

Area F: Memorial Park

Forester Avenue Bridge

The last bridge in this west to east trek is the Forester Avenue bridge. The Witch's Brook that meanders through the Village's natural area, Lewis Woodlands, enters the Wawayanda from the north, after flowing through an old culvert under the railroad right-of-way that seems barely adequate for this small stream. This area of Forester Avenue is famous for flooding and the enlarged pond area and low lying Memorial Park lands are a useful repository for high water during floods that threaten more built-up areas further downstream. From Forester Avenue, there are interesting views of the railroad bridge to the west and of the wetland area to the east in Memorial Park, where the confluence of Witch's Brook and the Wawayanda Creek is visible. A small restaurant along Forester Avenue has outdoor seating near Witch's Brook and the stream frontage could be emphasized and improved in this area.

Memorial Park Drive

Upon entering Memorial Park by foot or vehicle, the most noticeable feature is the pond on the north side of the Drive and the September 11th Memorial next to it that is cared for by the Warwick Valley Gardeners. Native pondside plantings would enhance the periphery of the pond that at present is solely mowed lawn. If opportunities exist to remove the nearby creekside concrete parking, it would be visually and environmentally beneficial. The pad could be replaced with a more generous parking area to the south of the drive constructed with permeable pavement to enhance the Creek's water quality. This area offers additional opportunities for installation of 'green infrastructure' such as rain gardens to slow and absorb water entering the Creek from culverts within park. Removing paved areas close to the Creek as much as possible, and installing green infrastructure storm-water practices to filter runoff flowing towards the Creek, are important steps for protecting and enhancing water quality and habitat, and can also help to incrementally mitigate flooding by capturing and slowing water before it reaches the Wawayanda.

Connections and Improvements

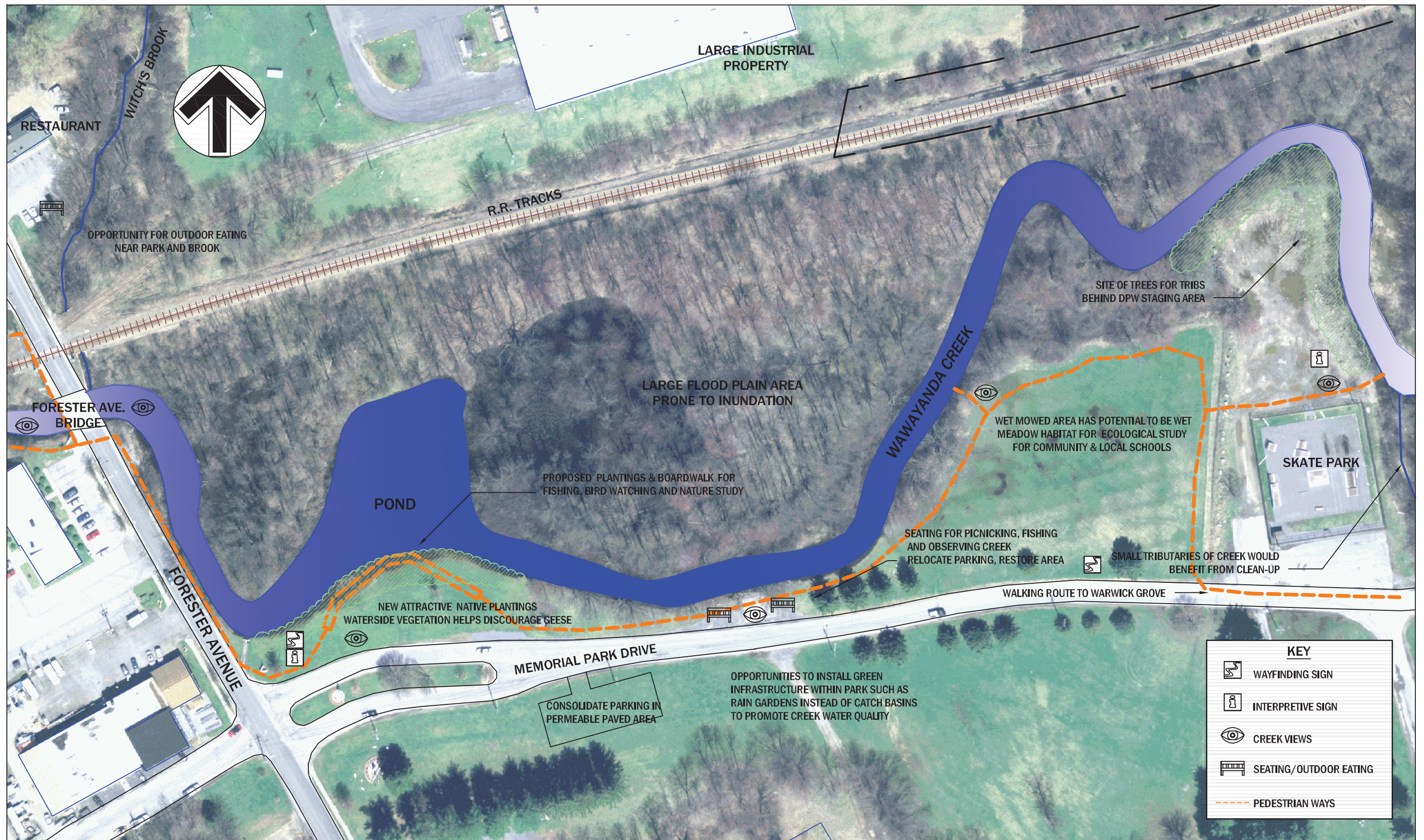
As a Village resource, Memorial Park offers generous open space that has habitat value as well as recreational opportunities. A new boardwalk passing through native plantings at the lake (proposed in this study) will discourage geese and increase the use of Memorial Park for passive recreation: exploring, strolling, nature study, fishing, bird watching, picnicking and relaxation. Currently science classes from the Park Avenue Elementary School use the lake for environmental study. A proposed small section of boardwalk for access over wet ground and thick native plantings to discourage geese and attract a greater variety of wildlife would be of interest to these classes as well as to others who are intrigued by the natural world. The large wet field to the east before the skate park is currently kept mowed but can be restored to a wet meadow with once yearly or biennial mowing. (*See Ecologist's Report, Appendix C.*)

The Creek frontage along the Village Department of Public Works staging area behind the skate park is now an area for the New York State Department of Environmental Conservation 'Trees for Tribs' program which has provided a variety of site appropriate riparian trees and shrubs for erosion control and water quality enhancement.

A leisurely pathway along the south side of the Creek can be established through the park before the Creek disappears into a heavily wooded area and flows north under the railroad right-of-way, the terminus of the study area. The pathway can then follow the park drive to eventually connect with Warwick Grove to the east and complete the connection to this pedestrian oriented residential community as well as to other Warwick area destinations such as the nearby Albert Wisner Public Library.



The Lake at Memorial Park Offers Opportunities for Nature Study and Could be Improved by Thick Plantings to Discourage Geese



AREA OF INTEREST - **F**
 VETERANS MEMORIAL PARK



The Wawayanda Creek Watershed & Water Quality



A Drainage Pipe Feeding into Witch's Brook before It Empties into the Wawayanda

Watersheds respect no municipal boundaries and the Wawayanda Creek is no exception as can be seen on the Watershed Map (opposite). This Map describes the extensive and circuitous drainage system that feeds the Creek segment that runs through the Village of Warwick. Activities and land use upstream may affect water quality as well as the quantity of stormwater run-off that impacts downstream areas. For this reason coordination with upstream communities, particularly the Town of Warwick, to solve watershed wide problems would be important for the Village to pursue.

Although focused on the immediate study area, recommendations, plans and strategies contained in this report strive to improve water quality, reduce erosion, restore biodiversity and create an example for a healthier watershed.

Water Quality - Existing Conditions

The Wawayanda Creek headwaters include a number of tributaries originating in the Town of Chester, the Town of Warwick, and in New Jersey. Selected tributaries briefly addressed in this report include Mistucky Creek, Witch's Brook, Long House Creek, and an unnamed tributary originating south of the Village of Warwick. For future planning purposes, the watershed of the Creek upstream of the Village can be addressed in a more comprehensive manner in a watershed plan that involves the Town and the Village, and possibly stakeholders in the New Jersey portion of the watershed, to create a framework for managing and restoring water resources, mitigating future flooding, and meeting other local and regional goals.

Water Quality Overview and Other Existing Data for Selected Streams and Waterbodies

Contained here is an overview of existing information about the Creek and several of its tributaries in the vicinity of the Village. The information presented here is aimed at describing water quality in the Wawayanda Creek and several tributary streams as it relates to the core study area for this project – the Creek corridor between Elm Street and Memorial Park. (It does not include information relevant to a broader view of water quality issues downstream of the Village.) This entire area is a sub-basin within the

larger Wallkill River watershed, which itself is tributary to the Rondout Creek and then to the Hudson.

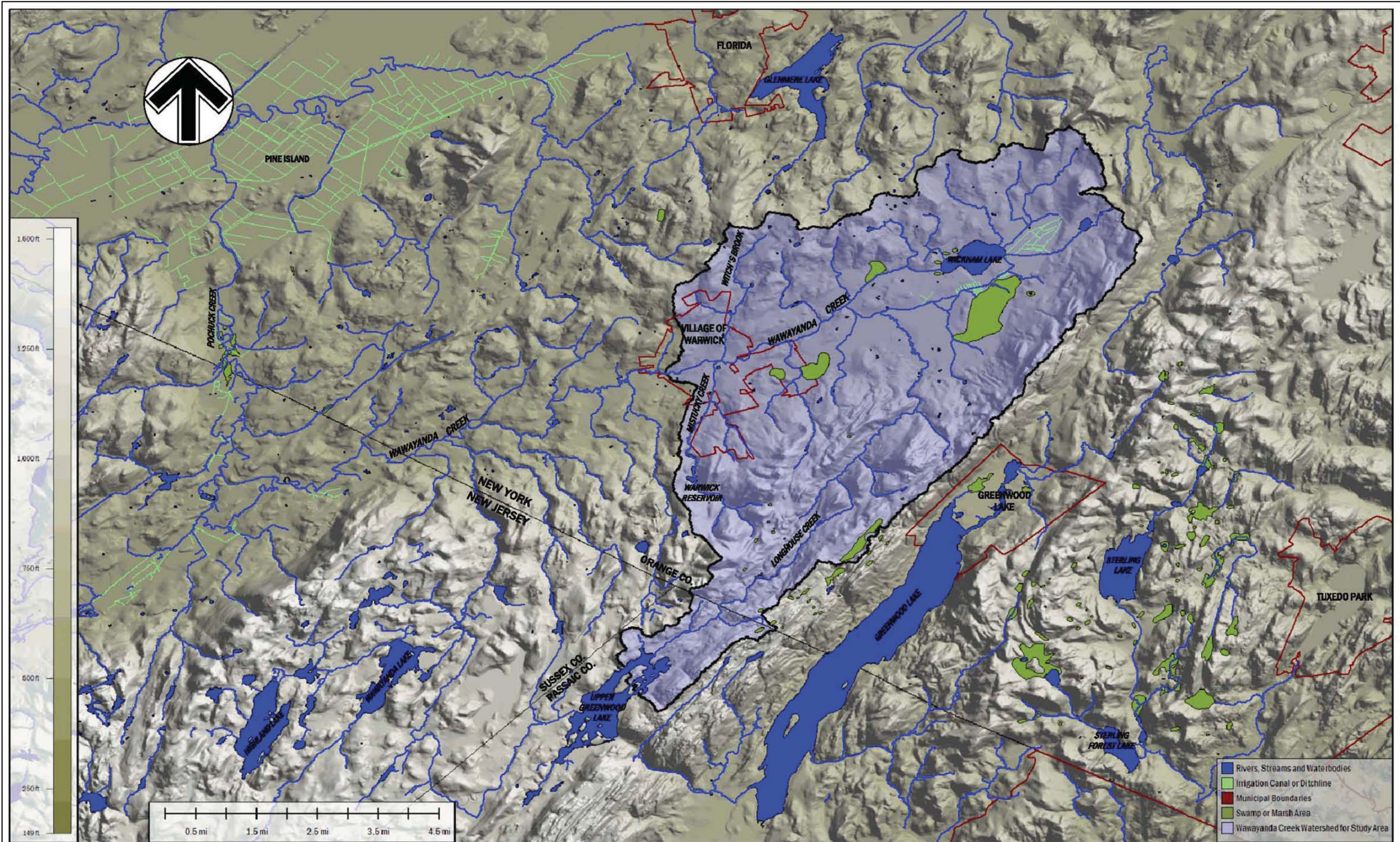
Wawayanda Creek Headwaters - Wickham Lake Area

An evaluation of existing information indicates that water quality downstream of Wickham Lake has experienced significant impacts over the years. The New York State Department of Environmental Conservation (NYS DEC) has conducted stream biomonitoring studies of the Wawayanda Creek upstream of the Village, at several sites downstream of Wickham Lake, beginning in 1989 (*see 30-year Trends Report*).¹³

NYS DEC also publishes a Waterbody Inventories and Priority Waterbodies Lists (PWL) for the whole state, and the Lower Hudson Basin Report published in August 2008¹⁴ describes conditions in the upper Wawayanda Creek, which is described as the area “above Warwick.” Notably, the PWL lists the Upper Wawayanda basin as being “stressed”, with the pollutant known to be causing impacts listed as nutrients (phosphorus), and another suspected source being silt/sediment. The suspected sources are listed as agriculture, urban/storm runoff, with several other possible sources also listed. Yet, the document does describe this portion of the stream as continuing to fully support aquatic life, a key criteria based on the stream’s classification, based on the NY DEC’s most recent report on the stream dated December 2004.

The NYS DEC stream biomonitoring method provides an index of water quality on a 0-10 scale termed a biological assessment profile, or BAP, where 10 is the highest water quality. NYS DEC has monitored water quality in the Wawayanda Creek near State School Road (the sampling site closest to Wickham Lake) and near Wisner Road, both upstream of the Village, and farther downstream at the River Street bridge near the Village boundary. The NYS DEC found BAP values at these sites from 1989-2002 ranging from a low of 3.34 at State School Road in 1989, to a high of 6.17 at River Street in 1995.

The Orange County Water Authority (OCWA) has conducted similar studies throughout the County using the NYS DEC methods beginning in 2004.¹⁵ OCWA has monitored a site on the Wawayanda Creek at Chancellor Lane, just upstream of the NYS DEC’s Wisner Road site (and downstream from NYS DEC’s State School Road site.) OCWA found a BAP value at this site of 3.90 in 2005, 2.87 in 2008, and 4.53 in 2009.



WAWAYANDA CREEK WATERSHED WITHIN STUDY AREA

While the 2009 findings indicate a significant improvement in water quality, a BAP of 4.53 remains below the 50th percentile of what water quality could be, and is considered by NYS DEC to be “moderately impacted.” OCWA had tentatively planned to monitor this site in 2010, at least in part based on the request of the Environmental Planner (Gruber) to the Village for this Wawayanda Creek Strategic Plan, but this did not occur. After consultations with NYS DEC monitoring staff, no monitoring was done by OCWA in 2011 (except for several sites monitored as part of a training workshop) due to the major flooding from Irene and Lee, which is likely to have reduced the numbers of macroinvertebrates enough to skew water quality findings.

Depending on the specific conditions and various technical and regulatory factors, a finding of moderate impact may trigger water quality planning and restoration measures including a finding that the water body is impaired which can lead to a requirement for development of a management and restoration plan known as a Total Maximum Daily Load, or TMDL.

Water quality conditions in Wickham Lake and downstream may have improved to some extent due to relatively recent wastewater infrastructure investments. At the same time, the water quality findings clearly suggest that there are significant ongoing impacts, which are likely due to a combination of factors including wastewater discharges, stormwater runoff, lawn maintenance (e.g. fertilizer and herbicide application) and agriculture. There is a wastewater treatment plant that discharges to the Wawayanda Creek headwaters upstream of the Village near Wickham Lake, and there are also individual onsite wastewater (septic) systems in various parts of the watershed.

Based on overall findings of the water quality studies in this and other nearby watersheds, and on our current understanding of water quality dynamics, it is likely that nutrient enrichment (from treated wastewater, lawn fertilizer, manure or other agricultural activities, and siltation) in Wickham Lake and in the Wawayanda Creek is a significant cause of the observed impacts.

If water quality conditions do lead to future listing of the Wawayanda Creek on the state’s impaired waterbody list (known as the 303d list) and it seems likely that a TMDL will be required, there are potential advantages available if the affected local municipalities are actively involved in developing the TMDL, rather than the more typical situation in which the NYS DEC leads the development process. A locally-driven process can potentially result in more local control of outcomes, a more flexible

approach to implementing restoration measures, and more effective use of locally-available knowledge and resources for implementing the findings of the TMDL.

Long House Creek

This tributary flows north from New Jersey and includes the outflow from Upper Greenwood Lake. In the Town of Warwick it flows through Cascade Lake, is joined by several smaller headwater streams, and then flows into the Wawayanda Creek north of the Village near Wisner Road. OCWA assessed water quality in Long House Creek above the Cascade Road bridge in 2005 and found a BAP value of 7.10, indicating relatively good water quality.

Unnamed tributary

This tributary originates in the Town, flows north through the Warwick County Park, and flows into the Wawayanda Creek near the southeast boundary of the Village. One site along this tributary, in the County Park, was monitored by OCWA in 2004 and the BAP value was 8.50, indicating very good water quality. At another OCWA monitoring site farther downstream at Village Green Court, the BAP value in 2004 was 6.70, perhaps reflecting the impacts of more impervious surfaces and other effects of road runoff and suburban development.

Mistucky Creek

Much of the water in this tributary originates upstream of, and flows through, the Warwick Reservoir. By the time it reaches the Wawayanda Creek, it also includes the flow from another smaller tributary that drains an area along Brady Road. OCWA monitored a site along this tributary at Cascade Road in 2004, finding a BAP value of 6.90. (Note: in OCWA’s report on this data, the stream is not named and is listed as site 5489_004). In the Village, notably, the Mistucky flows through Stanley Deming Park, potentially providing important opportunities for public access, water quality protection and restoration measures.

This area is near the Park Avenue Elementary School and is apparently easily reachable on foot by classes from the school, providing another potential linkage for public involvement, education, and community



Severely Eroded Banks of the Mistucky Creek in Stanley Deming Park

initiatives related to the stream. The banks of the Mistucky in Stanley Deming Park are significantly eroded by foot traffic and the lack of stabilizing vegetation.

Just downstream of the park, before the Mistucky reaches the Wawayanda Creek, it has apparently been subject to an earlier diversion project. Earlier mapping and aerial imagery, as well as historical information, indicate that there was a pond (ice pond as described previously) along the Mistucky just before it joined the Wawayanda Creek (just east of the present location of Kuiken Lumber). A significant portion if not the entire flow of the Mistucky now apparently bypasses the site and flows underground directly to the Wawayanda Creek. This seems, based on available information, to be a diversion from the original flow path.