on the recharge/discharge rate. There are no overlying "confining beds" of low permeability to physically isolate the groundwater system.[21]

This aquifer has been identified as a sole-source aquifer by the US Environmental Protection Agency (USEPA). A sole source aquifer is one that supplies 50 percent or more of the drinking water for a given aquifer service area for which there are no reasonably available alternative sources, should the aquifer become contaminated. This particular sole source aquifer is identified as part of the "Highlands Basin Aquifer" by the USEPA. Designation as a sole source aquifer is intended to increase protection for an area's ground water resources by requiring USEPA to review any proposed projects within the designated area that are receiving federal financial assistance.[22]

The pumping rate for Well 1 is 330,000 gallons per day, and it is Riverdale's principal source of drinking water, supplying 70% of the Borough. Residents in the northwestern quadrant of the Borough (Mathews Avenue – Rock Creek Terrace area) are supplied by an interconnection with the Passaic Valley Water Commission, drawing from the Wanaque Reservoir. This interconnection is also used during periods of peak summer demand by the rest of the Borough, or in times of well recovery when Well 1 is not being pumped. Riverdale maintains two storage tanks (250,000 and 100,000 gallons capacity) at the pump station on Dalton Drive, providing additional water to handle periods of high demand.[23]

Groundwater within an unconfined aquifer is highly susceptible to contamination because pollutants can easily seep into the spacious pores of the soil. Since Well 2 has already been closed and Riverdale relies on Well 1 to supply clean drinking water, it is important to protect Well 1 and its surrounding area. Options for protection of groundwater are detailed in section VII of this document. [24]

Many residences continue to use private wells for water supply in Riverdale, primarily in the Stoneleigh section of the Borough in the southwest and in the DeGraw Road area of north-central Riverdale.[25] These private wells are located in the Highlands Basin (see Figure IV-12) and are in areas with low recharge rates (see Figure IV-15). In the crystalline Highlands Basin, water is available in weathered and fractured zones of the bedrock, usually within 300 feet of the land surface. Yields from these crystalline rocks are limited by the degree of weathering and

fracturing. They do not exceed more than a few hundred gallons per minute and are often much lower. These aquifers generally yield water of satisfactory quality but are susceptible to local contamination because of their proximity to the land surface.[26]

Wastewater Management for Riverdale

Wastewater treatment for Riverdale's commercial, industrial, public use buildings (such as schools) and high-density developments are managed publicly through sewer systems. Some single family homes are also sewered in areas adjoining Newark Pompton Turnpike.[27] This wastewater treatment is handled by the Pequannock River Basin Regional Sewage Authority (PRBRSA). The PRBRSA provides wastewater service to the Boroughs of Bloomingdale, Butler, Kinnelon, Riverdale and a small portion of West Milford.[28]

According to the PRBRSA, the group was formed in 1974 by the towns of Bloomingdale, Butler and Kinnelon, and is the state-designated Water Quality Management Agency for the region. The PRBRSA system conveys sewage flows from the five towns through a 7-mile system of interceptor sewers into the system of the Two Bridges Sewerage Authority (a/k/a, the Pequannock, Lincoln Park and Fairfield Sewerage Authority or TBSA) for treatment and disposal with effluent discharge into the Pompton River in Lincoln Park. The TBSA treatment plant is designed to handle up to 7.5 million gallons per day of sewage.[31] By contract the PRBRSA has 2.5 million gallons per day of capacity in the TBSA system.[29]

The PRBRSA is governed by a Board of six Commissioners, two appointed by the member towns of Bloomingdale, Butler, and Kinnelon. Two PRBRSA Commissioners also serve as Commissioners on the Two Bridges Sewerage Authority.[30]

Many residences in the borough still rely on individual septic systems for wastewater treatment. Although the Borough has considered expanding service to these homes, limitations on sewage treatment capacity are an obstacle.[32]

Water Quality in Riverdale

Water quality in New Jersey is tightly regulated by a variety of federal and state programs. One of the most important is the federal Clean Water Act, which requires each state to establish "designated uses" for waterways within the state. These uses may be such things as swimming, fishing, or use as wildlife habitat. The state must create water quality standards sufficient to protect these uses, then review each waterway to see if it meets these standards. Waterways that do not meet the standards are considered "impaired" and are included on a list, called the "303 (d) list", that is provided to the federal government every 2 years. In New Jersey this report is entitled the "Integrated Water Quality Monitoring and Assessment Report." [38]

To determine what waterways may be impaired the NJDEP maintains monitoring networks. The Ambient Surface Water Quality Network was established in 1976 to determine status and trends of surface waters in New Jersey. Currently a network of 115 stations is sampled four times per year. A wide range of conventional parameters, metals, pesticides/volatile organic carbon (VOC's) and sediments are monitored in this program.[39]

In 1992, the NJDEP's Bureau of Freshwater & Biological Monitoring reactivated its Ambient Biomonitoring Network (AMNET) which, at the time of its last sampling in 1988, consisted of only 18 sampling sites statewide. The old network was determined to be inadequate to support the NJDEP's needs, so bureau staff designed a new program. The new program established sampling stations in every sub-watershed, statewide, where the health of instream benthic macroinvertebrate communities (bottom dwelling organisms visible to the naked eye) would be sampled on a rotational schedule of once every five years. Visual observations, stream habitat assessments and limited physical/chemical parameters are also performed on each site. At present 820 sampling sites have been established.[40]

Beyond NJDEP sampling, other organizations also conduct water quality monitoring. For example, the Pequannock River Coalition monitors water temperature and dissolved oxygen in the Pequannock River and river tributaries in the Riverdale area.

This combined monitoring has shown that water quality in Riverdale is generally high. It should be noted that this is mainly a function of the large undisturbed watershed area contributing to the Pequannock River north of the borough of Butler. More intensive land use south of Butler tends to degrade this higher water quality.

The principal water quality problems found by the NJDEP concern high water temperatures that present problems for wild trout in the Pequannock River. Wild brown trout that are resident in the river do best at temperatures of 54º-66º Fahrenheit and can be killed by water temperatures exceeding 81º.[41] Typical summer temperatures in the Pequannock River are shown in Figure IV-16. Clearly, the temperature readings in excess of 80º are a cause for concern.

The NJDEP has determined that these high water temperatures are largely due to a lack of sufficient river flow in the summer months. Flows in this segment of the Pequannock River are regulated primarily through the amount of water released from the Charlottesburg Reservoir in

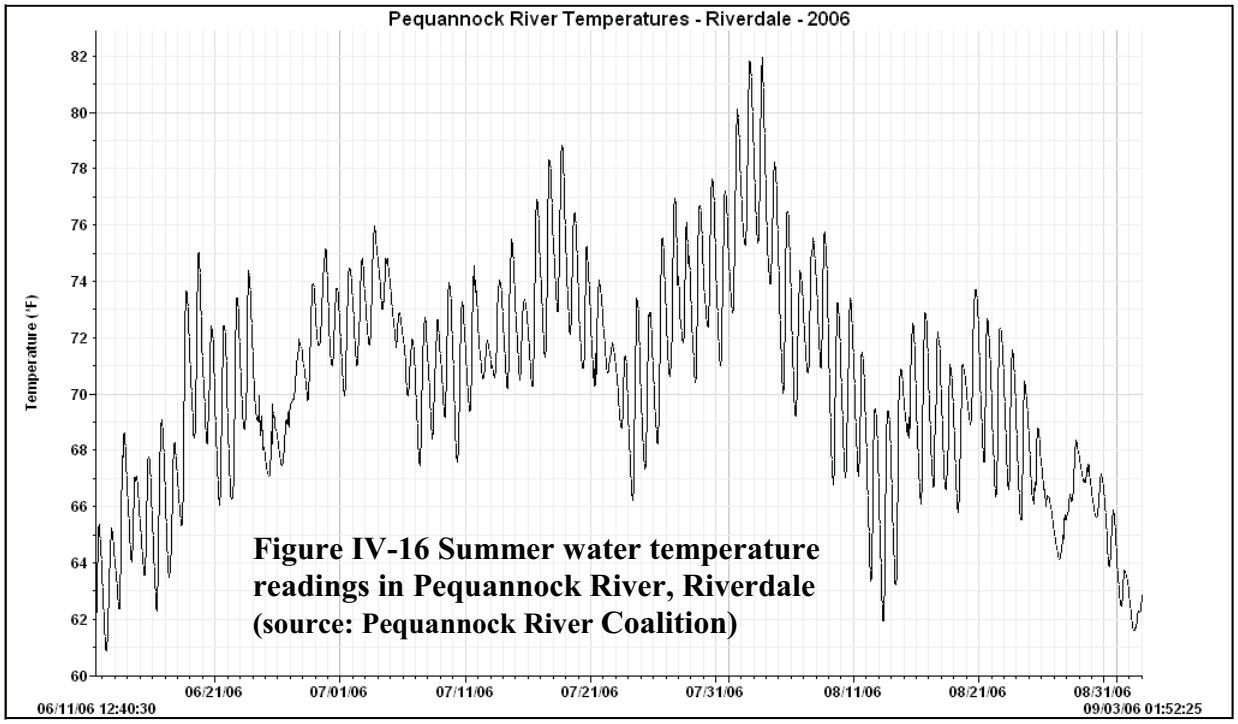

Figure IV-16 Summer water temperature readings in Pequannock River, Riverdale (source: Pequannock River Coalition)

West Milford by the City of Newark. When too little water is released into the river it can warm quickly on hot summer days, leading to water temperatures that are detrimental or lethal to trout. The NJDEP has developed a special plan, known as a "Total Maximum Daily Load" or "TMDL" to address these problems.[42]

Other water quality problems in the Riverdale area concern levels of toxins found in the flesh of fish taken from local waterways. These toxins include mercury, PCB's, DDX and Chlordane.[43] The sources of these pollutants may be airborne or from polluted runoff.

Recreational Values of Water Resources

The waterways of Riverdale have extraordinary recreational potential but this potential is largely underutilized.

Fishing is a popular pastime on the Pequannock River (see Figure IV-17). The Division of Fish and Wildlife stocks approximately 6,000 brook trout and rainbow trout in the Pequannock River from southern West Milford to Riverdale.[44] Wild brown trout in the river add to the productivity of this fishery. Appelt Park provides access to the river, although this access is limited by the park's small size (3.55 acres). Public land in this entire section of the Pequannock River, from southern West Milford to Pequannock, is quite limited.

The lower Pequannock River, south of Freedom Park, offers exceptional opportunities for canoe and kayak use (see Figure IV-18). However, this use has not been exploited or promoted. This area of the river also has great potential for angling, both for trout and for warmwater species such as bass and panfish.

Swimming is not a typical recreational use of the Pequannock River, and can even be dangerous, but this river is one of only a few in New Jersey with water quality high enough to be usable for swimming.

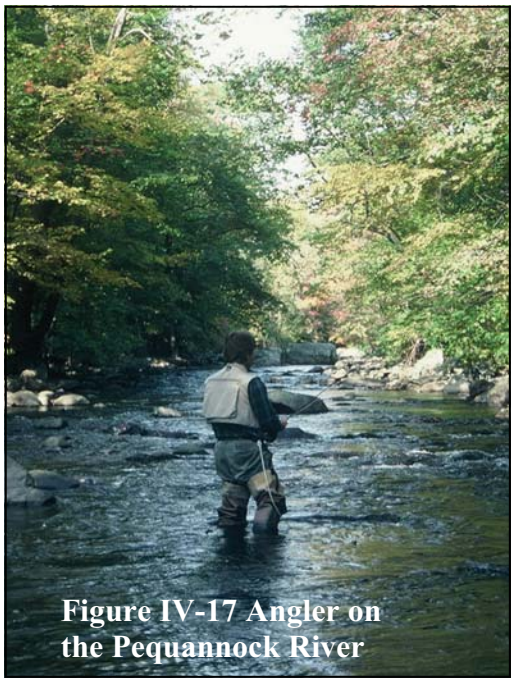

Figure IV-17 Angler on the Pequannock River

It should be noted that all these recreational uses are degraded by the same lack of water flow that generates problems with water temperatures during summer months. At the time of this writing the NJDEP was negotiating with the City of Newark for improvements in water releases and river flows.

The preservation of Riverdale's water resources and water quality is detailed in section VII of this document.

Figure IV-18 Canoe group on Pequannock River

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[22] Eastern Washington University, Department of Geology. 2005. *Virtual Aquifer Tour.* Eastern Washington University. <http://www.geology.ewu.edu/ftrips/aquifer/aqtour.htm
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V. Living Resources

Vegetation

The vegetation of Riverdale has developed in response to environmental conditions and human influences. Soils, sunlight, moisture, temperature, geology and hydrology all have an impact on the types of plant life a particular area supports.

Forested areas serve vital functions for wildlife habitat and for groundwater recharge. Although large forested areas are few in Riverdale (see Figure V-1), the remaining woodland represents most of the typical forest types of the New Jersey Highlands and Piedmont provinces.

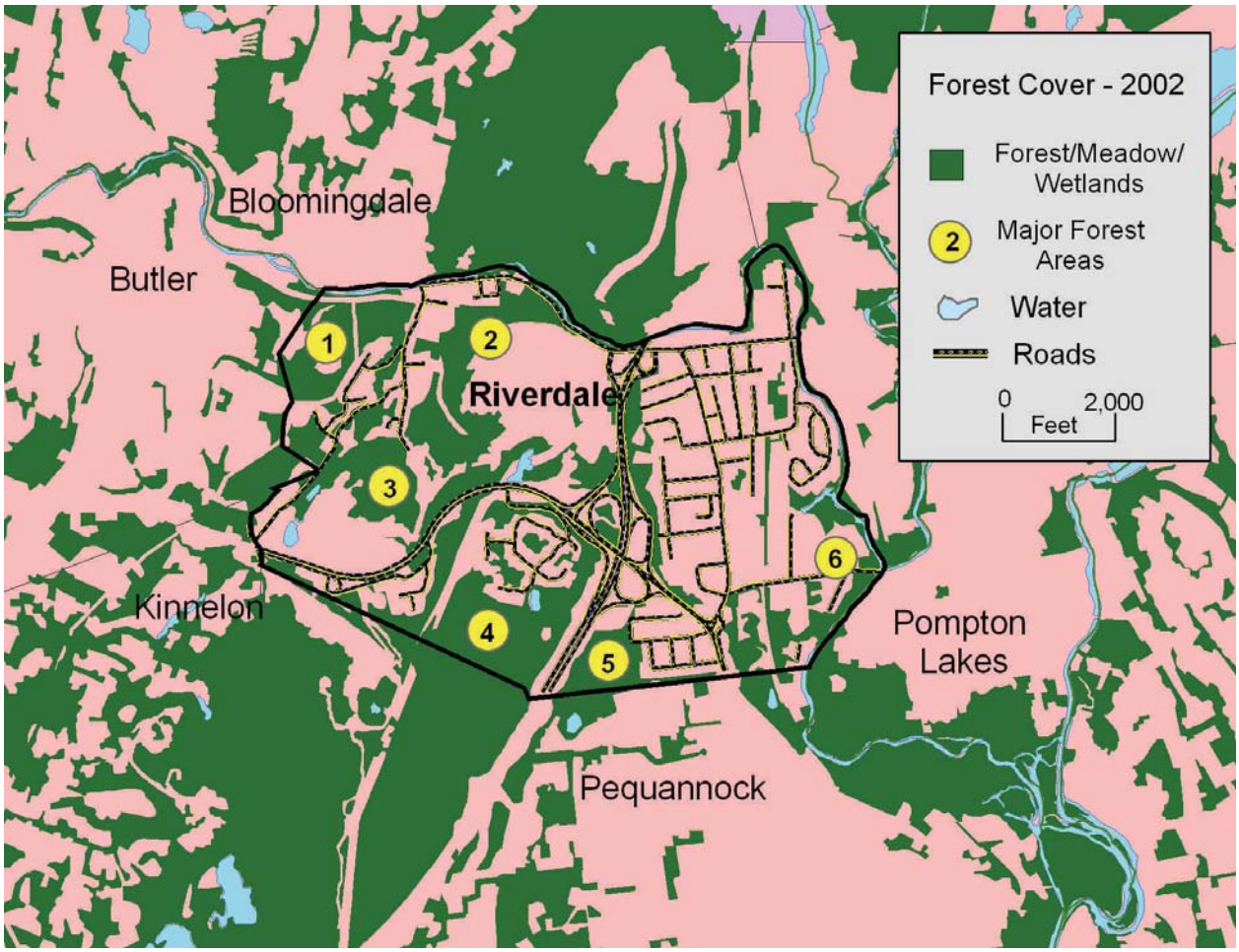


Figure V-1 Forests in the Riverdale Area (DEP Land Use Data—2002)
(This map was developed using NJDEP Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.)

A good example is the forest cover associated with riparian lands and floodplains bordering the Pequannock River (see Figure V-1, forest area 6). Trees such as black willow, silver maple, American basswood, pin oak, river birch, and American sycamore enjoy the fertile alluvial soils in these areas (see Figure V-2).[1]

Figure V-2 Riparian forest near Pequannock River, Riverdale

In the Highlands area of Riverdale these riparian forests are confined to lands close to the river. In the Piedmont area below Hamburg Turnpike, such lands are more expansive, producing some of the largest trees in the Borough (see Figure V-3). Understory shrubs associated with these riparian areas include speckled alder, witch hazel, and red-osier dogwood.

Figure V-3 Massive trees occur in Piedmont floodplains of Riverdale

Another forest type is the "dry-mesic" (dry to moderately moist) found primarily in northern and northwestern sections of the Borough (see Figure V-1, forest areas 1, 3, 4 and 5). These are mixed-oak forests dominated by oaks including red, black, and white oaks with lesser numbers of white ash, red maple, sugar maple, chestnut oak, scarlet oak, hickory, American beech, and tulip tree. Flowering dogwood and maple-leaved viburnum are dominant understory trees and shrubs, with hop hornbeam, ironwood, and sassafras also present.[3]

In the Highlands area of Riverdale, narrow valleys associated with fast-flowing streams host another common forest type, occurring primarily in ravines or cool north-facing slopes (see Figure V-4). This is the "mesic" (moderately moist), hemlock-hardwood forest dominated by eastern hemlock with red maple, sugar maple, yellow birch, sweet birch, American basswood, American beech, white ash, and tulip tree. The understory shrub and herbaceous layer is generally sparse under the hemlocks, with the

Figure V-4 Mesic forest area in Riverdale

exception of rhododendron thickets in some places.[2] A typical forest of this type is the stream valley of the Pequannock River tributary entering the river just north of Rt. 287 (see Figure V-1, forest area 2).

A more "xeric" (dry) forest type is found on steep slopes and dry ridgetops of the Borough (see Figure V-1, forest area 4). This is the chestnut oak forest with dominance by chestnut oak and associated species including scarlet, white, black, and scrub oaks, eastern redcedar, sweet birch, and hickories, with a shrub layer of heaths, including blueberries, mountain laurel, and black huckleberry. On the exposed ridgetops of these areas another plant community is found, dominated by eastern redcedar with lesser numbers of sweet birch, red maple, gray birch, serviceberry, chestnut, scarlet, and white oaks, scrub oak, black huckleberry, and grasses in open areas (see Figure V-5).[4]

The relative importance of various forested areas in Riverdale is somewhat debatable since all forests provide benefits. Large

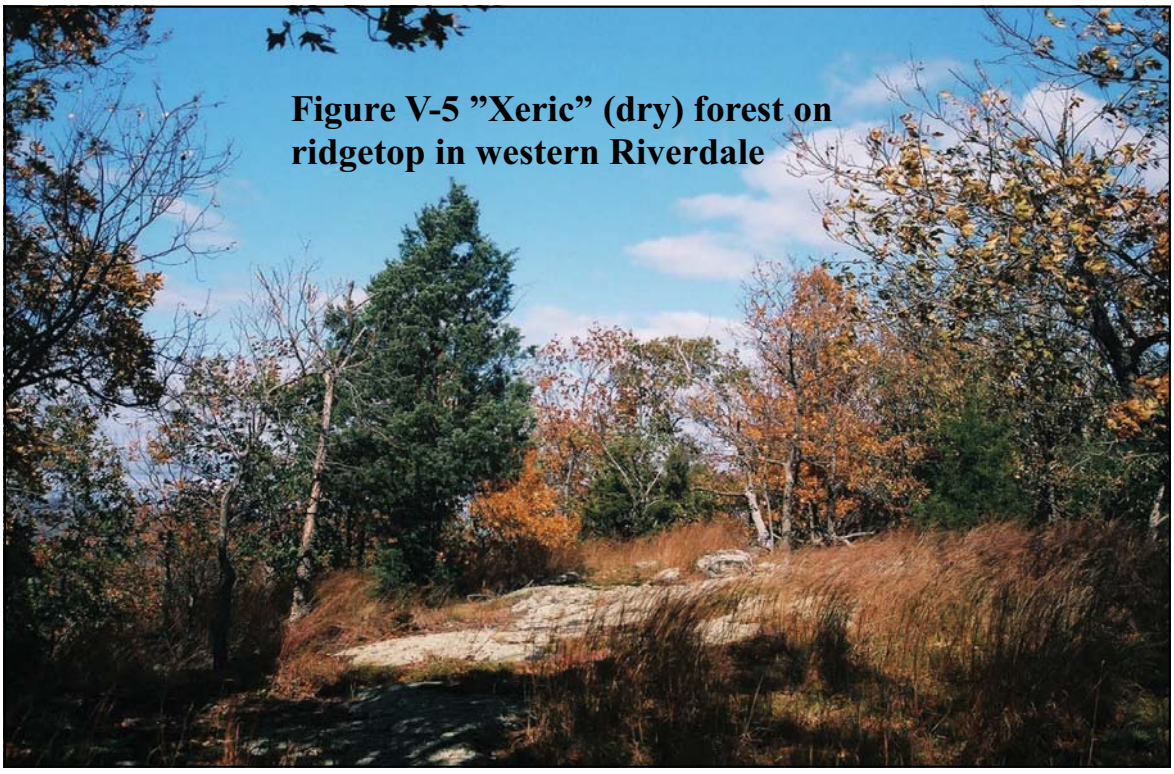


Figure V-5 "Xeric" (dry) forest on ridgetop in western Riverdale

contiguous blocks of forest are increasingly rare in New Jersey, offering habitat for birds and animals that are negatively impacted by human influences or that require large home ranges.[5]

For these reasons, the forests in southwestern Riverdale are critical lands (see Figure V-1, area 4) due to their connection with a large forested area extending into Pequannock and Kinnelon. Forests along rivers and stream protect water quality and create vital habitat for fish, aquatic birds, and animals. The value of forests for wildlife habitat is explored more fully under "Fish and Wildlife." Forests overlying prime recharge areas should be protected, since the Borough of Riverdale relies on groundwater for potable supply.

Forests are not the only vegetative communities in Riverdale. The Borough also has three types of wetlands. Typically, the type of wetland is assigned by the vegetation found in these wetland areas. These wetlands have been mapped by the NJDEP (see Figure V-7). However, this mapping is by no means complete. When development projects are proposed a more detailed analysis of wetlands on the site, known as a "Letter of Interpretation" may show other wetlands that were previously unidentified.

Wetlands in Riverdale that are only saturated for limited periods are dominated by trees like red maples that rely on shallow surface root systems to keep their roots above water and provide the roots with sufficient oxygen (see Figure V-6). These areas are known as "Deciduous wooded wetlands." They are prime habitat for other plants such as skunk cabbage, ferns, and mosses. Approximately 18 acres of this type are mapped in Riverdale.

Figure V-6 Deciduous wooded wetland in Riverdale

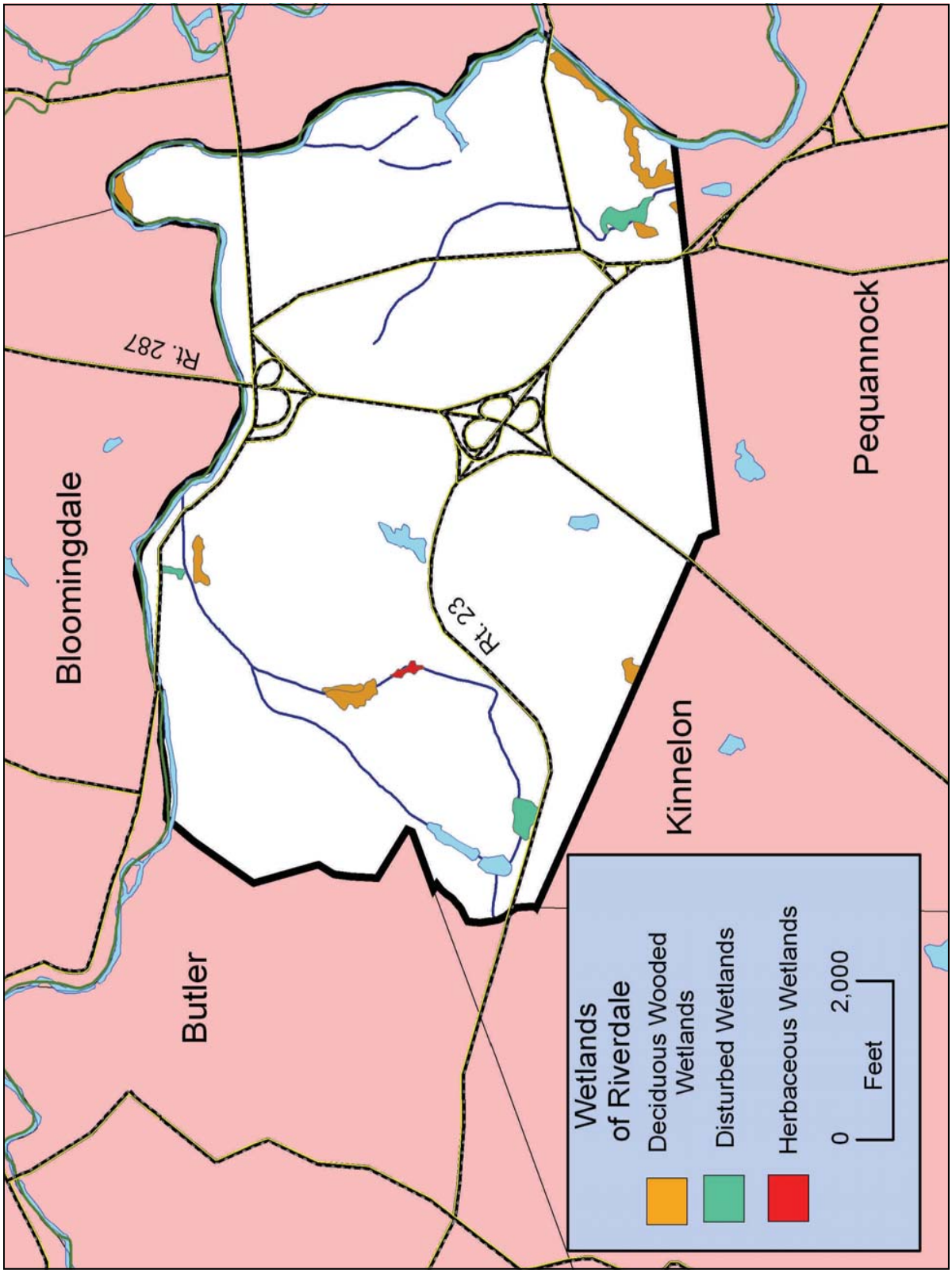
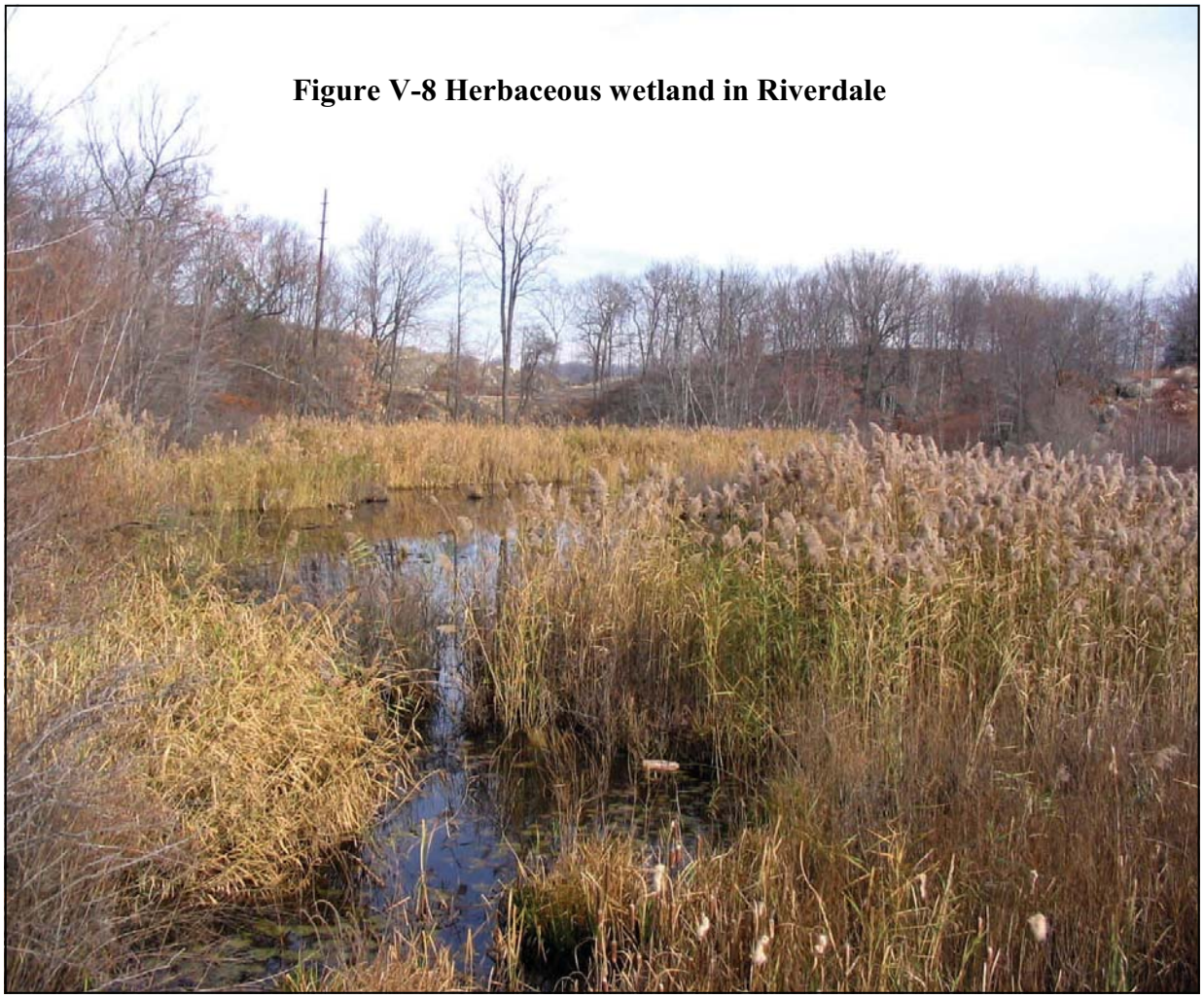


Figure V-7 Wetlands in the Riverdale Area

(This map was developed using NJDEP Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.)

The second type of wetland in Riverdale is the "Herbaceous wetland." These lands are more frequently inundated and support few trees (see Figure V-8). Vegetation is dominated by plants like grasses, cattails or phragmites. Herbaceous wetlands are not common in Riverdale, covering only about 0.8 acres.

Figure V-8 Herbaceous wetland in Riverdale



Disturbed wetlands are those that have been modified by human activity. There are about 7 acres of this wetland classification in the Borough. The plant species depend on the physical properties of the wetlands and the degree of alteration.

Plant communities in New Jersey face problems beyond the clearing of land. For example, hemlock trees in the eastern U.S. have recently come under attack by a foreign invader, the hemlock woolly adelgid. This pest has destroyed many hemlock stands on the Eastern seaboard. One study found that, as of 1998, 30% of the hemlock stands in New Jersey showed evidence of this infestation.[6]

Another forest pest is the gypsy moth, with cyclical infestations that impact hardwood trees

such as oaks. Introduced diseases also create problems for beech trees (beech bark disease), butternut (butternut canker disease), and flowering dogwoods (dogwood anthracnose).[7]

The presence of non-native plants has greatly altered plant communities and ecosystem functions in Riverdale. Some of the more common invasive plant species are Norway maple, tree-of-heaven, Japanese barberry, Japanese honeysuckle, stilt grass, and garlic mustard. Particularly aggressive are two invasive plants found in wetlands and river/stream corridors—purple loosestrife and Japanese knotweed.[8] Japanese knotweed now covers extensive areas along the Pequannock River (see Figure V-9). These non-native species provide little or no benefit to wildlife and crowd out beneficial native plants.

Figure V-9 Japanese Knotweed in Appelt Park

Fish and Wildlife

Prior to European settlement in the 1700's, Riverdale had a full complement of native wildlife. However, colonists sought to eliminate large predators—a bounty on wolves was established in New Jersey in 1697[9] - and such species as timber wolves and mountain lions were extirpated by the 18th century. Other native wildlife, like the passenger pigeon, were hunted to extinction. Even whitetail deer were reduced to small remnant populations in New Jersey by the late 1800's.

The extensive clearing of forests also reduced habitat for many birds and animals. It is a surprising fact that forest cover has actually increased in many areas of northern New Jersey over the past century. Older photographs of Riverdale reveal how much acreage was devoted locally to fields and pasture.

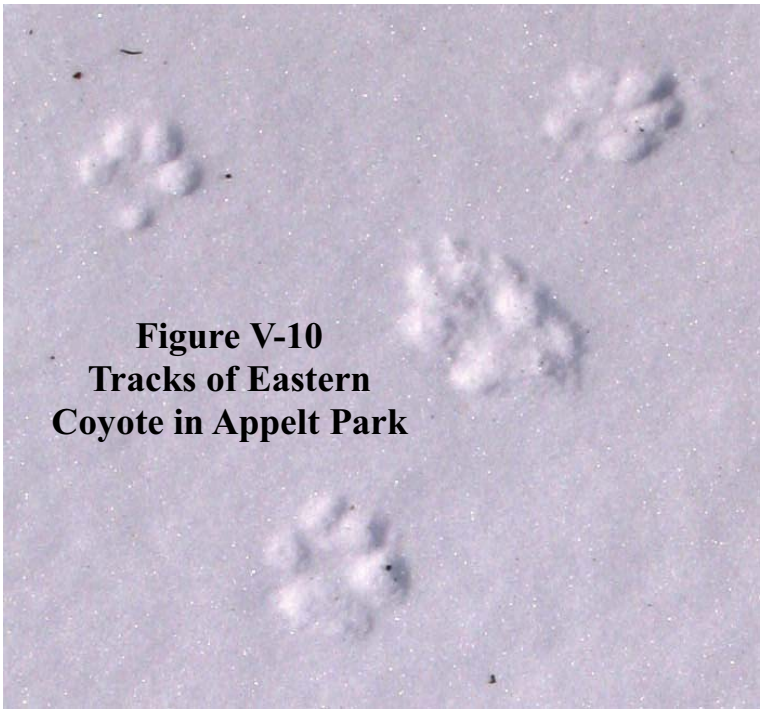


Figure V-10
Tracks of Eastern Coyote in Appelt Park

Since the early 1900's forest recovery, establishment of restrictive hunting laws and scientific game management have restored a number of species. Protection and reintroduction efforts have served to vastly increase populations of white-tail deer, wild turkey, bobcat, and black bear.

In addition, some birds and mammals, historically unknown in New Jersey, have established themselves, either by expanding their range or through human introduction. Good examples are the Eastern coyote (see Figure V-10), a migrant from the western states, the European starling, introduced in New York's Central Park, and the common pigeon or rock dove. All are now abundant in the Riverdale area.

Today, Riverdale, though small in size, has a surprisingly full complement of wildlife. With the possible exception of a few species, such as bobcat and timber rattlesnake, most of the wildlife found in northern New Jersey has at least some presence in Riverdale.

In 1989 a list of potential and observed wildlife in the Federal Hill area of Bloomingdale area was developed for the Bloomingdale Environmental Commission. This list, with supplemental observations for Riverdale by local citizens, is provided in Appendix B. Although a number of these animals are rarely seen, their presence may be confirmed by tracks and other signs.

Some animals readily adapt to human activities and suburban development. Mammals such as the grey squirrel, raccoon, opossum, cottontail rabbit (see Figure V-11), and striped skunk will thrive in suburban landscapes as long as a minimal amount of undisturbed land is provided.

Figure V-11 Young Cottontail Rabbit

Others, such as mink and muskrat, require high-quality aquatic habitat. Their continued existence can only be assured by maintaining healthy stream/river corridors with adequate undisturbed buffers.

Figure V-12 Stump of birch tree harvested by beavers (Riverdale)

For beaver and river otter, these habitat areas must be extensive. Throughout a year, an otter may occupy 50 or more miles of a stream or river course.[10] An abundant food supply in the form of trees and shrubs is needed by beavers. Sign of beavers, both old and new, are frequently seen along the Pequannock River (see Figure V-12). Fortunately much of the Pequannock River and the river tributaries have retained at least some un-degraded riparian buffers.

Riverdale's largest mammal is the black bear, occurring primarily in the forested Highlands. Black bears need a diversity of habitat types to provide food in different seasons, from bulbs and vegetation in spring to mast crops like acorns and beechnuts in autumn. Maintaining these natural food supplies prevents bears from seeking alternative foods such as garbage or livestock.[11] Preserving large areas of contiguous open space, and linkages between open space tracts is necessary to the long-term survival of the black bear in Riverdale.

Figure V-13 Blue jay

The bird life of Riverdale is also extensive due to the wide range of habitat types. Again, some birds readily adapt to suburban areas, including many songbirds like the blue jay (Figure V-13).

Woodlands, especially in the western part of the Borough offer forest-interior birds such as the Cooper's hawk a relatively remote and undisturbed territory. Wild turkeys also make use of these forested areas, but have increased their presence in suburban neighborhoods too.

The Pequannock River hosts a remarkable array of waterfowl and aquatic birds including a variety of herons and ducks and an occasional Osprey. The river is an important wintering area for many of these birds, since stretches of swift current maintain ice-free water, even in the coldest conditions (se Figure V-14).

Figure V-14 Mallard ducks on Pequannock River

Reptiles and amphibians are also well represented in Riverdale. Most species of turtles, along with water snakes, frogs, and salamanders rely on good quality wetlands and waterways.

Others, such as the five-lined skink (Riverdale's only lizard), the Black rat snake, reaching a length of 8 feet (see Figure V-15), and the Gray tree frog, inhabit upland areas.

Figure V-15 Black rat snake

Fisheries resources are equally varied. The upper Pequannock River and its tributaries, above Hamburg Turnpike, support a reproducing population of brown trout (see Figure V-16). These fish require cold, clean, well-oxygenated water. Rivers and stream capable of hosting spawning trout are increasingly rare in New Jersey. In addition, the N.J. Division of Fish and Wildlife stocks rainbow trout and brook trout in this section of the Pequannock River. Other species that thrive in this cold, well-oxygenated water are black-nosed dace, fallfish, white suckers, and darters..

Ponds and the lower reaches of the Pequannock River hold fish that are better suited to these warmer, less-pristine waters including bass, sunfish, and chain pickerel.

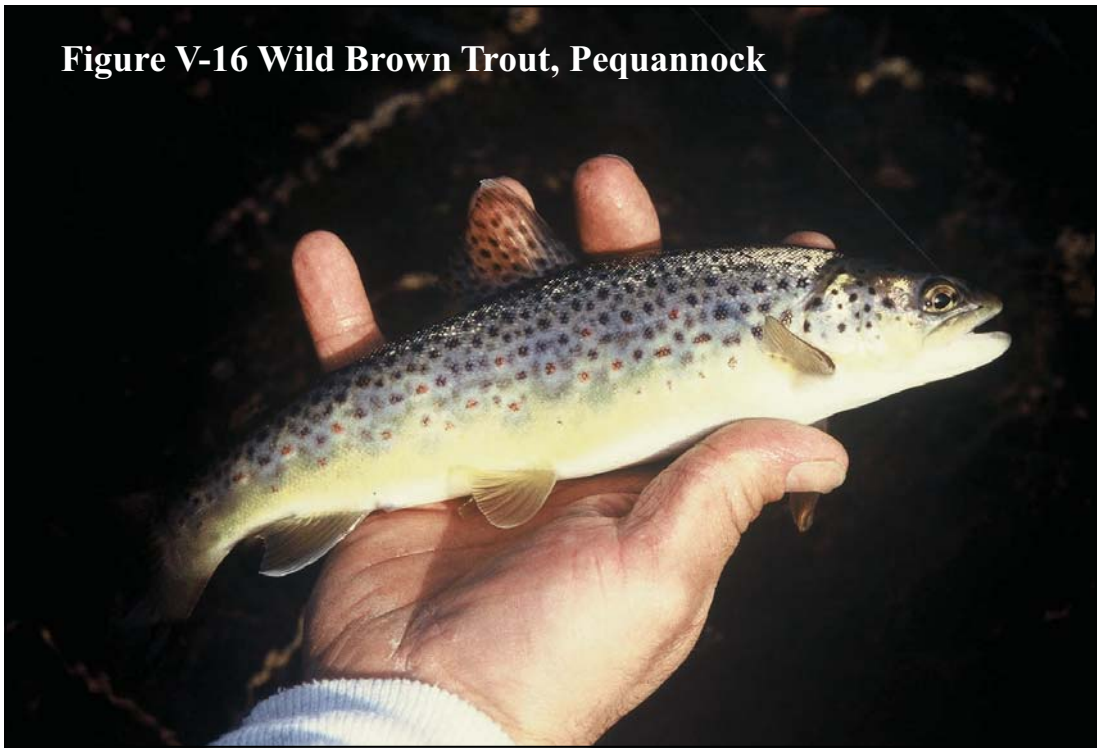


Figure V-16 Wild Brown Trout, Pequannock

The NJDEP maintains a list of endangered and threatened wildlife for New Jersey. Some are residents or occasional visitors to Riverdale, including several birds— the Osprey, Cooper's hawk, Black-crowned night heron, and Yellow-crowned night heron.

For the threatened Wood turtle, a likely Riverdale resident, the NJDEP has mapped potential habitat (see Figures V-18 and V-19). This turtle is not strictly aquatic, ranging through woodlands, wetlands and meadow areas. Its diet includes both vegetable and animal matter, such as berries, mussles, insects and herbs. The 5-9 inch shell is dirty brown in color on the back with distinctive rings on the scales resembling spider webs or the growth rings of trees. The belly is brightly hued in yellow and orange with black bands[12].

To protect these endangered and threatened species the NJDEP ranks undeveloped lands based on their relative value as habitat. The ranking system sets a value of 1 to 5, with 5 being the highest value and 1 the lowest. The ranking of forested land in Riverdale is shown in Figure V-17. All Riverdale forests are ranked as "2" or "4". The highest ranked lands are part of the large contiguous area of forest in the southwestern portion of the Borough. Preservation of these critical lands is covered in section VII of this document.

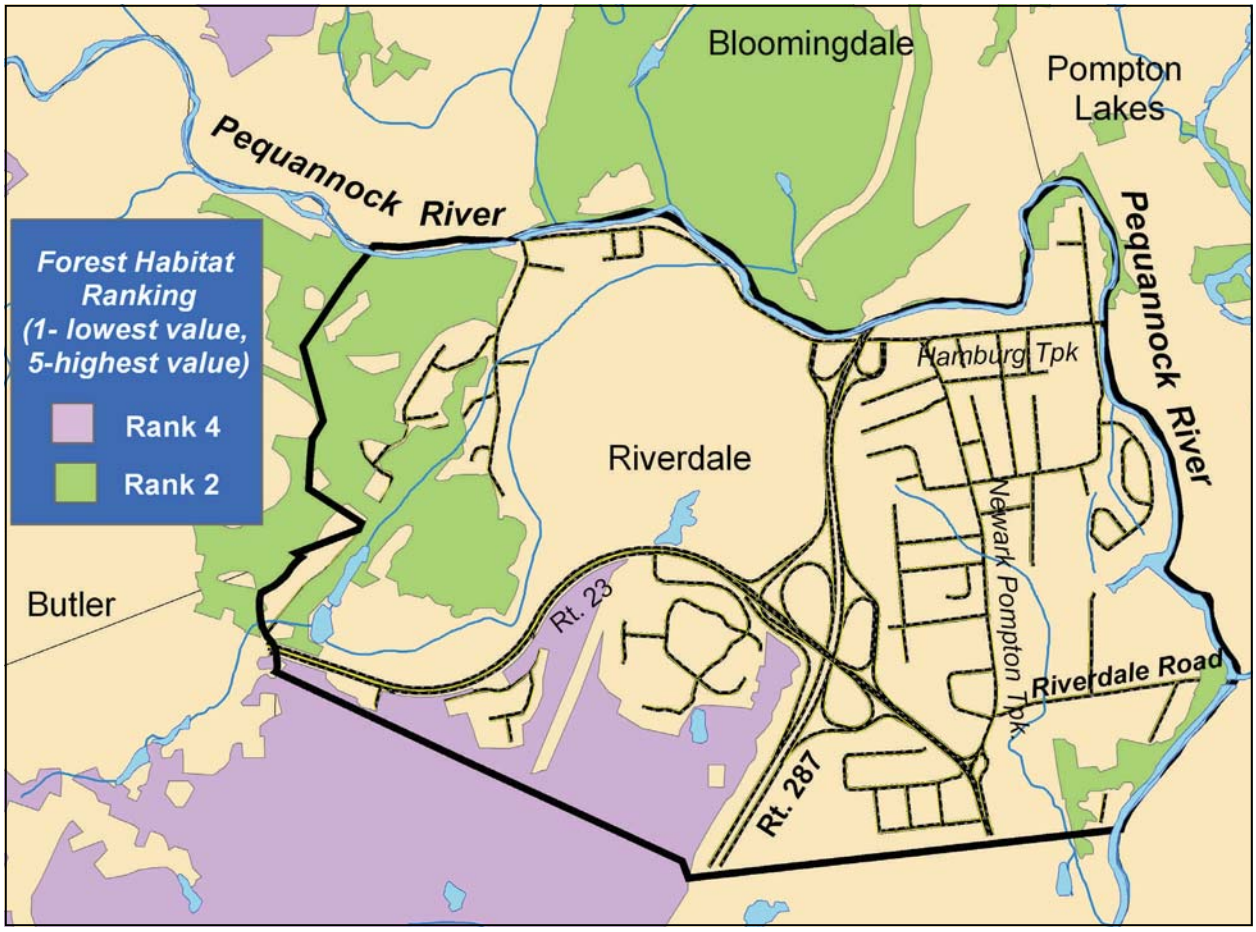


Figure V-17 Ranking of Forests in the Riverdale Area as Wildlife Habitat
(This map was developed using NJDEP Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.)

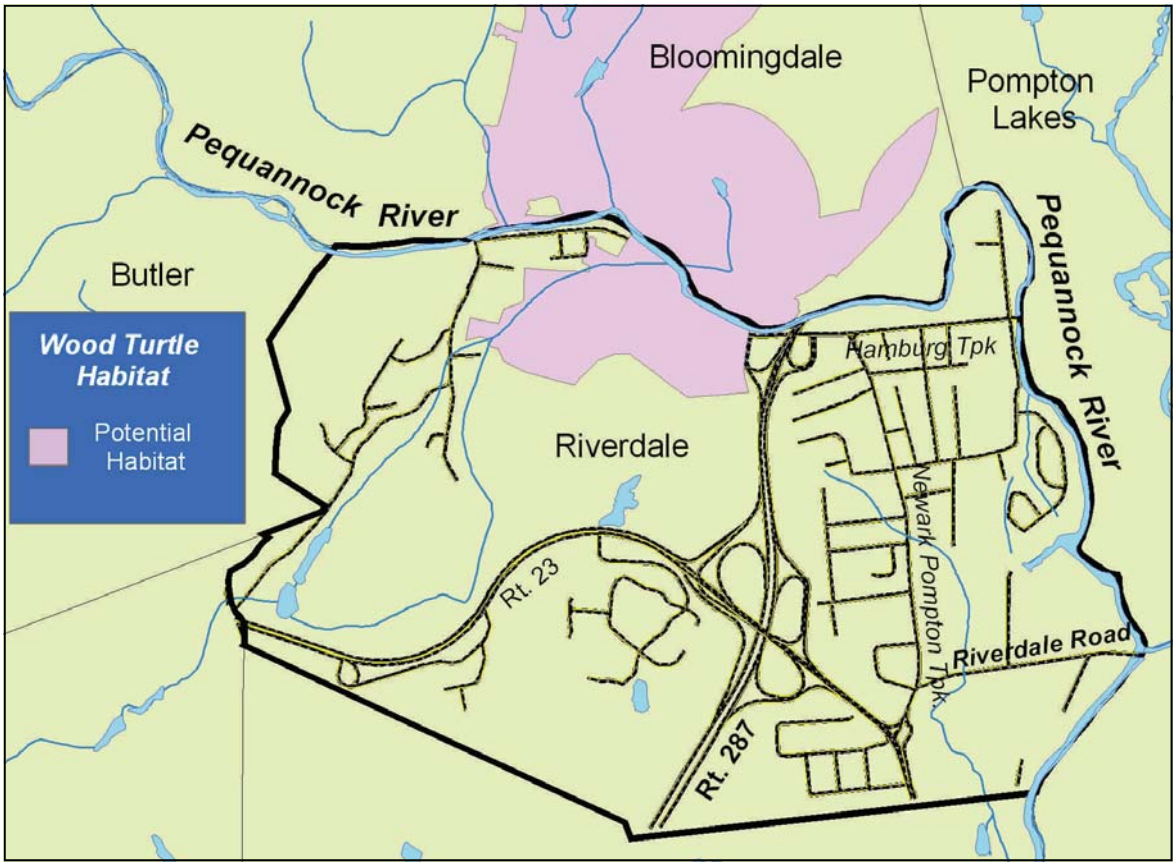


Figure V-19 Wood Turtle Habitat in the Riverdale Area

(This map was developed using NJDEP Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.)

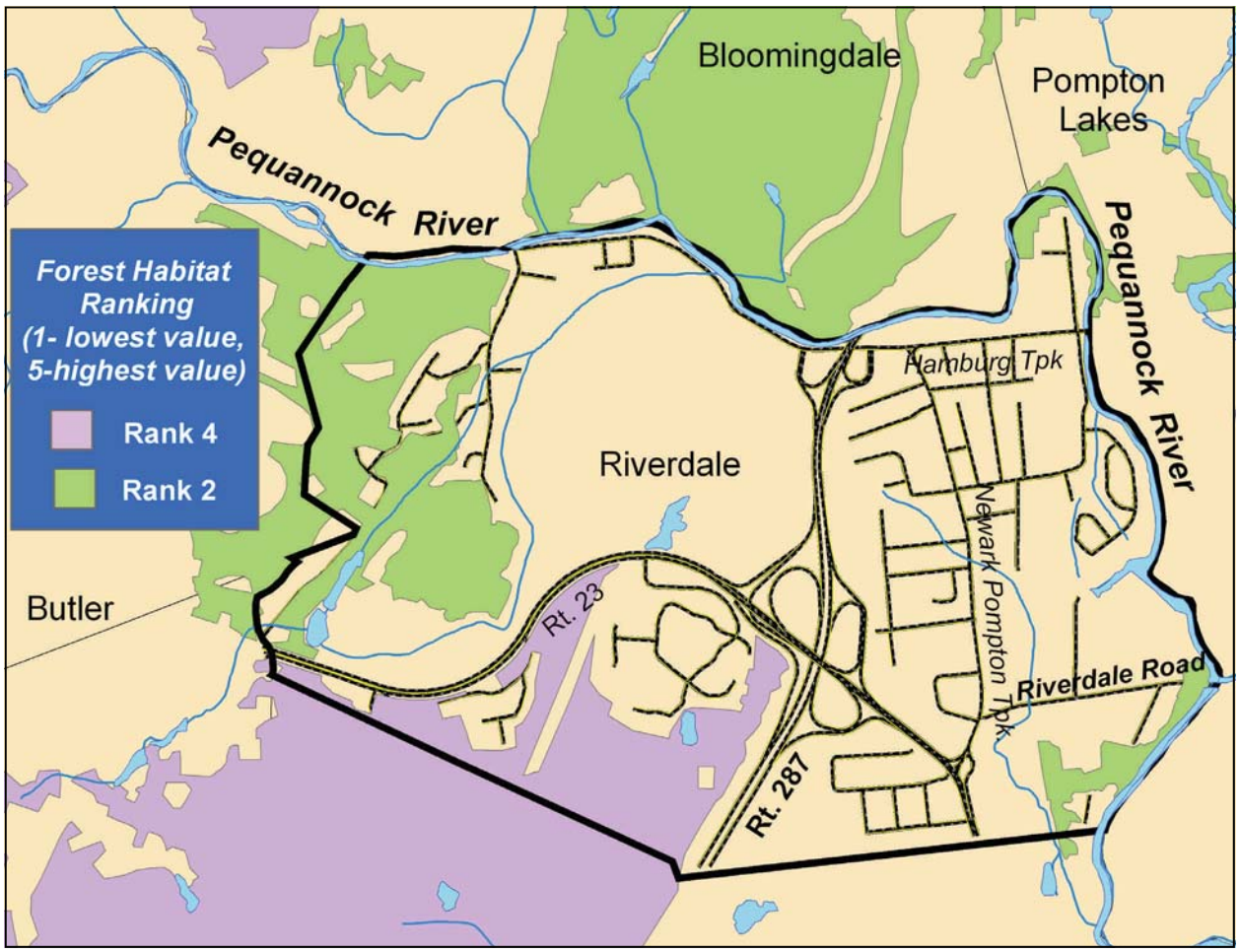


Figure V-17 Ranking of Forests in the Riverdale Area as Wildlife Habitat
(This map was developed using NJDEP Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.)

[1] U.S. Fish and Wildlife Service. 1997. *Significant Habitats and Habitat Complexes of the New York Bight Watershed.* U.S. Fish and Wildlife Service, Wasington, DC. <http://training.fws.gov/library/pubs5/web_link/text/ny_njh.htm#narrative

[2] *Ibid.*

[3] *Ibid.*

[4] *Ibid.*

[5] U.S. Department of Agriculture, Forest Service. 2002. *New York / New Jersey Highlands Regional Study.* U.S. Department of Agriculture, Forest Service, Newtown Square, PA. <http://www.na.fs.fed.us/highlands/maps_pubs/regional_study/regional_study.shtm

[6] *Ibid.*

[7] *Ibid.*

[8] New Jersey Department of Environmental Protection. February 2004. *An Overview of Nonindigenous Plant Species in New Jersey.* New Jersey Department of Environmental Protection, Trenton, NJ. <http://www.state.nj.us/dep/parksandforests/natural/heritage/InvasiveReport.pdf

[9] Shadow Wolf Country. 2006. *The Wolf Chronology.* <http://www.angelfire.com/bc/shadowcountry/wolfchrono.html

[10] Nebraska Game and Parks Commission. 2006. *Nebraska Wildlife Species Guide*. Nebraska Game and Parks Commission, Lincoln, NE. <http://www.ngpc.state.ne.us/wildlife/otters.asp

[11] New Hampshire Fish and Game Department. 2006. Black Bear. New Hampshire Fish and Game Department, Concord, NH 03301. <http://www.wildlife.state.nh.us/Wildlife/Wildlife_profiles/profile_black_bear.htm.

[12] Wisconsin Department of Natural Resources. February 1, 2006. *Wood Turtle*. <http://dnr.wi.gov/org/land/er/factsheets/herps/wturtle.htm

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VI. Natural Resource Use

Residential, Industrial, and Commercial Land Uses

The borough of Riverdale is relatively small and quite densely populated with 2,635 residents as of 2005, or nearly 1,200 persons per square mile. Much of the land in Riverdale is devoted to residential housing with lesser amounts used for commercial and industrial purposes. These land uses are depicted in Figure IV-14.

The Borough of Riverdale is entirely within an area designated in the New Jersey State Development and Redevelopment Plan as "Metropolitan" (see Figure V-1). A Metropolitan Area is intended to "*Provide for much of the state's future redevelopment; revitalize cities and towns; promote growth in compact forms; stabilize older suburbs; redesign areas of sprawl; and protect the character of existing stable communities*."[A]

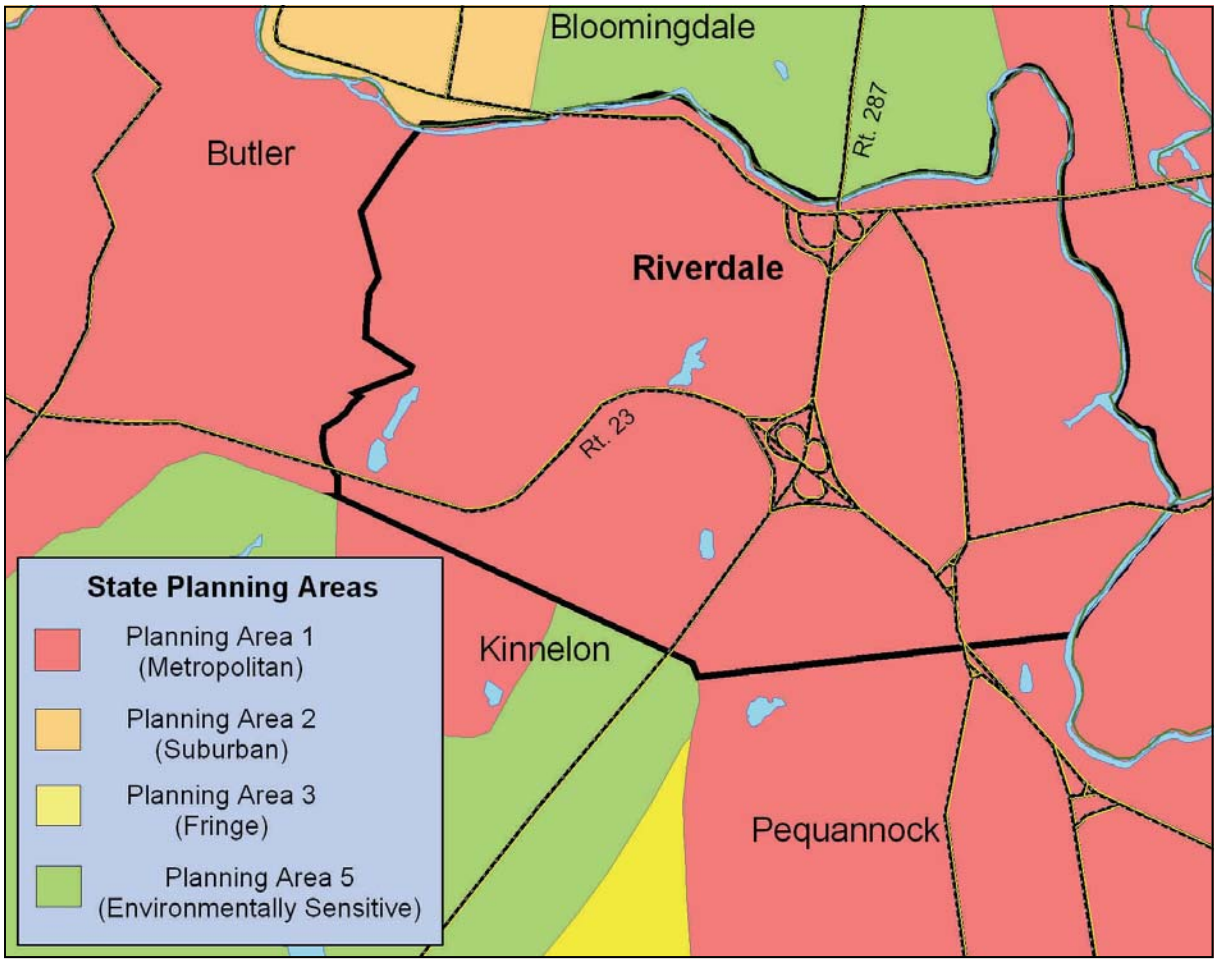


Figure VI-1 State Development and Redevelopment Plan Areas
(This map was developed using NJDEP Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.)

Under this designation, the State lists the following goals regarding Natural Resource Conservation: "*Reclaim environmentally damaged sites and mitigate future negative impacts, particularly to waterfronts, scenic vistas, wildlife habitats and to Critical Environmental Sites, and Historic and Cultural Sites. Give special emphasis to improving air quality. Use open space to reinforce neighborhood and community identity, and protect natural linear systems, including regional systems that link to other Planning Areas."*[A]

Existing development patterns in Riverdale have often been guided by existing road systems with industrial and commercial uses congregated along Hamburg Turnpike, Route 23, Newark Pompton Turnpike, and Riverdale Road. These patterns have not always been aligned with protection of natural resources. In some cases steeply sloped areas adjoining Rt. 23 and wetlands, floodplains and riparian corridors near Riverdale Road and Hamburg Turnpike have suffered environmental damage. In addition, vital groundwater recharge areas surrounding Riverdale's municipal wells have been impacted by both commercial and residential use.

As noted in the State Plan, opportunities should be sought to reclaim damaged sites, mitigate impacts to waterfronts and protect linear systems such as stream and river corridors. These goals should be considered as land use changes occur and redevelopment takes place. The recent creation of an Open Space Fund and an Open Space Master Plan in the Borough will provide key funding and guidance toward reaching these goals. Periodic re-examination of the Borough Master Plan can also be used to revise zoning and land use.

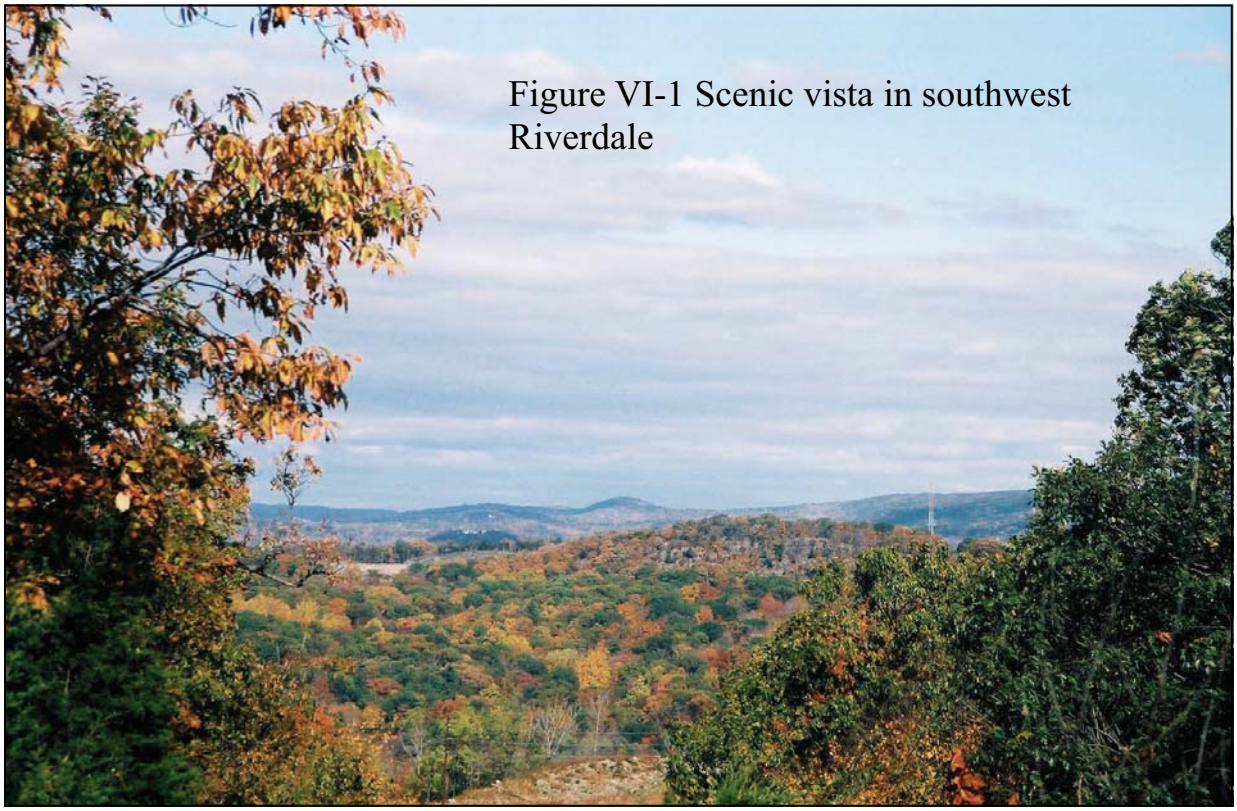
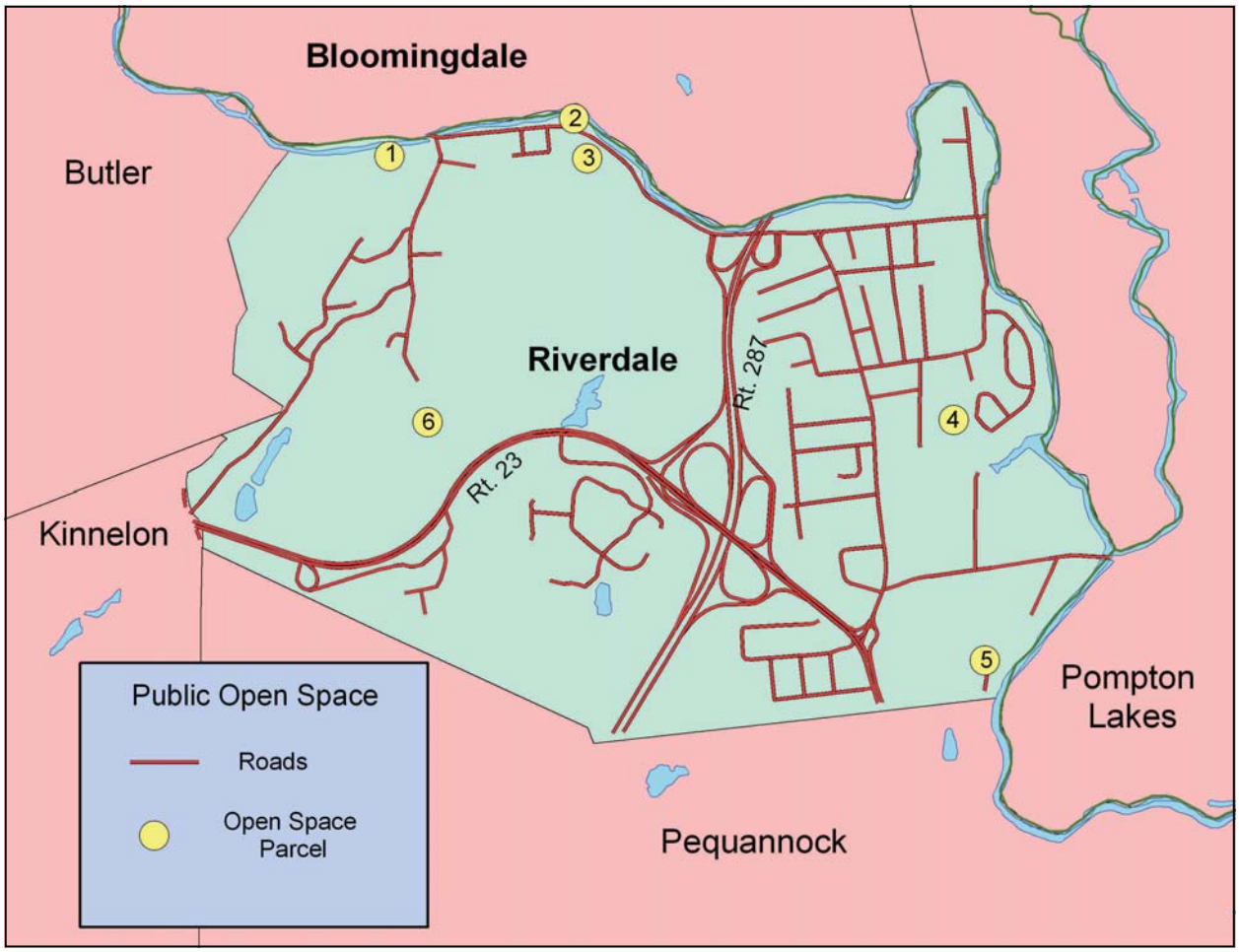


Figure VI-1 Scenic vista in southwest Riverdale

Other Land Uses

Preserved open space in Riverdale is very limited. Currently there are 74 acres of publicly owned land in Riverdale, representing about 5 percent of the total land area. Of this 74 acres, 61.5 acres are used as parks or remain in a natural condition. These lands are depicted in Figure VI-3.



Map Number	Description	Acreage	Lots/Blocks
1	The Enclave	11	Block 11, Lots 1.01-136, 2.01 Block 1, Lot 1 Block 5, Lot 1
2	Appelt Park	3.55	Block 2, Lot 9
3	Glenburn	5.73	Block 3, Lot 25
4	Independence Park / Freedom Park	12.35	Block 19, Lot 5.01
5	Vacant Lot	.34	Block 30, Lot 43
6	D.R. Horton	21.7	Block 40, Lots 2 and 3.01

Figure VI-3 Publicly owned lands in Riverdale

[1] New Jersey State Planning Commission. 2006.*New Jersey State Development and Redevelopment Plan.* <http://www.nj.gov/dca/osg/plan/stateplan.shtml
[2] *Ibid.*

VII. Sustaining the Natural Resources of Riverdale

Preservation and Conservation—Water Resources

As described in section IV of this document, most residents of Riverdale are supplied with water from a Public Community Supply Well. This well, the remaining one of a pair of public community supply wells found within the Borough, is operated by the Riverdale Borough Water Department and is located at the terminus of Dalton Drive.[1]

Its source is an unconfined aquifer in a sediment layer that is made of fine-grained sandstone, mudstone, and siltstone, along with minor dolomitic siltstone and shale. This aquifer has been designated as a sole-source aquifer by the US Environmental Protection Agency (USEPA).[2]

Groundwater within an unconfined aquifer is highly susceptible to contamination because pollutants can easily seep into the spacious pores of the soil. For this reason it is important to protect Well 1 and its surrounding area.[3]

An appropriate means of protecting wells is by adopting a Well Head Protection Ordinance. The ordinance delineates land nearby a well into three regions, based on the time it takes for pollutants to reach the well. Tiers 1 and 2, adjacent to the wellhead, have the strictest policies, while land that lies in the third tier are encouraged to follow best management usage. The Borough Open Space and Recreation Plan provides specific mapping of these areas along with a Model Municipal Well Head Protection Ordinance.[4]

Figure VII-1 Construction site in Riverdale

As another groundwater protection strategy, redevelopment of properties within the Well Head Protection Areas or in areas with high recharge rates or highly permeable soils (see Figures IV-13 and IV-15) should be engineered to reduce impervious cover and promote recharge of clean stormwater.

Private wells in the Stoneleigh and DeGraw Road areas are also within an unconfined aquifer and are equally susceptible to contamination. In addition, these wells are in sections with poor recharge rates. High-density or intensive development may be inappropriate around these wells since it may reduce recharge rates or contaminate these supplies.

Protecting the quality and quantity of surface waters also relies on promoting appropriate land use. First and foremost, sensitive areas and areas critical to water quality should be protected. These include riparian buffers, steep slopes, floodplains, wetlands and forested lands. Riparian buffers and wetlands are largely protected by state regulation under the Flood Hazard Control Act Rules, the Freshwater Wetlands Protection Act, and the Stormwater Management Rules. Steep slopes and forests outside these areas require municipal protection.

Figure VII-2 Silt-laden runoff from a steeply-sloped construction site in Riverdale.

Steeply sloped land is particularly vulnerable. Trees and other plants grow slowly in the thin soils on such slopes and re-establishing vegetation can be extremely difficult when these areas are disturbed. Construction on steep slopes (see Figure VII-1)often results in high sediment loads from runoff damaging waters downstream (see Figure VII-2). Blasting and grading can also affect the flow of subsurface water, impacting aquifer recharge, wetlands, and waterways. Finally, loss of vegetation can increase the volume of runoff, exacerbating flooding in low-lying areas.

To address these issues the Borough of Riverdale adopted a steep slope protection ordinance in 2005. This ordinance allows minimal disturbance on slopes of 15% to 25% and prohibits the disturbance of slopes greater than 25%.

Where land preservation is not possible or appropriate, development or redevelopment should employ techniques, called Best Management Practices, that reduce impacts. For example, a critical factor for water quality is the nature of the stormwater that will be reaching waterways from the site. What are the likely pollutants in the runoff? What methods are available to reduce the pollutant load to the receiving waterway and promote infiltration onsite? Guidance on pollutant characteristics of urban stormwater and appropriate Best Management Practices (BMPs) can be found in detail within the New Jersey manual, *Best Management Practices for Control of Nonpoint Source Pollution from Stormwater*. All development proposals should be consistent with the principles and practices found in the manual.[5] Care must also be taken during development. Inadequate control of sediment and runoff can create enormous problems for downstream waterways.

As noted in this document, the Pequannock River has unique problems with high water temperatures that impact sensitive aquatic life, such as trout. Land development plays an

important role in addressing or worsening these problems. Heated runoff from impervious surfaces like roads, rooftops or parking lots may raise temperatures in the receiving waterway substantially. Measures that can reduce the volume and temperature of runoff include[6]:

- Reducing impervious cover
- Maximizing infiltration of runoff
- Providing shade on impervious cover with trees and planting strips
- Use of bio-retention basins instead of detention basins
- Discharge of stormwater as sheet flow to a vegetated buffer
- Use of vegetated swales rather than pipes to carry runoff

Preservation of a shading canopy over waterways is also a priority. Sampling by the Pequannock River Coalition has shown temperature increases of 4-6 degrees Fahrenheit on a 300-foot section of unshaded stream. Although the NJDEP prohibits removal of vegetation along trout-associated waterways, local planning boards must be diligent in seeing these rules enforced.

Preservation and Conservation—Land and Living Resources

As in the protection of water resources, there is a direct link between preservation of land and the preservation of living resources, since plants and animals can only be protected by preserving their habitat. Although all undeveloped lands provide a form of habitat, some areas are particularly significant. For example, large tracts of contiguous forest are especially valued due to their rarity and importance to sensitive wildlife. The largest remaining tracts of forest are located in the southern part of the Borough, west of Rt. 287. Other significant forested lands are in the north and northwest and along the Pequannock River. Currently the majority of these lands are privately owned.

In addition, links between these undeveloped areas are critical, providing corridors that allow wildlife to move across different lands and habitat types. In this regard stream and river corridors offer vital connections in Riverdale, as many of them have remained largely intact. These riparian corridors can also offer the public access to lands and waters for fishing, hiking and boating, and, as discussed, provide great water quality benefits.

A good example is the riparian land adjacent to an unnamed tributary of the Pequannock River that connects Federal Hill, Appelt Park, Glenburn, undeveloped property near the Riverdale Quarry, and forested lands adjacent to Home Depot (see Figure VII-3). Recently the Borough has begun to explore options for redevelopment of the quarry property. The protection and/or

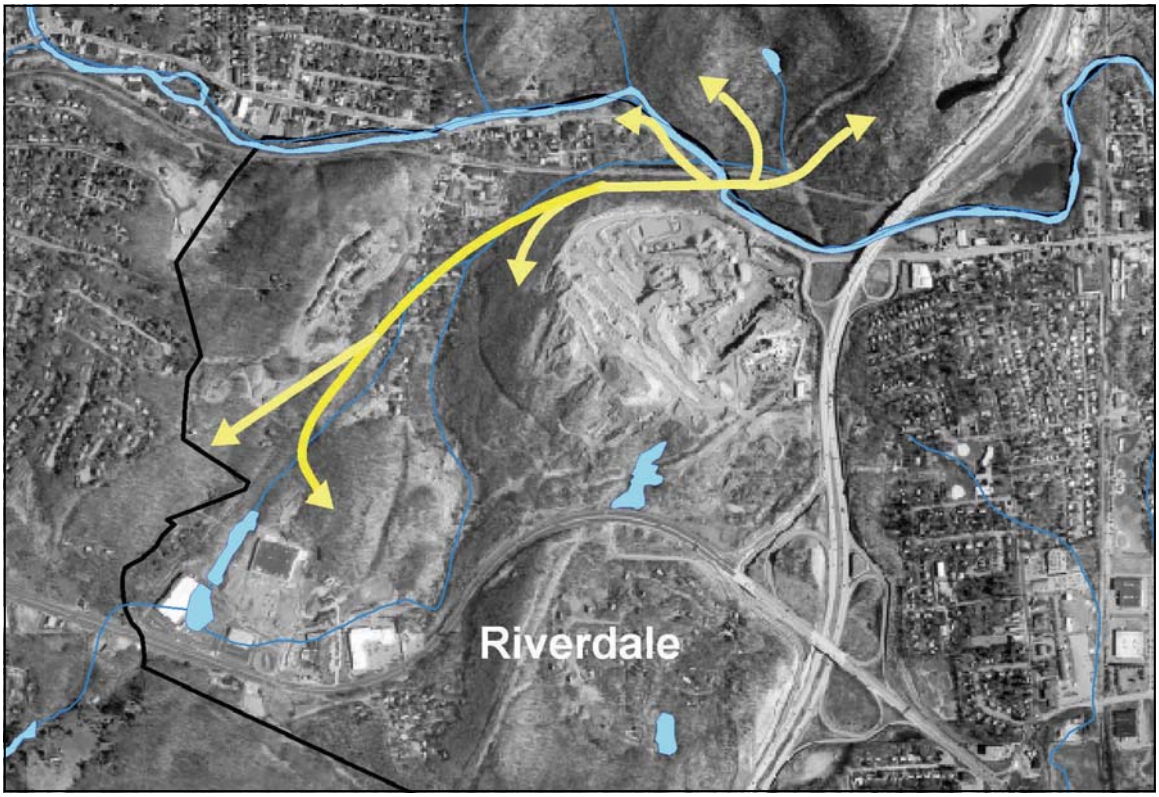


Figure VII-3 Land linkage provided by riparian corridors

restoration of these linkages should be a central element in these plans.

Figure VII-4 Appelt Park

The Borough of Riverdale has already taken major steps toward securing key lands with the adoption of an Open Space and Recreation Plan, an Open Space Fund and the creation of the Riverdale Land Conservancy to oversee these initiatives. Targeting acquisition of key lands that offer wildlife habitat, water quality protection, public access, and/or linkages will ensure that vital natural resources are conserved.

While acquisition of land is the most certain means of protecting resources, not all important properties can or should be acquired. Conservation of private holdings including forested land, steeply sloped areas, wetlands, floodplains, and riparian corridors may be fostered through educational efforts or municipal regulation. Again, Riverdale has taken some steps toward these goals in adoption of a Steep Slope Protection Ordinance. Similar ordinances can be used to promote forest protection and riparian preservation. Although the New Jersey Stormwater Management Rules afford protection to some riparian buffers, these regulations apply only to major development. Included in Appendix C and D are model ordinances addressing forest and riparian land protection.

Educating the public on the sensitivity of local waterways and the importance of protecting riparian areas can also yield increased protection.


Figure VII-5 Whitetail Deer

At some point in the future the Borough of Riverdale will face the problem of managing the Borough's whitetail deer. Deer are prolific, with females typically producing 2 offspring each year. Left unchecked, this population growth eventually exceeds the carrying capacity of the land, leading to over-browsing of vegetation. This often benefits non-native vegetation that deer do not utilize, and results in degradation of the overall habitat for a wide range of animals.

While controversial, controlled hunting has been shown to be an effective and viable option for keeping deer herds in balance with the land.[7]

Restoration

Restoring the natural resources of Riverdale relies on identifying locations where losses have occurred and developing plans or methods to address them. Potential goals should include:

- Restoration of riparian vegetation
- Restoration of wetlands and floodplains
- Reduction of impervious cover
- Improvement of stormwater management
- Control of invasive vegetation

In some cases, as noted, this work can occur as land uses change and properties are redeveloped. One example is redevelopment recently proposed for lands along the Pequannock River near Riverdale Road. The proposal provides for improved stormwater management, reductions in impervious cover and restoration of riparian lands . Borough planning and zoning boards can take advantage of such opportunities by recognizing the environmental sensitivity of particular areas and fostering improvements through zoning changes or site plan specifics.

Private landowners can be encouraged to adopt landscaping methods and practices that further restoration goals. Suburban landscaping sometimes results in denuded stream banks, leading to increased erosion, higher water temperatures and loss of wildlife habitat (see Figure VII-6). Responsible fertilizer, herbicide and pesticide use and the replanting of vegetation along waterways can improve water quality dramatically. Landowners can also be alerted to the presence of invasive vegetation and the need for its removal. Typically homeowners have little understanding of the sensitivity of natural resources or the role they play in protecting them.

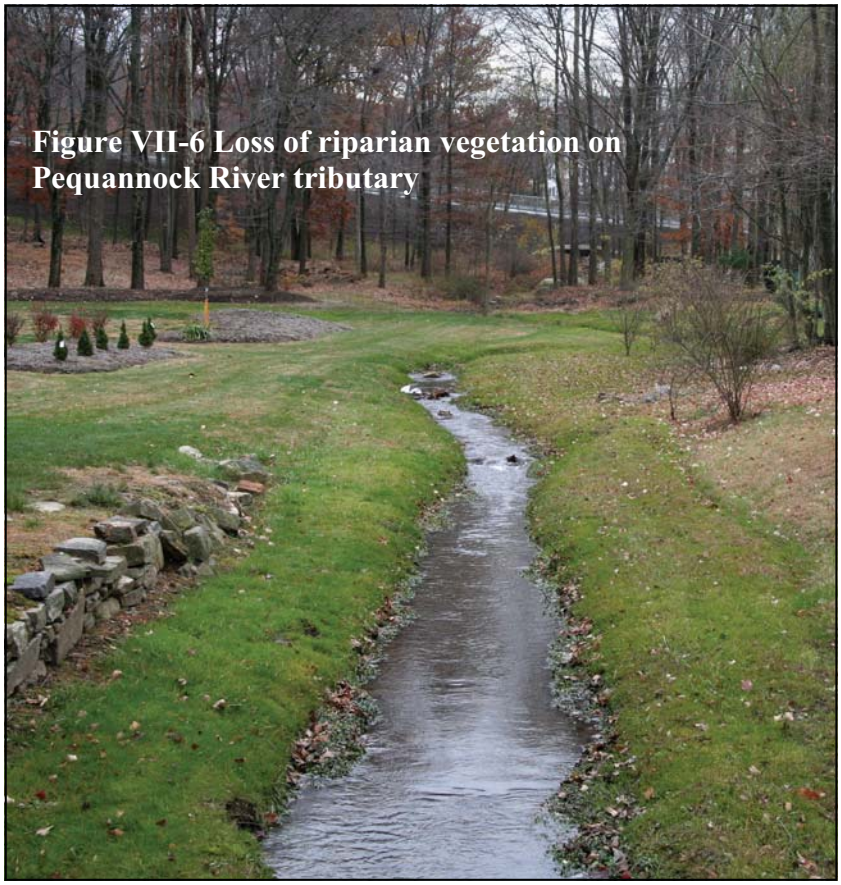


Figure VII-6 Loss of riparian vegetation on Pequannock River tributary

Publicly owned lands can best be restored by collaborating and cooperating with other organizations, particularly

conservation or environmental groups. In fact, these cooperative efforts are already occurring. In 2004 the Pequannock River Coalition began restoring a section of riverbank on the Pequannock River that had been stripped of vegetation during a County road project. Trees and shrubs were replanted to reduce erosion and restore a shading canopy on this section of the river (see Figures VII-7 and VII-8).

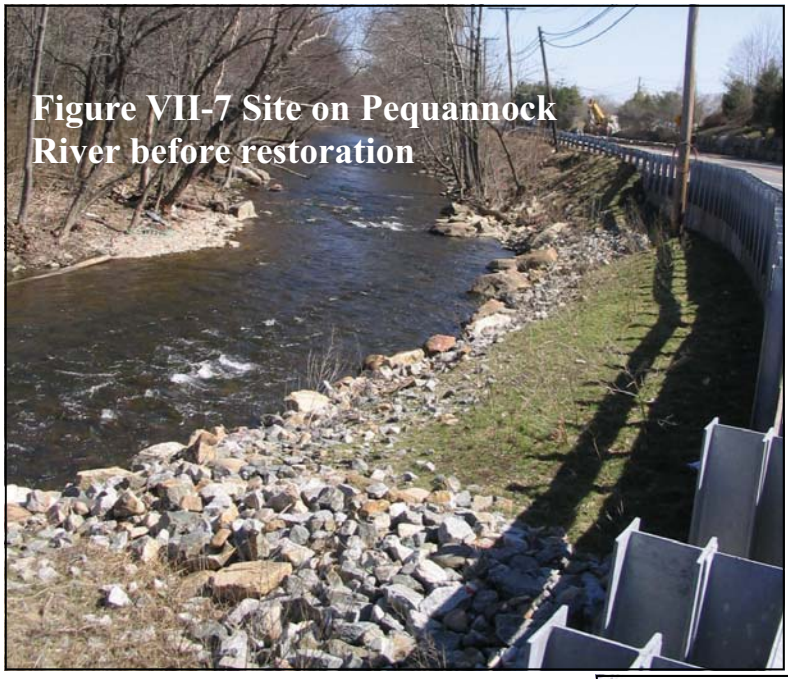


Figure VII-7 Site on Pequannock River before restoration

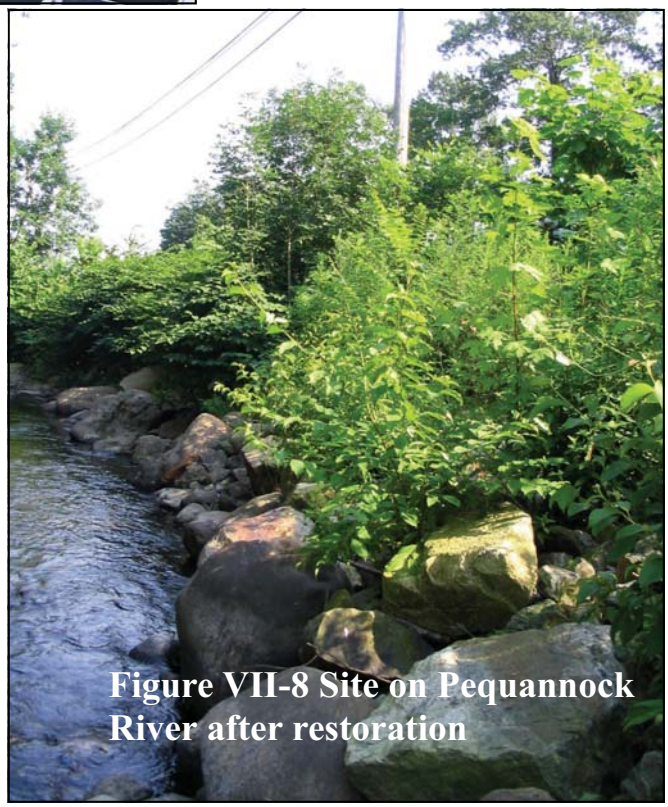


Figure VII-8 Site on Pequannock River after restoration

The Highlands Water Protection and Planning Act

A new and important factor in the preservation of natural resources in Riverdale is the Highlands Water Protection and Planning Act, adopted by the State of New Jersey in 2004.

In framing this Act the legislature declared that the "*...New Jersey Highlands is an essential source of drinking water, providing clean and plentiful drinking water for one-half of the State's population, including communities beyond the New Jersey Highlands, from only 13 percent of the State's land area; that the New Jersey Highlands contains other exceptional natural resources such as clean air, contiguous forest lands, wetlands, pristine watersheds, and habitat for fauna and flora, includes many sites of historic significance, and provides abundant recreational opportunities for the citizens of the State*."[8]

The Act created a 15-member Highlands Council, charged with implementation of the Act and with creation of a Regional Master Plan for this area. To safeguard these resources the Act divided the entire New Jersey Highlands region into two areas—the Preservation Area and the Planning Area (see Figure VII-9). Within the Preservation Area the stated goals of the Act are:

1. protect, restore, and enhance the quality and quantity of surface and ground waters therein;
2. preserve extensive and, to the maximum extent possible, contiguous areas of land in its natural state, thereby ensuring the continuation of a Highlands environment which contains the unique and significant natural, scenic, and other resources representative of the Highlands Region;
3. protect the natural, scenic, and other resources of the Highlands Region, including but not limited to contiguous forests, wetlands, vegetated stream corridors, steep slopes, and critical habitat for fauna and flora;
4. preserve farmland and historic sites and other historic resources;
5. preserve outdoor recreation opportunities, including hunting and fishing, on publicly owned land;
6. promote conservation of water resources;
7. promote brownfield remediation and redevelopment;
8. promote compatible agricultural, horticultural, recreational, and cultural uses and opportunities within the framework of protecting the Highlands environment; and
9. prohibit or limit to the maximum extent possible construction or development which is incompatible with preservation of this unique area.[9]

In the Planning Area the stated goals are:

1. protect, restore, and enhance the quality and quantity of surface and ground waters therein;
2. preserve to the maximum extent possible any environmentally sensitive lands and other lands needed for recreation and conservation purposes;
3. protect and maintain the essential character of the Highlands environment;
4. preserve farmland and historic sites and other historic resources;
5. promote the continuation and expansion of agricultural, horticultural, recreational, and cultural uses and opportunities;
6. preserve outdoor recreation opportunities, including hunting and fishing, on publicly

owned land;
7. promote conservation of water resources;
8. promote brownfield remediation and redevelopment;
9. encourage, consistent with the State Development and Redevelopment Plan and smart growth strategies and principles, appropriate patterns of compatible residential, commercial, and industrial development, redevelopment, and economic growth, in or adjacent to areas already utilized for such purposes, and discourage piecemeal, scattered, and inappropriate development, in order to accommodate local and regional growth and economic development in an orderly way while protecting the Highlands environment from the individual and cumulative adverse impacts thereof;
10. promote a sound, balanced transportation system that is consistent with smart growth strategies and principles and which preserves mobility in the Highlands Region.[10]

The New Jersey Department of Environmental Protection adopted a series of new regulations to preserve Highlands' resources. However, at present these regulations only apply to the Highlands Preservation area, while Riverdale Borough is entirely within the Planning Area.

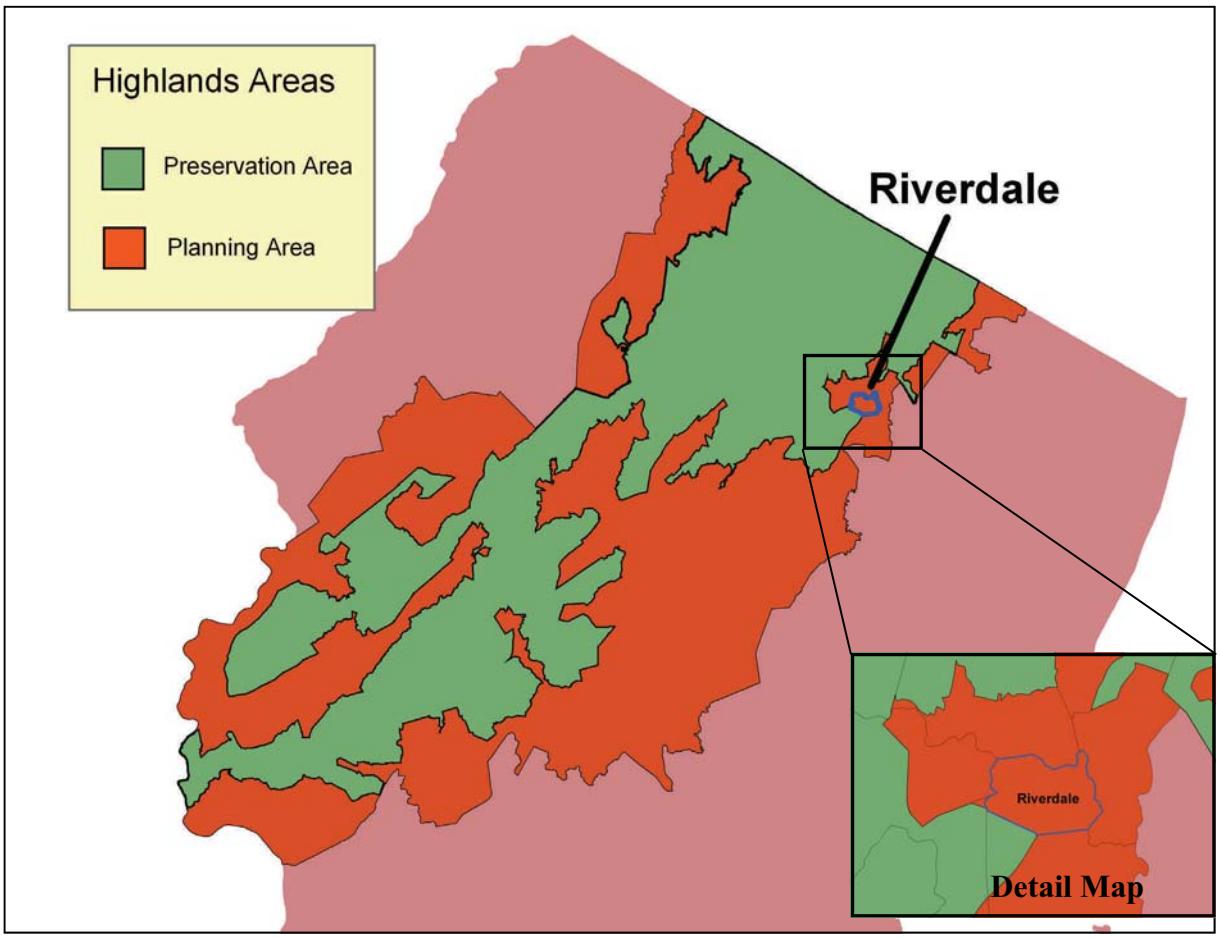


Figure VII-9 New Jersey Highlands
(This map was developed using NJDEP Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.)

At the time of this writing, the New Jersey Highlands Council had released a draft Regional Master Plan (RMP) for the New Jersey Highlands. Currently this plan is the subject of public comment and is likely to be substantially revised before adoption.

The RMP, when completed, should offer a wealth of information on natural resources in the Riverdale area. We anticipate that this information will be used in future iterations of this Inventory.

[1]Passaic River Coalition. 2005. *Borough of Riverdale Open Space and Recreation Plan.* Passaic River Coalition, Basking Ridge, NJ.
[2] *Ibid.*
[3] *Ibid.*
[4] *Ibid.*
[5] Fred Kelly. U.S. Department of Agriculture, Natural Resource Conservation Service. 2001. *Restoration of Urban Streams.* <http://www.state.nj.us/dep/watershedmgt/DOCS/Restoration%20of%20Urban%20Streams.pdf
[6] Kushner, Ross. 2004. *Pequannock River Temperature Impairment: Characterization, Assessment and Management Plan*. Pequannock River Coalition, Newfoundland, NJ.
[7] New Jersey Audubon Society. 2005. *New Jersey Audubon Society's Forest Health and Ecological Integrity Stressors and Solutions Policy White Paper.* New Jersey Audubon Society, Bernardsville, NJ. <http://www.njaudubon.org/Conservation/PDF/ForestHealthWhitePaper.pdf
[8]State of New Jersey. July, 2004. *Highlands Water Protection and Planning Act.* State of New Jersey. Trenton, NJ. <http://www.state.nj.us/dep/wmm/sgwqt/2006swqs.pdf.
[9] *Ibid.*
[10] *Ibid.*

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Appendix A—Glossary of Selected Terms

Alluvial—Relating to mud and/or sand deposited by flowing water.[1]

Aquifer—An area of underground soil or rock, both porous and permeable, that allows ground water to easily move. Aquifers are capable of yielding supplies of water and typically consist of unconsolidated deposits or gravel, sand, sandstone, granite, or fractured rock such as limestone. Aquifers can be classified as confined or unconfined.[2]

Deciduous- shedding or losing leaves annually; the opposite of evergreen. Trees such as maple, ash, cherry, and larch are deciduous.[3]

Floodplain—Mostly level land along rivers and streams that may be submerged by floodwater. A 100-year floodplain is an area which can be expected to flood once in every 100 years.[4]

Fluvial—Pertaining to a river or stream.[5]

Fragipan—A dense layer of soil, containing silt and sand but no organic matter and little clay, whose extreme hardness and impermeability are due primarily to compaction. [6]

Herbaceous- low-growing, non-woody plants, including wildflowers and ferns.[7]

Hydrologic/Hydrology—The science of water relating to occurrence, properties, distribution, circulation and transport of water.[8]

Infiltration—The downward entry of water through the soil surface into the soil. Infiltration constitutes the sole source of water to sustain the growth of vegetation and it helps to sustain the ground water supply to wells, springs, and streams. The rate of infiltration is influenced by the physical characteristics of the soil, soil cover (i.e. plants), water content of the soil, soil temperature, and rainfall intensity. The terms infiltration and percolation are often used interchangeably.[9]

Igneous (rock)—Any rock solidified from molten or partly molten material.[10]

Impervious cover - any surface in the urban landscape that cannot effectively absorb or infiltrate rainfall; for example, sidewalks, rooftops, roads, and parking lots.[11]

Metamorphic (rock)—Any rock derived from other rocks by chemical, mineralogical and structural changes resulting from pressure, temperature or shearing stress.[12]

Permeability—A measure of how well the spaces in the soil or rock are connected. Used to determine the ease with which rock, soil, or sediment will transmit water.[13]

Physiographic (province) - An area of land with similar terrain, rock types, geologic structure and history. The United States is divided into eight physiographic divisions, 25

physiographic provinces and 86 physiographic sections.[14]

Till, glacial—Glacial deposits composed of rock fragments ranging from clay to boulder size that are randomly arranged.[15]

Watershed—The entire area of land whose runoff of water, sediments, and dissolved materials (e.g., nutrients, contaminants) drain into a river, lake, estuary, or ocean.[16]

Wetland—A type of ecosystem, generally occurring between upland and deepwater areas, that provides many important functions, including fish and wildlife habitat, flood protection, erosion control, water quality maintenance, and recreational opportunities. A wetland is an area that is covered by water or has water-saturated soil during a portion of the growing season. In general, it is often considered the transitional area between permanently wet and dry environments.[17]

[1] U.S. Environmental Protection Agency. 2006. *Mid-Atlantic Integrated Assessment.* U.S.E.P.A., Washington, D.C. < http://http://www.epa.gov/maia/html/glossary.html
[2] *Ibid.*
[3] Forest Service, Maryland Department of Natural Resources. 2006. *Glossary of Forestry Terms.* Maryland Department of Natural Resources, Annapolis, MD. <http://www.dnr.state.md.us/forests/gloss.html
[4] U.S. Environmental Protection Agency. 2006. *Mid-Atlantic Integrated Assessment.* U.S.E.P.A., Washington, D.C. < http://http://www.epa.gov/maia/html/glossary.html
[5] *Ibid.*
[6] Iowa State University. 2006. *Illustrated Glossary of Geologic Terms.* Iowa State University, Ames, Iowa. <http://www.ge-at.iastate.edu/glossary.shtml
[7] Forest Service, Maryland Department of Natural Resources. 2006. *Glossary of Forestry Terms.* Maryland Department of Natural Resources, Annapolis, MD. <http://www.dnr.state.md.us/forests/gloss.html
[8] U.S. Environmental Protection Agency. 2006. *Mid-Atlantic Integrated Assessment.* U.S.E.P.A., Washington, D.C. < http://http://www.epa.gov/maia/html/glossary.html
[9] *Ibid.*
[10] University of California Museum of Paleontology. 2006. *Glossary.* University of California Museum of Paleontology, Berkeley, CA <http://www.ucmp.berkeley.edu/glossary/glossary.html
[11] U.S. Environmental Protection Agency. 2002. *Glossary for the Eight Tools of Watershed Protection.* <http://www.epa.gov/watertrain/protection/glossary.html
[12] University of California Museum of Paleontology. 2006. *Glossary.* University of California Museum of Paleontology, Berkeley, CA <http://www.ucmp.berkeley.edu/glossary/glossary.html
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[16] U.S. Environmental Protection Agency. 2006. *Mid-Atlantic Integrated Assessment.* U.S.E.P.A., Washington, D.C. < http://http://www.epa.gov/maia/html/glossary.html
[17] *Ibid.*

Appendix B—Wildlife of Riverdale

In 1989 the Borough of Bloomingdale commissioned a Natural Resource Inventory. This Inventory was created by the firm Geonics with assistance from the Bloomingdale Environmental Commission. The document provided a list of potential wildlife in the Bloomingdale area, and is a reasonable staring point for a wildlife inventory of Riverdale. It is included here with supplemental data provided by the author and by Don Pruden, a noted naturalist living in Riverdale who has created an extensive photographic record of local wildlife.

List of Mammals

"Xp" indicates that a photographic record of this animal exists. Habitat preferences are listed as W-woodland; O-open country (meadows, fields); R-riparian habitat (streams, lakes, wetlands). State threatened and endangered species are also indicated (* - endangered, **- threatened).

Common name	Latin name	Potential (from Geonics)	Observed (Don Pruden and Ross Kushner)	Habitat Preference
Black Bear	*Ursa americanus*	X	Xp	W
Beaver	*Castor canadensis*		X	R
Bobcat**	*Felix rufus*	X		W
Cottontail Rabbit	*Sylvilagus floridanus*	X	Xp	W/O
Coyote	*Canis latrans*		X	W/O
Eastern Chipmunk	*Tamias striatus*	X	Xp	W
Eastern Mole	*Scalopus aquaticus*	X	X	W/O
Gray Fox	*Urocyom cinereoargenteus*	X		W/O
Grey Squirrel	*Sciurus carolinensus*		X	W
Little Brown Bat	*Myotis lucifugus*	X	Xp	W/O/R
Long Tailed Weasel	*Mustela frenata*	X		W/O
Masked Shrew	*Sorex cinereus*	X		W/O
Meadow Vole	*Microtus pennsylvanicus*	X		O
Mink	*Mustela vison*	X	X	R
Muskrat	*Ondatra zibethicus*	X	X	R
Opossum	*Didelphus marsupalis*	X	X	W/O
Raccoon	*Procyon lotor*	X	X	W/O/R
Red Fox	*Vulpes fulva*	X	Xp	W/O
Red Squirrel	*Tamiasciurus hudsonicus*	X		W
River Otter	*Lutra canadensis*	X	X	R

List of Mammals (continued)

"Xp" indicates that a photographic record of this animal exists. Habitat preferences are listed as W-woodland; O-open country (meadows, fields); R-riparian habitat (streams, lakes, wetlands). State threatened and endangered species are also indicated.

Common name	Latin name	Potential (from Geonics)	Observed (Don Pruden and Ross Kushner)	Habitat Preference
Striped Skunk	*Mephitus mephitus*	X	X	W/O
Southern Red-backed Vole	*Cletbrionomys gapperi*	X		O
Southern Bog Lemming	*Synaptomys cooperi*	X		O
Southern Flying Squirrel	*Glaucomys volans*		X	W
White-footed Mouse	*Peromyscus leucopus*		X	W/O
White-tailed Deer	*Odocoileus virginianus*	X	Xp	W/O
Woodchuck	*Marmota monax*		X	O

List of Birds

"Xp" indicates that a photographic record of this bird exists. State threatened and endangered species are also indicated (* - endangered, **- threatened).

Common name	Latin name	Potential (from Geonics)	Observed (Don Pruden and Ross Kushner)
American black duck	*Anas rubripes*	X	X
American bittern*	*Botarus lentiginosus*		Xp
American Coot	*Fulica americana*	X	
American goldfinch	*Sinus tristus*	X	X
American woodcock	*Philohela minor*	X	
Barn swallow	*Hirundo rustica*	X	
Barred owl**	*Strix varia*	X	
Belted kingfisher	*Ceryle alcyon*		Xp
Black-capped chickadee	*Parus atricapillus*		X
Black-crowned night heron**	*Nycticorax nycticorax*		X
Black vulture	*Coragyps atratus*		X
Blue jay	*Cyanocitta cristata*	X	X
Blue-winged teal	*Anas discors*	X	
Bobwhite quail	*Colinas virginianus*	X	X
Broad winged hawk	*Buteo platypteris*		X
Canada goose	*Branta canadensis*	X	Xp
Cardinal	*Richmondena cardinalis*	X	X
Carolina chickadee	*Parus carolinensis*	X	
Catbird	*Dumatella carolinensis*	X	X
Cedar waxwing	*Bombycilla cedorum*		Xp
Chimney swift	*Chaetura peligica*	X	X
Chipping sparrow	*Spizella passerina*	X	X
Common crow	*Corvus btachyrhynchos*	X	X
Common grackle	*Quiscalus quiscula*	X	X
Common merganser	*Mergus merganser*	X	
Common night hawk	*Chordeiles minor*	X	
Common snipe	*Gallinago gallinago*	X	

List of Birds (continued)

"Xp" indicates that a photographic record of this bird exists. State threatened and endangered species are also indicated (* - endangered, **- threatened).

Common name	Latin name	Potential (from Geonics)	Observed (Don Pruden and Ross Kushner)
Common sparrow	*Spizella pusilla*	X	
Common yellowthroat	*Geothlypis trichus*	X	
Cooper's hawk**	*Accipiter cooperii*		X
Downy woodpecker	*Picoides pubescens*	X	
Eastern bluebird	*Sialis sialis*		X
Eastern kingbird	*Tyrannus tyrannus*	X	
Eastern phoebe	*Sayomis phoebe*		X
Gadwall duck	*Anas strepera*		X
Great blue heron	*Ardea berodias*	X	Xp
Great egret	*Casmerodius albus*		Xp
Great horned owl	*Bubo virginianus*	X	X
Green heron	*Butorides virescens*		X
Hairy woodpecker	*Picoides villosus*	X	
Hermit thrush	*Catharsus guttatus*	X	
Hooded merganser	*Lophodytes cucullatua*		Xp
House sparrow	*Passer domesticus*	X	
House wren	*Troglodytes aedon*	X	
Least bittern	*Ixobrychus exilis*		Xp
Mallard duck	*Anas platyrhynchas*	X	Xp
Mute swan	*Cygnus olor*		X
Northern mocking bird	*Mimus polyglottos*		Xp
Northern oriole	*Icterus galbula*		X
Northern rough-winged sparrow	*Stelgidopteris serripennis*	X	
Osprey**	*Pandion haliaetus*		X
Pied-billed grebe	*Podylimbus podiceps*	X	
Pileated woodpecker	*Dryocopus pileatusi*		Xp
Red-eyed vireo	*Vireo olivaceus*	X	

List of Birds (continued)

"Xp" indicates that a photographic record of this bird exists. State threatened and endangered species are also indicated (* - endangered, **- threatened)..

Common name	Latin name	Potential (from Geonics)	Observed (Don Pruden and Ross Kushner)
Red-tailed hawk	*Buteo jamaicensis*		Xp
Red-winged blackbird	*Agelainus phoeniceus*	X	X
Red/Yellow shafted flicker	*Colaptes auratus*	X	X
Robin	*Turdus migratorius*	X	Xp
Rubythroated hummingbird	*Archilochus colubris*		X
Rufous-sided towhee	*Pipilo erythropthalmus*	X	X
Scarlet tanager	*Piranga olivacea*		Xp
Screech owl	*Otis asio*	X	X
Short eared owl*	*Asio flammeuis*	X	
Song sparrow	*Melospiza melodia*	X	X
Spotted sandpiper	*Aetitus macularia*	X	
Starling	*Sturnus vulgaris*	X	X
Swamp sparrow	*Melospiza georgiana*	X	
Turkey vulture	*Cathartes aura*		Xp
Virginia rail	*Rallus limicola*	X	
Whip-poor-Will	*Caprimulgus vociferous*		X
White-eyed vireo	*Vireo grisus*	X	X
Wild turkey	*Meleagris gallopavo*		Xp
Winter wren	*Troglodytes troglodytes*	X	
Wood duck	*Aix sponsa*	X	Xp
Wood thrush	*Hylocichla mustelina*		
Yellow-crowned night heron**	*Nyctanassa violaceus*		X

List of Reptiles and Amphibians

"Xp" indicates that a photographic record of this animal exists. State threatened and endangered species are also indicated (* - endangered, **- threatened)..

Common name	Latin name	Potential (from Geonics)	Observed (Don Pruden and Ross Kushner)
American toad	*Bufo americanus*		Xp
Black rat snake	*Elaphe o. obsoleta*		Xp
Bull frog	*Rana catesbeiana*	X	Xp
Common snapping turtle	*Chelydra s. serpentina*	X	Xp
Cricket frog	*Acris crepitans*		Xp
Eastern box turtle	*Terrapene c. carolina*	X	Xp
Eastern garter snake	*Thamnophis s. sirtolis*	X	Xp
Eastern painted turtle	*Chrysemys p. picta*	X	Xp
Eastern red-spotted newt	*Notophthalmus viridescens*		Xp
Five-lined skink	*Eumeces fasciatus*		Xp
Gray tree frog	*Hyla versicolor*		Xp
Green frog	*Rana clamitans*	X	Xp
Marbled salamander	*Ambystoma opacum*	X	
Northern black racer	*Coluber c. constrictor*	X	
Northern red salamander	*Pseudotriton r. ruber*	X	
Northern water snake	*Natrix s. sipedo*	X	Xp
Pickerel frog	*Rana palustris*	X	Xp
Spotted turtle	*Clemmys guttata*		Xp
Timber rattlesnake*	*Crotalus h. horridus*	X	
Wood frog	*Rana sylvatica*	X	Xp
Wood turtle**	*Clemmys insculptata*	X	Xp

List of Fish

Common name	Latin name	Observed (Ross Kushner)
Bass, largemouth	*Micropterus salmoides*	X
Bass, smallmouth	*Micropterus dolomieui*	X
Bluegill sunfish	*Lepomis macrochirus*	X
Blacknose dace	*Rhinichthys atratulus*	X
Brown bullhead	*Ictalurus nebulosus*	X
Brown trout	*Salmo trutta*	X
Carp	*Cyprinus carpio*	X
Chain Pickerel	*Esox niger*	X
Common shiner	*Notropis cornutus*	X
Creek chub	*Semotilus atromaculatus*	X
Fallfish	*Semotilus corporalis*	X
Pumpkinseed sunfish	*Lepomis gibbosus*	X
Tessellated darter	*Etheostoma olmstedi*	X
White sucker	*Catostomus commersoni*	X
Yellow perch	*Perca flavescens*	X

Appendix C—Model Tree Protection Ordinance

This model ordinance has been prepared by the 10 Towns Great Swamp Watershed Committee as a prototype for adoption by its municipal government members

1. PURPOSE

(Insert municipal name) having found that indiscriminate, uncontrolled and excessive destruction, removal and clear cutting of trees upon lots and tracts of land results in increased drainage control costs, increased soil erosion and sedimentation, decreased fertility of the soil, degradation of water resources, decreased groundwater recharge, increased buildup of atmospheric carbon and increased dust and decreased property values, all of which negatively affect the character of *(insert municipal name)*.

(Insert municipal name) realizing that the removal of trees adversely affects the health, safety and general welfare of our residents, desires to regulate and control indiscriminate and excessive cutting of trees by preserving the maximum possible number of trees in the course of development of a site, ensuring that the health of trees preserved on a site is maintained throughout the development process, protecting larger, older specimens of trees and encouraging innovative design and grading to promote the preservation of existing trees.

It is recognized that there is a strong relationship between the integrity of *(Insert municipal name)* and the region's water resources, the development on steep slopes, tree removal, soil disturbance, stormwater management and the general use of land resources. Therefore, the appropriate management of these resources is an important health, safety and general welfare concern.

2. APPLICABILITY

With the exception of the exemptions set forth in Section 5 of this ordinance, no tree shall be cut or otherwise removed from any lands in *(insert municipal name)* without a tree removal permit. All applications to the Planning Board or Zoning Board of Adjustment for approval of a major subdivision, minor subdivision or site plan requiring tree removal shall include an application for a tree removal permit. Any residential, commercial, business or industrial lot owner wishing to remove trees upon said lot must comply with the Section 8 of this ordinance. The application shall be submitted to *(insert appropriate municipal office)* for review and approval. No tree that was planted or preserved as part of any landscape plan or in accordance with any street tree requirements approved in conjunction with a subdivision or site plan shall be removed, except for such trees directed to be removed pursuant to Section 5, subsection F, G, H & I.

3. DEFINITIONS

(Municipalities should include the following definitions in their adopted ordinance unless the definition is already provided for in the adopted zoning ordinance)

Board - the municipal agency, either Planning Board or Zoning Board of Adjustment, to which the application for tree removal permit is submitted.

Caliper - Standard measure of tree size for trees to be newly planted. The measurement is taken 6 inches above the ground for trees 4 inches in diameter or less and 12 inches above the ground for trees over 4 inches in diameter.

Clear Cutting - the removal of all standing trees on a lot or a portion of a lot.

Diameter at Breast Height - diameter of a tree measured four and one-half (4 ½) feet (forestry method) above the ground level on the downhill side for existing trees. Diameter at Breast Height may appear as the abbreviation "DBH" (Diameter Breast Height).

Drip Line - a limiting line established by a series of perpendicular drop points marking the maximum radius of the crown of an existing tree, but not less than six (6) feet from the trunk, whichever is greater; and within which no construction or disturbance shall occur.

Replacement Tree - a nursery-grown certified tree, properly balled, marked with a durable label indicating genus, species and variety, and satisfying the standards established for nursery stock and installation thereof, set forth by the American Association of Nurseryman.

Selective Cutting - the removal of larger trees on an individual basis while leaving trees of lesser size.

Silviculture - the management of any wooded tract of land to insure its continued survival and welfare, whether for commercial or noncommercial purposes, pursuant to a plan approved by the New Jersey Bureau of Forestry.

Thinning - the removal of undesirable, competitive, diseased or damaged trees so as to cultivate and improve the development of remaining trees on the lot.

Tree - any self supporting woody plant which reaches a typical mature height of twelve (12) feet or more at maturity and has a typical DBH of four (4) inches or greater.

Tree Canopy - the top layer or crown of mature trees.

Wooded Acres Permitted for Development - means the wooded lands within a lot or tract which are not specifically excluded from development by any federal, state, county or municipal law or ordinance, deed restriction or covenant running with the lands. For purposes of this Ordinance, those lands specifically eliminated from consideration as wooded acres permitted for development include, but are not limited to, wetlands as defined by N.J.S.A. 13:9B-1 et seq.

4. TREE CUTTING OR REMOVAL RESTRICTED

With the exception of the exemptions set forth in Section 5, no person shall cut or remove, or cause to be cut or removed, any existing tree with a diameter at breast height (DBH) of six (6) inches or greater upon any lands within *(insert municipal name)* unless the cutting or removal can be accomplished in accordance with the provisions of this ordinance.

5. EXEMPTIONS

The following shall be exempt from this ordinance:

A. Commercial nurseries and fruit orchards.
B. Christmas tree farms.
C. Residential lots that are less than two (2) times the minimum required lot size where removal is no more than three (3) trees with a ten (10) inch DBH or less in any two (2) year period.
D. Residential lots that are greater than two (2) times the required lot size and are removing no more than six (6) trees with a ten (10) inch DBH or less in any two (2) year period.
E. Any tree which is part of a cemetery.
F. Trees directed to be removed by municipal, county, state or federal authority pursuant to law.
G. Removal of trees which are dead, dying or diseased, or trees which have suffered damage, or any tree whose angle of growth makes them a hazard to structures, roads, or human life.
H. Removal of trees which appear to cause structural damage to buildings or foundations.
I. Any tree growing on or over a public right-of-way or public land.
J. Pruning or removal of trees within the right-or-way by utility companies for maintenance of utility wires or pipelines and the pruning of trees within sight easements.
K. Trees removed in conjunction with farmland greater than five (5) acres in size that will be actively devoted primarily to agricultural uses and that yield a minimum annual income of five hundred dollars ($500) from said farming activities except that where the owner desires to remove any trees for the purpose of expanding farmlands, an inventory of trees to be removed, identified by size and species, shall be prepared and filed with the *(insert appropriate municipal officer)* prior to any tree removal. In the event the expanded farmlands are not actively devoted primarily to farming activities for a period of seven (7) years following tree removal, the tree replacement provisions contained in Section 7 shall apply.
Those projects which have received major subdivision or site plan approval prior to the effective date of this Ordinance and amended major subdivision and site plans.

6. TREE REMOVAL REQUIREMENTS FOR MAJOR AND MINOR SUBDIVISIONS AND SITE PLANS

Each application to the Planning Board or Zoning Board of Adjustment *(insert appropriate municipal office)* for approval of a major or minor subdivision or a site plan that requires the removal of trees shall include an application for a tree removal permit. The applica-

tion and development proposal shall conform to the following provisions:

A. **Application Form** - The application form may be obtained from the *(insert appropriate municipal officer)* and shall include the following information :

1. Name and address (street, lot and block) of the owner of the premises and status of legal entity (individual, partnership, corporation of this or any other state, etc.);

2. Description of the premises where removal is to take place, including lot and block numbers, street address as assigned;

3. A list of all trees to be removed with a DBH equal to or greater than six (6)inches identified by size and species, including total number of each species to be removed;

4. Purpose for tree removal (new construction, street or roadway, driveway, utility easement, recreation areas, parking lot, etc);

5. Proof that there are no delinquent property taxes or assessments due on the property for which the application is submitted; and

6. Such other information as may be deemed necessary in order to effectively process and decide such application.

7. **Landscape Plan** - The following information shall be provided on a landscape plan prepared by a Registered Landscape Architect or Registered Professional Engineer and submitted with the application for tree removal. The landscape plan must be submitted prior to tree removal permit approval.

8. **Base information**

a. Location of existing tree canopy within the property boundaries.

b. Location of individual trees with a DBH equal to or greater than six (6) inches identified by size and species within the area of development/limit of disturbance.

c. Location of individual trees with a DBH equal to or greater than six (6) inches identified by size and species beyond the area of development/limit of disturbance.

d. Location of individual existing trees and their drip lines noted for preservation within the area of development/limit of disturbance identified by size and species. Where clusters of trees exist on the site or are contiguous with adjacent sites, fragmentation of the cluster shall be avoided where possible.

e. Location of all required replacement trees.

f. Clear labeling of the area(s) intended for tree/vegetation removal.

g. Tree protection material details and limit of disturbance line.

h. Location of existing and proposed buildings/structures.

i. All bodies of water and wetlands, including water retention and detention areas.

j. Location of all existing driveways and parking areas.

k. **Design Requirements**

l. Only those trees necessary to permit the construction of buildings, structures, streets, driveways, infrastructure and other authorized improvements shall be removed. Existing vegetation shall be preserved to the greatest extent feasible.

m. No more than sixty (60) percent of the existing tree canopy within the property boundaries shall be removed. The location of the remaining forty (40) percent of the tree canopy to be preserved shall be noted on the landscape plan. Steep slope limits of disturbance shall supersede this section when appropriate.

n. No more than ten (10) percent of existing trees with a DBH equal to or greater than ten (10) inches within the area of development/limit of disturbance shall be removed unless the applicant shall replant trees removed in accordance with Section 7.

o. Input from a designated subcommittee of the Board and/or the Shade Tree Committee *(Insert Planning Commission if other committees do not exist)* shall be requested for recommended areas of tree preservation.
p. Landscape standards may be waived by the Board when trees and/or shrub masses are preserved and/or relocated on-site that duplicate or essentially duplicate the landscape requirements contained in this section.
q. The appropriate reviewing authority shall have the option of requiring a conservation easement to protect any or all trees or tree canopy areas to remain on site.
r. **Site protection**
1. Tree protection measures and the limit of disturbance line shown on the landscape plan shall be provided in the field with snow fencing or other durable material and verified by the *(insert appropriate municipal officer)* or other designated official prior to soil disturbance.
2. Protective barriers shall not be supported by the plants they are protecting, but shall be self-supporting. Barriers shall be a minimum of four (4) feet high and shall last until construction is complete.
3. Chain link fence may be required for tree protection if warranted by site conditions and relative rarity of the plant.
4. Snow fencing used for tree protection shall be firmly secured along the drip line, but shall be no less than six (6) feet from the trunk.
5. The grade of the land located within the drip line shall not be raised or lowered more than six (6) inches unless compensated by welling or retaining wall methods; and in no event shall welling or retaining wall methods be less than six (6) feet from the trunk of a tree.
6. No soil stockpiling, storage of building materials, construction equipment or vehicles shall be permitted within the drip line or within six (6) feet of any remaining trees, whichever is greater.
7. Any clearing within the drip line, or within six (6) feet of the trunk of a remaining tree, whichever is greater, shall be done by hand-operated equipment.
Where a tree that has been noted for preservation is severely damaged and unable to survive, tree replacement shall occur as provided in Section 7.

7. TREE REPLACEMENT AND REFORESTATION

The replacement of trees shall occur as prescribed in the following table.

Tree Replacement Schedule	
Caliper of Existing Tree Removed	**Number of Replacement Trees (3" caliper)**
Less than 6 inches	1
Between 6 & 12 inches	3
Between 12 & 18 inches	4
Between 18 & 24 inches	5
Between 24 & 30 inches	7
Between 30 & 36 inches	10
36 inches or greater	The equivalent of 3" caliper trees or greater

1. Replacement tree(s) shall be of nursery grade quality, balled and burlapped and located on site. Where replacement trees are required but not suitable for the particular site prescribed due to the size of the site, *(insert municipal name)* shall deposit the trees into a community tree bank. Trees deposited into the community tree bank shall be utilized for planting on public lands (Policy Decision).
2. The type of replacement tree(s) shall be the same as the species removed from the site or other as approved by the *(governing body)*.
3. The planting of all replacement trees shall be done by or supervised by a person with horticultural training in tree care and planting methods.

Newly planted replacement trees shall be monitored for a period of one year to ensure the health of the trees. If the replacement trees die within the one year period, the developer/applicant shall replace the dead tree.

8. TREE REMOVAL AND PROTECTION ON RESIDENTIAL, COMMERCIAL, INDUSTRIAL AND BUSINESS ZONED LOTS (EXCLUDING MAJOR AND MINOR SUBDIVISIONS AND SITE PLANS)

A. **Applicability** - On any residential lot that is less than two timesthe required lot size with a tree removal rate of five (5) or more trees with a ten (10) inch DBH or greater in a two (2) year period; or, any residential lot that is twice the required lot size or greater with a tree removal rate of more than six (6) trees with a ten (10) inch DBH or greater in a two (2) year period shall submit an application for a tree removal permit to the *(appropriate municipal officer)*. The application and development proposal shall conform to the provisions contained herein.

B. The provisions of this section shall also **apply to all commercial, industrial and**

business zoned lots.

C. **Application Form** - The application form shall be available from the *(appropriate municipal officer)* and shall include the following information:

1. Name and address (street and lot and block) of the owner of the premises and status of legal entity (individual, partnership, corporation of this or any other state, etc.);
2. Description of the premises where removal is to take place, including lot and block numbers, and street address as assigned;
3. A list of all trees to be removed with a DBH equal to or greater than ten (10) inches identified by size and species, including total number of each species to be removed.
4. Purpose for tree removal (construction, building addition, street or roadway, driveway, utility easement, recreation area, patio, parking lot, etc.);
5. Such other information as may be deemed necessary in order to effectively process such application.

D. **Sketch Data**

1. Base information - A sketch shall be provided showing the location of the tree(s) to be removed with a DBH of ten (10) inches or greater.
2. Design requirement - Trees to be removed shall be those trees necessary to permit the construction of buildings or building additions, structures, driveways, septic fields, decks and lawn areas. The trees removed shall not consitute more than one half acre or shall be no more than 50 percent of the lot size, whichever is less. Existing vegetation shall be preserved to the greatest extent feasible.

E. **Site Protection** - Site protection measures shall be provided in accordance with Section 6C.

F. **Tree Removal Criteria** - In addition to the design requirements stated above, the *(insert appropriate municipal officer)* may grant a tree removal permit based upon one or more of the following circumstances:

1. Where the location of an existing tree provides no other alternative but to place a structure outside the permitted building setbacks.
2. Where the location of an existing tree negatively impacts on an existing septic field.
3. Where no other alternative exists for the placement of a building, building addition, strucuture, septic field, driveway, deck, patio or lawn area for the recreational use by the inhabitants of the building or dwelling, or any other authorized improvements, but in the vicinity of an existing tree.
4. Where the location or growth of a tree inhibits the enjoyment of any outdoor pool, patio or deck.
5. Where the location, angle or growth of an existing tree makes it a hazard to structures or human life.

G. **Review by Planning Board** - If, in the opinion of the *(insert appropriate municipal officer)*, the request for tree removal does not satisfy the above criteria, then the application may be forwarded to the Planning Board for action.

H. **Tree replacement** - Tree replacement shall be accordance with the provisions in Section 7 of this ordinance.

9. REVIEW STANDARDS

In accordance with the design requirements provided in this ordinance, unless otherwise indicated herein, a tree removal permit may only be granted for the following reasons and

under the following terms and conditions:

A. Where the area proposed for tree removal is to be occupied by: a building or other structure; a street or roadway; a driveway; a parking area; a patio; a swimming pool; a recreation area; a power, drainage, sewerage or any other utility line, easement, or right-of-way, or where the area of tree removal is 20 feet or less from either side of or around the perimeter of any of the foregoing, whichever is applicable.
B. In areas proposed for tree removal which are not to be occupied by any of the uses or facilities set forth in part A of this Section:
1. That the continued presence of such tree or trees is likely to cause danger to persons or property upon the property for which removal is sought, or upon adjoining or nearby property.
2. That the area where such tree or trees are located has a cut, depression or fill of land, or the topography of the land is of such a character as to be injurious or dangerous to such tree or trees, or to tree or trees located nearby.
3. That the removal of trees is for the purpose of conducting forestry activities, which activities include, but are not limited to, the harvesting of trees in accordance with a forest management plan and the thinning out of a heavily wooded area, with some trees to be removed, and other trees to remain.
C. Upon an express finding by the appropriate decisional authority that the proposed tree removal will not result in or cause, increase or aggravate any or all of the following conditions: impaired growth or development of remaining trees or shrubs on the property of the applicant or upon adjacent property, soil erosion, sedimentation and dust, drainage or sewerage problems, dangerous or hazardous conditions, and depression in the land value of the subject property and properties in the neighboring area.
D. The appropriate decisional authority shall have the power to affix reasonable conditions to the granting of the permit for the removal of trees.

10. PROTECTION OF TREES

Whenever an application for tree removal is granted under the terms and conditions of this ordinance, the following protective measures shall be observed:

A. No material or temporary soil deposits shall be placed within the drip line of any existing tree to be preserved.
B. Except while engaged in tree removal, no equipment shall be operated within six feet of any tree protected by this ordinance nor shall such equipment be operated at any time in such a manner as to break, tear, bruise, decorticate or otherwise injure any living or dormant tree. Except while engaged in tree removal, all requirements of Section 6 shall be observed.

11. PERMIT APPROVAL

A. **Time limits for approval**
1. Where the permit application is submitted as a part of an application for major subdivision, minor subdivision or site plan approval, the time for approval shall be governed by the timing requirements applicable to major subdivision, minor subdivision or site plans.

2. Where the application is made in connection with a residential, commercial, business or industrial lot that is not part of a major or minor subdivision or site plan, the *(insert appropriate municipal officer or body)* shall act on the application within thirty (30) days of its receipt or within such additional time as is consented to by the applicant. Failure to act within thirty (30) days, or any extension thereof, shall be deemed to be an approval of the application and thereafter, a tree removal permit shall be issued.

B. Approval by default with regard to major subdivision, minor subdivision and site plan applications, shall not be deemed to be a waiver of a tree removal permit.

12 DURATION OF PERMITS

Permits granted for the removal of trees under the terms and conditions of this ordinance shall run with the land and shall remain in force and effect for the following periods of time, and not thereafter. Once the permit has expired, a new application must be submitted for review and a new permit issued.

A. If granted for a lot or parcel of land for which no building permit is required - one year from the date of issuance.

B. If granted for a lot or parcel of land for which a building permit is required, but for which no site plan approval is required by the Planning Board, until expiration of the building permit granted with such tree removal permit.

C. If granted for a lot or parcel of land for which site plan approval from the Planning Board/Zoning Board is required as a condition precedent to obtaining a building permit - until expiration of the site plan approval, or expiration of the building permit issued after such site plan approval.

D. If granted for a lot or parcel of land for which minor subdivision is sought - one year from the date of granting such minor subdivision.

E. If granted for a lot or parcel or land for which preliminary approval of a major subdivision is sought - until expiration of such approval.

13. INSPECTION

A. Prior to taking final action upon any application for tree removal, an inspection of the site shall be made by the *(insert appropriate municipal officer, board or committee)*, in those cases where final determination is to be made by that body as to the granting or denial of an application.

B. Prior to any tree removal, all trees must be marked and areas to be cleared identified for inspection by a municipal representative.

C. The *(insert appropriate title)* shall periodically inspect the site throughout the duration of construction in order to ensure compliance with this ordinance.Such inspection shall be made of the site referred to in the application, and of contiguous and adjoining lands, as well as of lands in the vicinity of the application, for the purpose of determining drainage conditions and physical conditions existing thereon.

14. NOTICE OF COMMENCEMENT OF TREE REMOVAL

A. The holder of a tree removal permit shall notify the *(insert appropriate municipal officer)* in writing at least four (4) business days in advance of when the tree removal activity will commence.
B. The notice shall also include information as to the manner of disposal of the removed trees.
C. In the case of the removal of dead or diseased trees, the dead or diseased trees shall not be turned into mulch and applied to the site, but shall be disposed of in a manner so as to not disease other trees on site.

15. FEES

A review fee of ___ dollars shall accompany the application for tree removal.

16. PENALTIES

When regulated trees are removed without a tree removal permit, the affected areas shall be replanted to the satisfaction of the appropriate municipal authority.