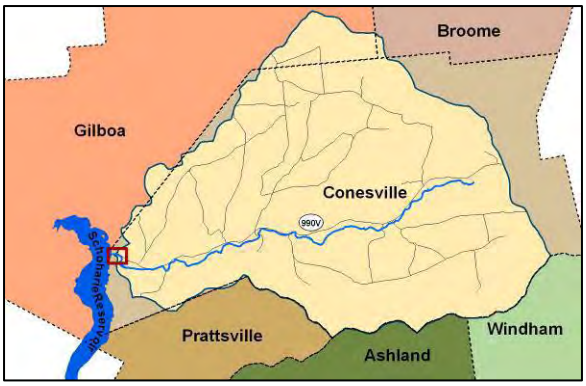
Manor Kill Management Unit 10

Town of Conesville –Station 1775 to Station 0

This management unit begins at Station 1775, continuing approximately 1,775 ft to Station 0, at Manor Kill's confluence with the Schoharie Reservoir, in the Town of Conesville.

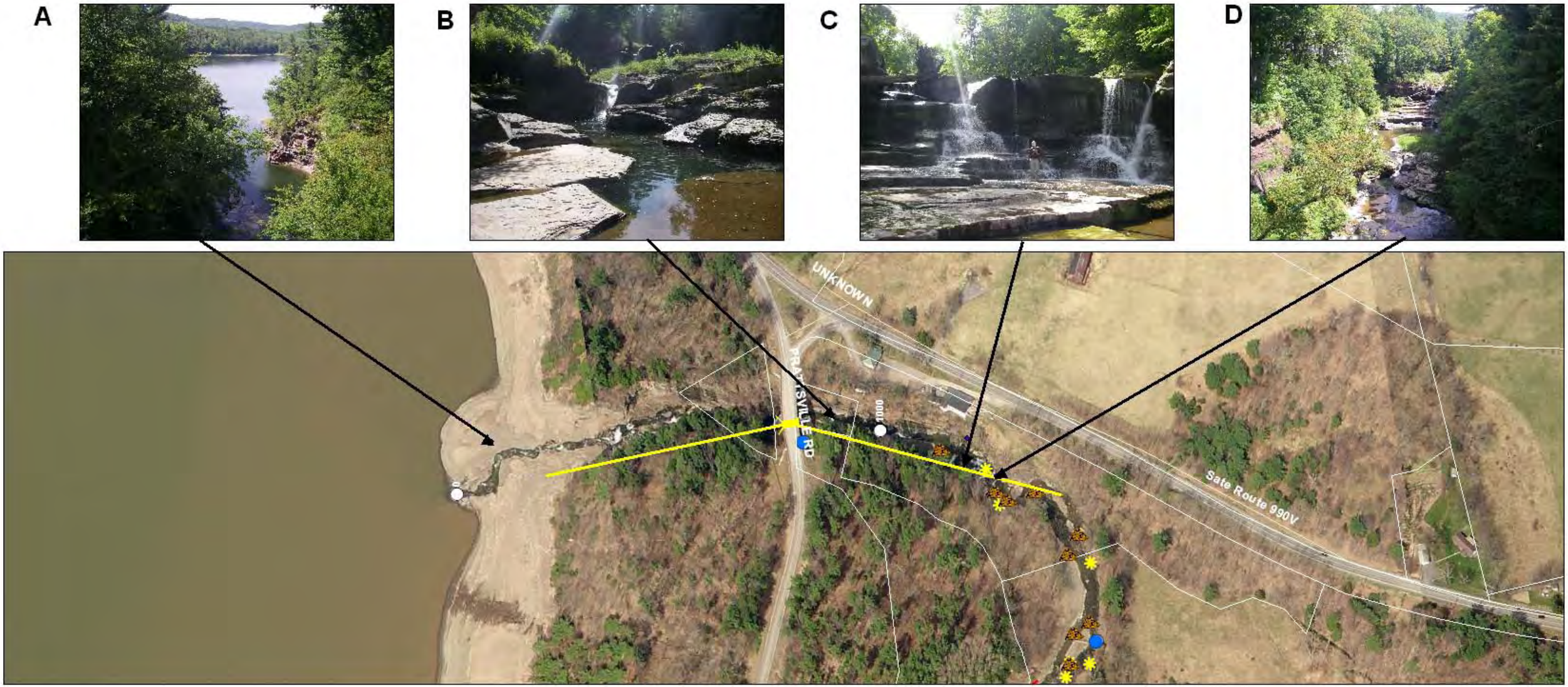


Management Unit 10 location
see Figure 4.0.1 for more detailed map

Stream Feature Statistics

0% of streambanks experiencing erosion
0% of streambanks have been stabilized
0% of streambanks have been bermed
0 feet of clay exposures
10.27 acres of inadequate vegetation
2,095 feet of road within 300ft. of stream
0% of streambanks are proposed for planting

Summary of Recommendations Management Unit 10	
Intervention Level	Assisted Self-Recovery
Stream Morphology	No recommendations at this time.
Riparian Vegetation	Treat, remove and prevent the spread of Japanese knotweed where feasible. Plant a buffer of trees and shrubs along proposed planting sites and increase width of riparian buffer in appropriate locations.
Infrastructure	When bridges are replaced, construct with the appropriate height and width to allow conveyance of flood flows. Inspect the stormwater infrastructure to ensure some level of treatment prior to emptying into the stream.
Aquatic Habitat	Watershed Aquatic Habitat Study
Flood Related Threats	No recommendations at this time.
Water Quality	Encourage homeowners to participate in the CWC septic program, if eligible.
Further Assessment	Consider hydraulic analysis of bridge openings.



Legend

- Bank Erosion
- Bank Erosion Monitoring Site (BEMS)
- Bridge
- Bedrock
- Berm
- BMP
- Crossing
- Clay Exposure
- Clay Exposure
- Culvert
- Dam
- Deposition
- Dump Site
- Gage
- Large Woody Debris
- Obstruction
- Planting Site
- Piped Outfall
- Revetment
- 1000ft Stream Stationing
- Tax Parcel
- Tributary
- Utility

Manor Kill Management Unit 10
Stream Feature Inventory

N W E S

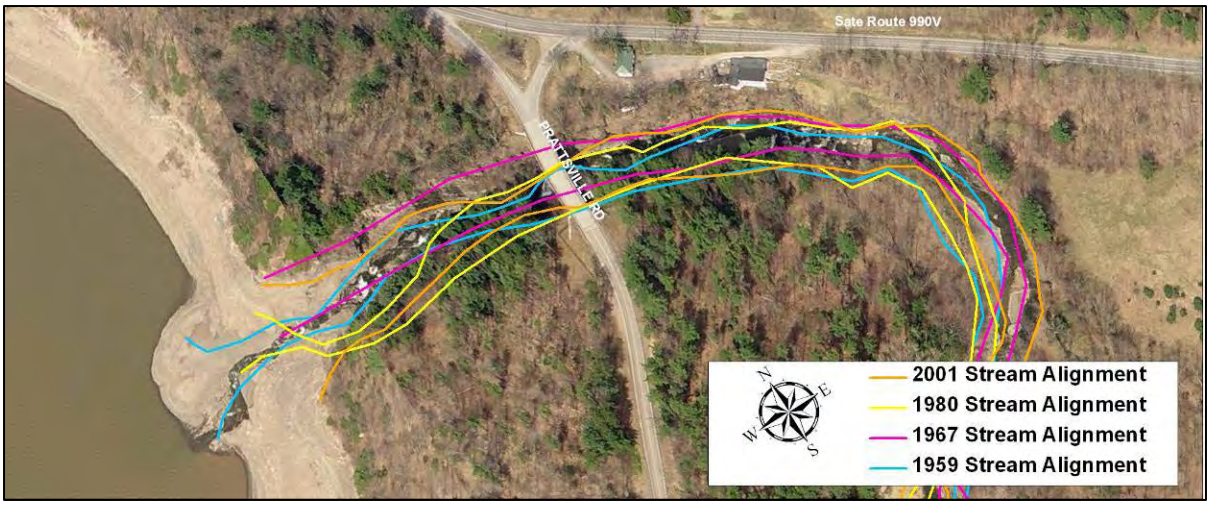
Scale = 1:2,500

0 150 300 600 Feet

Stream flow

Figure 4.10.1 Management Unit 10 - 2006 aerial photography with 2008 stream feature inventory.

Historic Conditions



Historic stream channel alignments overlayed with 2006 aerial photograph

As seen from the historical stream channel alignments (above), the *planform* of the channel has not changed significantly over the years; the channel has remained fairly stable throughout this management unit.

As of 2007, according to available NYS DEC records dating back to 1998, there was one stream disturbance permit issued in this management unit. In 1999, the NYC Department of Environmental Protection (NYCDEP) was issued a permit to replace County Route 39 (Prattsville Road) Bridge over the Manor Kill; this permit was renewed in 2001.

Manor Kill Falls, located at the downstream end of this management unit, was and continues to be a popular tourist site as the Manor Kill creek drops into the Schoharie Reservoir in a cascade of waterfalls. New York City's Schoharie Reservoir was placed into service in 1926 and holds 17.6 billion gallons of water at full capacity. Water stays in the reservoir a short time before it is drawn into the Shandaken Tunnel and travels southeast 18 miles, where it enters the Esopus Creek at Allaben in Ulster County. It then flows another 11

Postcard of Manor Kill Falls
Photo Credit: The Catskill Vintage Views

miles down the Esopus Creek into the Ashokan Reservoir for longer-term storage and settling. When it leaves the Ashokan, it is carried southeast under the Hudson River via the 92-mile Catskill Aqueduct. It ordinarily makes its way to the Kensico Reservoir in Westchester for further settling and mixing with Delaware system water, before moving down aqueducts to the Hillview Reservoir in Yonkers and entering New York City's water supply distribution system (DEP, 2007).

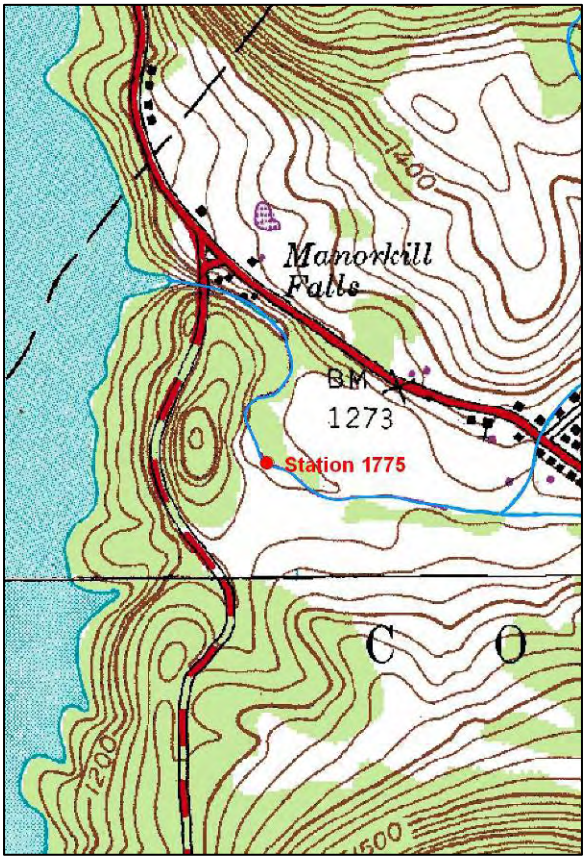
Stream Channel and Floodplain Current Conditions (2008)

Revetment, Berms and Erosion

The 2008 stream feature inventory revealed that there were no streambanks with signs of active erosion along the 3,550 ft. of total streambank length in the unit (Fig. 4.10.1). There were also no *Revetments* or berms in Management Unit 10.

Stream Channel Conditions (2008)

The following description of stream channel conditions references insets in foldout, Figure 4.10.1. Stream stationing presented on this map is measured in feet and begins at the confluence with the Schoharie Creek in Conesville. "Left" and "right" streambank references are oriented looking downstream, photos are also oriented looking downstream unless otherwise noted. Italicized terms are defined in the glossary. This characterization is the result of an assessment conducted in 2008.



1980 USGS topographic map – Prattsville Quadrangle, contour interval 20ft

Management unit #10 began at Station 1775. The drainage area ranged from 34.29 mi^2 at the top of the management unit to 34.4 mi^2 at the bottom of the unit.

The valley slope was 4.5%.

Valley morphology in this management unit was confined with a bedrock channel (1,158 feet) throughout much of the unit. Generally, stream conditions in this management unit were stable, with adequate sediment transport ability and no streambank erosion. Management efforts in this unit should focus on preservation of existing wetlands and forested areas and improvements to the riparian buffer by planting *herbaceous* areas with native trees and shrubs.

As Management Unit 10 began, an unnamed tributary (Station 1758) entered along the right streambank. This tributary appeared to be small and was flowing at the time of the assessment. There was minor scour along the right streambank at its confluence with the Manor Kill.

As the stream meandered to the left, a point bar had formed along the left streambank (Station 1758). Point bars commonly form on the inside of meander bends, where stream velocity is slower during high flows, allowing sediment to drop out of the water column and settle along the stream bed. This point bar extended approximately 174 feet and was mainly comprised of cobble and gravel and some vegetation.

Point Bar at Station 1758

Downstream of the point bar, woody debris had accumulated along the right streambank. Large trees had fallen into the stream from the bank and contributed to localized scouring of the bank and bed as well as localized aggradation. These trees my obstruct flow along the right portion of the stream channel. Woody debris is beneficial to a stream system, it provides critical habitat for fish and insects, and adds essential organic matter that will benefit organisms downstream. Further downstream (Station 1531) a side bar had formed along the right streambank and was comprised of boulders, cobble and gravel; a secondary channel flowed along its back side. The divergence of this channel was not observed during field assessment.

Continuing downstream, the slope of the streambed began to steepen. The stream channel became confined as bedrock lined the banks and bed of the channel (Figure 4.10.1, Inset D, Stations 1437-0). The stream apporached a series of breaks in the elevation of the bedrock resulting in a mulit-tiered waterfall; steep vertical banks were on both sides of the stream, with a mature forest along the top of the left bank and a mixture of forest and buildings along the right. The bedrock provides lateral control by limiting stream bank erosion; it provides grade control for the channel by preventing degradation or downcutting of the stream, the process by which streambeds and floodplains are lowered in elevation by eroding downward into the stream bed over time. This bedrock began at Station 1437 and continued beyond Manor Kill's confluence with the Schoharie Reservior.

Bedrock Beginning at Station 1437

As water flowed towards the first tier of the waterfall, there was some aggradation and woody debris that had been deposited along the left streambank (Station 1328). The remains of an old stacked rock foundation was also observed along the left bank at Station 1305. Along the right bank there was an additional woody debris obstruction. A large tree with its root wad extended from the top of the waterfalls to the lower tier.

Tree at Station 1248

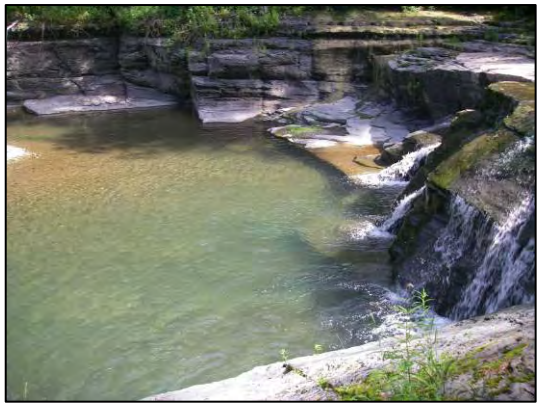
The stream flowed over the first tier of the waterfall (Figure 4.10.1, Inset C, Station 1248); dropping approximately 13 feet into a deep pool. A waterfall is a geological formation resulting from the stream flowing over a nickpoint, or sudden break in the elevation of the bedrock. As the stream increases its velocity at the edge of the waterfall, it collects material from the streambed. This causes the waterfall to carve deeper into the bed and to recede upstream. Often over time, the waterfall will recede back to form a canyon or gorge

Waterfall House at Station 1100

downstream as it recedes upstream, and it will carve deeper into the ridge above it (Beisel, 2006).

Along the right bank there was old stacked rock along the bedrock which may have been part of a foundation or a staircase the led toward The Waterfall House at the top of the bank. The Waterfall House, which is currently a bar and restaruant, has been a landmark in West Conesville for over 50 years.

At Station 1154 the stream flowed over a second tier dropping approximately 10 feet into a large, deep pool. Deep pools are common at the base of waterfalls due to the energy of the water hitting the streambed. Just downstream of the pool, cobble and gravel had accumulated along the left bank and was vegetated with herbaceous vegetation and some low lying willows. The stream flowed over a third tier dropping approximately 5 feet and continued to flow through a complex of very deep, narrow pools (Figure 4.10.1, Inset B, Station 979). Often the rock stratum below the shelf is softer allowing the stream to carve into the bed; especially during periods of high flow when the stream has increased power.



Pool at Station 1154

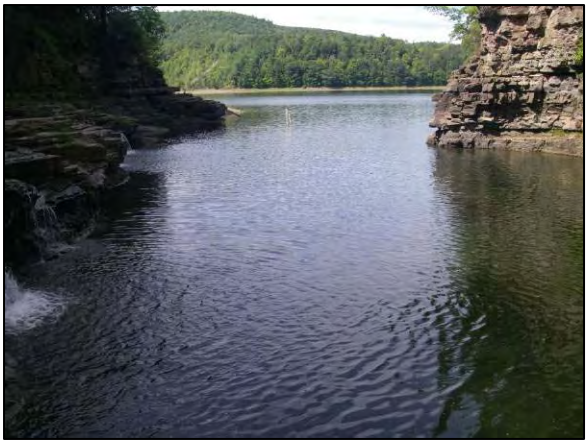
Waterfall & Bridge at Station 800

Continuing downstream, the stream flowed over a fourth tier; cascading over a series of rock steps and dropping approximately 43 feet into a large, deep pool.

County Route 39/Prattsville Road Bridge (ID 000000002264080) spanned approximately 160 feet across the Manor Kill at Station 800. This bridge, orginally built in 1930, was replaced by NYCDEP in 2003. It appeared to be in good functional and structural condition; the abutments

Postcard of Original Bridge (ca .1930) & Picture of Current Bridge (2008)
Postcard Photo Credit: The Catskill Vintage Views

showed no signs of scour and the bridge appeared to pass stream flows effectively. Under the bridge, a seep entered the stream over vegetated bedrock along the left bank. Management Unit 10 ended as the stream exited the pool downstream of the fourth tier and flowed into the Schoharie Reservior. (Figure 4.10.1, Inset A, Station 0). The Schoharie Reservoir contributes approximately 15% of NYC water annually (Joint Venture, 2004).



Manor Kill Confluence with the Schoharie Reservoir

Fishing is permitted on all NYC reservoirs, including the Schoharie Reservoir, providing the person has obtained an Access Permit. Row boats are allowed for fishing on the reservoir. Boats must be registered with a Boat Tag, steam cleaned by DEP, and stored in designated areas on the reservoir, all of which is free of charge. (See Section 2.10 Recreational Opportunities for more detailed information).

Sediment Transport

Streams move sediment as well as water. Channel and floodplain conditions determine whether the reach aggrades, degrades, or remains in balance over time. If more

sediment enters than leaves, the reach aggrades. If more leaves than enters, the stream degrades (See Section 3.2 for more details on Stream Processes).

Sediment transport in this unit is influenced by valley morphology, steep slope and a bedrock controlled channel. Evidenced by lack of significant aggradation or erosion, this unit appeared to be conveying its sediment load effectively; there were no major sediment sources in this unit.

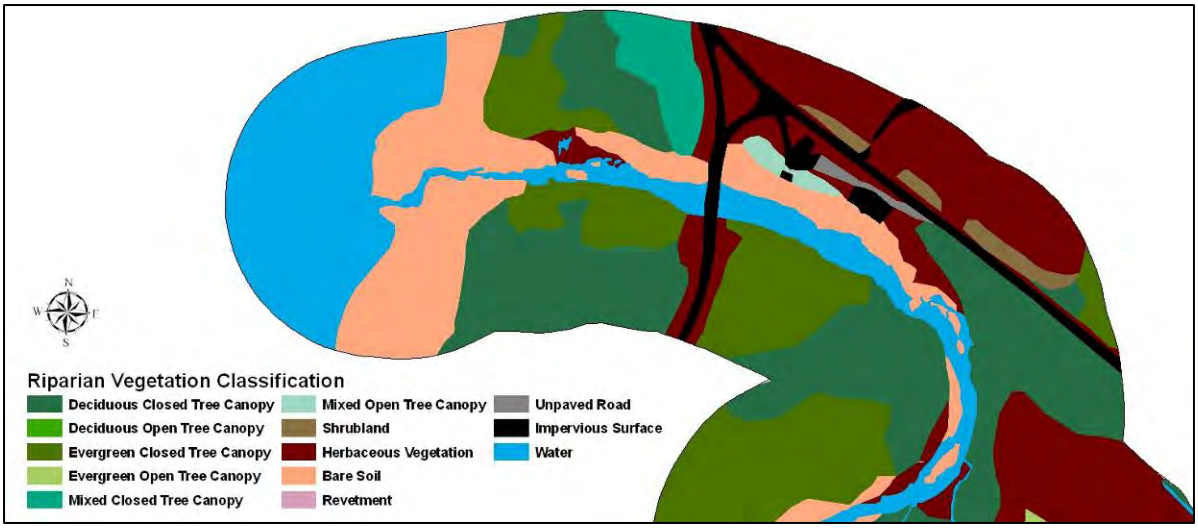
Riparian Vegetation

One of the most cost-effective and self-sustaining methods for landowners to protect streamside property is to maintain or replant a healthy buffer of trees and shrubs along the banks and floodplains, especially within the first 50 to 100 ft. of the stream. A dense mat of roots under trees and shrubs binds the soil together, making it much less susceptible to erosion. Mowed lawn (grass) does not provide adequate erosion protection on stream banks because it typically has a very shallow rooting system and cannot reduce erosive forces by slowing water velocity as well as trees and shrubs. One innovative solution is the interplanting of revetment with native trees and shrubs which can significantly increase the working life of existing rock rip-rap, while providing additional benefits to water, habitat, and aesthetic quality. *Riparian*, or streamside, forest can buffer and filter contaminants coming from upland sources, shallow groundwater or overbank flows, and slow the velocity of floodwaters causing sediment to drop out, while allowing for *groundwater recharge*. Riparian plantings can include a great variety of flowering trees, shrubs, and sedges native to the Catskills. Native species are adapted to our regional climate and soil conditions and typically require less maintenance following planting and establishment. There were no riparian improvement planting sites documented within this management unit.

Japanese knotweed at Station 42469

Some plant species that are not native can create difficulties for stream management, particularly if they are invasive. Japanese knotweed (*Fallopia japonica*), for example, has become a widespread problem in recent

years. Knotweed shades out other species with its dense canopy structure (many large, overlapping leaves), but stands are sparse at ground level, with much bare space between narrow stems, and without adequate root structure to hold the soil of streambanks. The result can include rapid streambank erosion and increased surface runoff leading to a loss of valuable topsoil. Japanese knotweed locations were documented as part of the stream feature inventory conducted during the summer of 2008 (Riparian Vegetation Mapping, Section 2.7). There were no Japanese knotweed occurrences documented during the stream feature inventory. The best means for controlling knotweed is prevention of its spread, therefore, efforts should be taken to ensure that all fill brought into the area is clean and does not have fragments of knotweed or other invasive plants. If Japanese knotweed sprouts or small stands are observed, they should be eradicated immediately to avoid further spread within this unit.



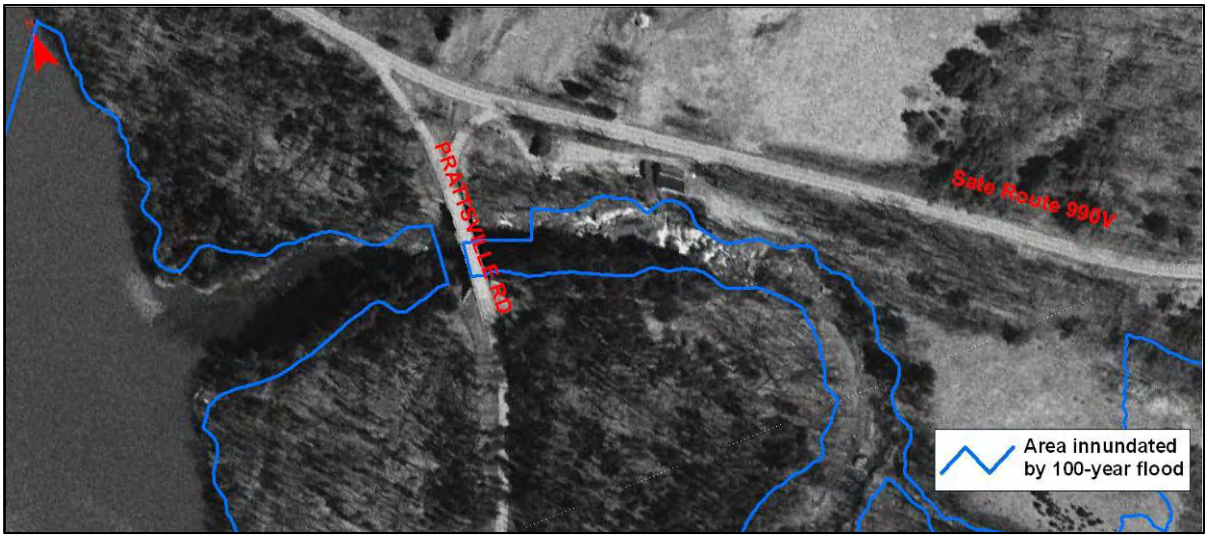
Riparian vegetation classification map based on aerial photography from 2006

An analysis of vegetation was conducted using aerial photography from 2006 and field inventories (see above map and Riparian Vegetation Mapping, Section 2.7). In this management unit, the predominant vegetation type within the 300 ft. riparian buffer was forested (45.66%) followed by herbaceous (17.12%). *Impervious* area (4.48 %) within this unit's buffer was primarily the local and private roadways. Areas of herbaceous (non-woody) cover may present opportunities to improve the riparian buffer with tree plantings in order to promote a more mature vegetative community along the streambank and in the floodplain.

Flood Threats

As part of its National Flood Insurance Program (NFIP), the Federal Emergency Management Agency (FEMA) performs hydrologic and hydraulic studies to produce Flood Insurance Rate Maps (FIRM), which identify areas prone to flooding. The NYS DEC Bureau of Program Resources and Flood Protection has developed new floodplain maps for the Manor Kill on the basis of recent surveys. The new FIRM hardcopy maps are available for viewing at the Schoharie County Soil & Water Conservation District Office.

According to the current floodplain maps (below), no existing structures in this unit appeared to be situated within the estimated 100-year floodplain. The 100-year floodplain is that area predicted to be inundated by floods of a magnitude that is expected to occur once in any 100-year period, on the basis of a statistical analysis of local flood record. Most communities regulate the type of development that can occur in areas subject to these flood risks.



100-year floodplain boundary map

Aquatic Habitat

Generally, habitat quality appeared to be good throughout this management unit. Canopy cover was adequate along most of the streambanks. There were some areas of woody debris accumulation observed in the unit. Woody debris provides critical habitat for fish and insects, and added essential organic matter that will benefit organisms downstream. The

waterfall spillways in this unit raise the amount of dissolved oxygen in the water while pools offer a deep holding habitat.

In 2008, researchers from SUNY Cobleskill conducted macroinvertebrate and fish surveys along the Manor Kill, but there were no sampling sites within Management Unit 10. See the macroinvertebrate and fish reports (Appendix F) for more detailed information regarding the surveys and their findings.

It is recommended that an aquatic habitat study be conducted on the Manor Kill with particular attention paid to springs, tributaries and other potential thermal refuge for cold water fish, particularly trout. Once identified, efforts should be made to protect these thermal refugia locations in order to sustain a cold water fishery throughout the summer.

Water Quality

Clay/silt exposures and sediment from stream bank and channel erosion pose a potential threat to water quality in the Manor Kill. Fine sediment inputs into a stream increase *turbidity* and can act as a transport mechanism for other pollutants and pathogens. There were no significant clay exposures identified in this management unit.

Stormwater runoff can also have a considerable impact on water quality. When it rains, water falls on roadways and parking areas before flowing untreated directly into the Manor Kill. The cumulative impact of oil, grease, sediment, salt, litter and other unseen pollutants found in road runoff can significantly degrade water quality. However, there were no stormwater culverts observed in this management unit in 2008.

Nutrient loading from failing septic systems is another potential source of water pollution. Leaking septic systems can contaminate water with nutrients and pathogens making it unhealthy for drinking, swimming, or wading. There were a few buildings located in close proximity to the stream channel in this management unit. These building owners should inspect their septic systems annually to make sure they are functioning properly. Servicing frequency varies per household and is determined by household size, tank size, and presence of a garbage disposal. Pumping the septic system out every three to five years is recommended for a three-bedroom house with a 1,000-gallon tank; smaller tanks should be pumped more often. To assist watershed landowners with septic system issues, technical and financial assistance is available through two Catskill Watershed Corporation (CWC)

programs, the Septic Rehab and Replacement program and the Septic Maintenance program (See Section 2.12). Through December 2007, no homeowner within the drainage area of this management unit had made use of these programs to replace or repair a septic system.

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