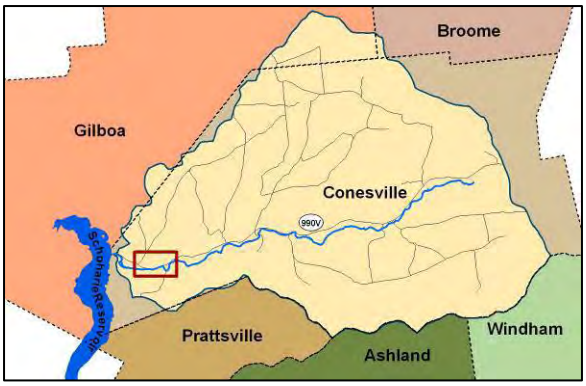
Manor Kill Management Unit 8

Town of Conesville – Station 9805 to Station 4523

This management unit began at Station 9805 and continued approximately 5,282 ft to Station 4523 in the Town of Conesville.

Stream Feature Statistics

10% of streambanks experiencing erosion
5.3% of streambanks have been stabilized
0% of streambanks have been bermed
680.6 feet of clay exposures
22.9 acres of inadequate vegetation
5,017 feet of road within 300ft. of stream
6.5% of streambanks are proposed for planting



Management Unit 8 location
see Figure 4.0.1 for more detailed map

Summary of Recommendations Management Unit 8	
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.
Aquatic Habitat	Watershed Aquatic Habitat Study
Flood Related Threats	No structures in 100-year floodplain – protect floodplain from development.
Water Quality	Encourage homeowners to participate in the CWC septic program, if eligible.
Further Assessment	Consider hydraulic analysis of bridge openings; establish bank erosion monitoring sites at the two mass failures (Stations 8388 – 8269 and Stations 8123-7800).

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 8
Stream Feature Inventory

N W E S

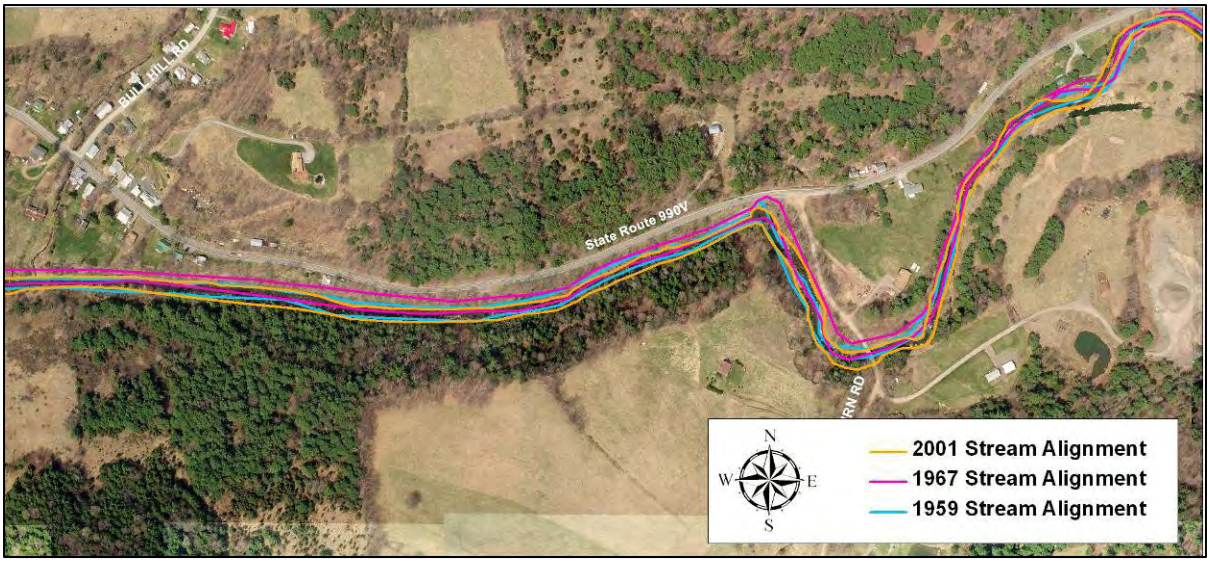
Scale = 1:4,700

0 250 500 1,000 Feet

Stream flow

Figure 4.8.1 Management Unit 8 - 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 from 1959 through 2001.

As of 2007, according to available NYS DEC records dating back to 1998, there have been three stream disturbance permits issued in this management unit. In 1994 a permit was issued to Schoharie County for the replacement of Pangman Road Bridge, and the installation of a temporary bridge for a detour road. In 1998 the Town of Conesville was issued a permit for bank stabilization along the Manor Kill at Pangman Road. In 2008 a permit was issued to a private landowner for a temporary access ford for logging purposes.

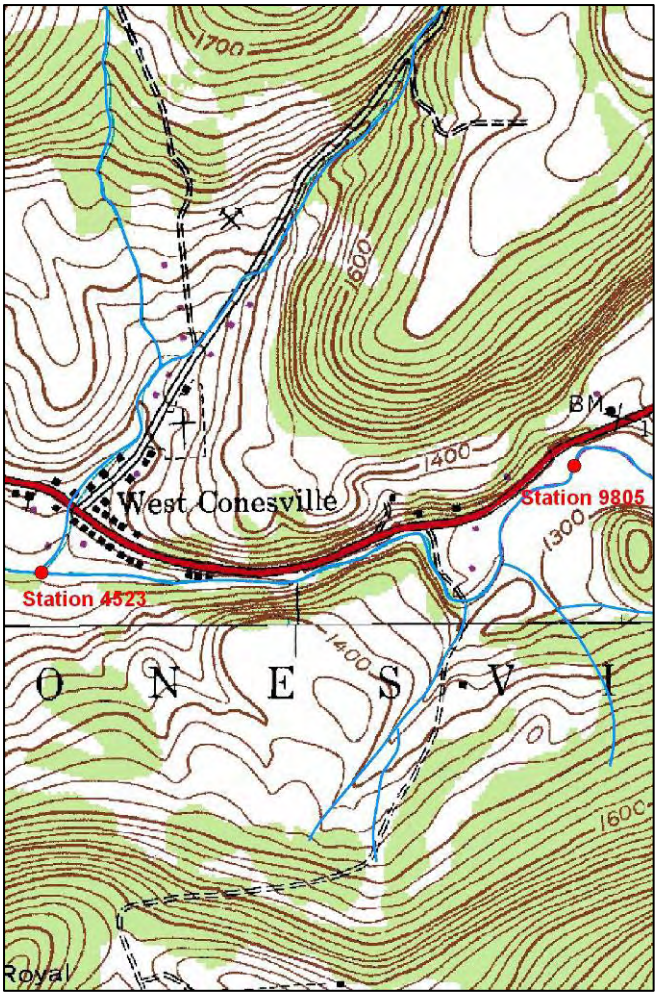
Stream Channel and Floodplain Current Conditions (2008)

Revetment, Berms and Erosion

The 2008 stream feature inventory revealed that 10% (1,007 ft.) of the streambanks exhibited signs of active erosion along the 10,564 ft. of total streambank length in the unit (Figure 4.8.1). *Revetment* has been installed on 5.3% (559 ft.) of the streambanks. There were no berms identified in the 2008 stream feature inventory.

Stream Channel Conditions (2008)

The following description of stream channel conditions references insets in foldout, Figure 4.8.1. Stream stationing presented on this map is measured in feet and begins at the confluence with the Schoharie Reservoir 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 #8 began at Station 9805. The drainage area ranged from 31.6 mi^2 at the top of the management unit to 32.6 mi^2 at the bottom of the unit. The valley slope was 1.16%.

Valley *morphology* in this management unit was unconfined with a broad glacial and alluvial valley flat in the upstream portion of the management unit. Approximately midway through the management unit, the stream channel became confined by the encroachment of State Route 990V and valley form (Stations 7400-5100). Generally, stream conditions in this management unit were somewhat impaired. There were six eroding banks documented in this management unit, including two mass failures which contained clay exposures. 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.

Wetland boundary approximately delineated by NWI
Stations 11544 – 8400

Management Unit 8 began along the downstream portion of a 15.3 acre palustrine wetland which started in Management Unit 7. This wetland is classified as PEM1/SS1E, *palustrine, emergent, persistent, scrub-shrub, broad-leaved deciduous, seasonally flooded/saturated* (see Section 2.6 for detailed wetland type descriptions). Wetlands are important features in the landscape that provide numerous beneficial functions including protecting and improving water quality, providing fish and wildlife habitats, storing floodwaters, and maintaining surface water flow during dry periods.

Just downstream of the start of Management Unit 8 there was a channel *divergence* (Station 9756) along the right bank where a flood chute split off from the main channel. Flood chutes convey flow through a secondary channel during periods of high flows. At the time of the assessment the channel contained standing water however flow was subsurface. This flood chute flows through a back yard near a home before converging with the main channel approximately 275 feet downstream (Figure 4.8.1, Inset D, Station 9440). A riparian planting site (Stations 9683-9579) was proposed along the lawn, which was mowed to the top of the bank of the main channel.

Downstream of the divergence, there was a *head cut* (Station 9725). A head cut is a marked change in stream bed slope that is unprotected, or of greater height than the stream can maintain (similar to a step). The stream was actively eroding the streambed downward to a new base level.

Head Cut at Station 9725

Continuing downstream, a proposed riparian planting site was identified along the left streambank. This site was a successional

Riparian Planting Sites at Stations 9715-9337 and 9683-9579; Tributary at Station 9543

old field with shrubs and a few trees. Recommendations for this site include planting native trees and shrubs along the streambank and the upland area. Enhancing the quality of the buffer with woody vegetation, and increasing the overall buffer width, will help to protect water quality through this reach by slowing stormwater runoff and filtering pollutants associated with nearby land use. Buffer width should be increased by the greatest amount agreeable to the landowners. Increasing the buffer width to at least 100 feet will increase the buffer's functionality. About midway along the site, an unnamed tributary (Station 9543) entered from the left bank. This tributary appeared to receive its waters from upstream wetlands. Throughout this section of stream there were multiple areas of channel *aggradation*, the process by which streams are raised in elevation by the deposition of material eroded and transported from other areas. These areas include point, center and side bars that were vegetated with grasses and sedges.

Further downstream it appeared that two logs had been placed perpendicular to the stream to serve as a habitat structure (Station 9245). Habitat structures are generally placed in an effort to create scour pools that offer deeper holding habitat as well as create spillways that raise the amount of dissolved oxygen in the water. In general, due to the channel spanning design, they cause water to back up on the upstream side of the structure which can increase sediment deposition. These logs were placed approximately 10 feet apart and spanned the width of the channel, however portions of both logs were buried and neither seemed to have a significant impact on the stream.

Habitat Structure at Station 9245

As the stream meandered to the left, a proposed riparian planting site was identified along the right bank. Lawn was mowed to the edge of the stream with shrubs and trees on the face of the bank. Recommendations for this site include planting native trees and shrubs along the streambank and the upland area. Buffer width should be increased by the greatest amount agreeable to the landowners. Increasing the buffer width to at least 100 feet will increase the buffer's functionality and protect the stream from nearby land uses.

Planting Site at Stations 9036-8852

Along this planting site the stream changed from a cobble, gravel channel to a steeper channel with cobbles and boulders. A *step pool complex* (Station 9000) stretched for approximately 550 feet with large boulders and excess sediment deposition throughout; there was a drop in channel elevation of approximately 10 feet. A step pool sequence is a series of short drops interspaced with pools. This type of morphology is a common feature of high gradient streams, the steps provide grade control and the pools dissipate energy.

Flood Chute at Station 8426

At Station 8426 a flood chute converged with the main channel along the left streambank. The divergence of this flood chute was not observed during field assessment. This flood chute was lined with medium and large boulders; there was no flow at the time of the assessment. Additionally, this flood chute appeared to receive water from upland drainage.

As the stream meandered to the right, the *thalweg*, or deepest part of the stream channel, flowed up against the left streambank causing a mass failure (Figure 4.8.1, Inset C, Stations 8388 – 8269). This mass failure resulted in an erosion area of approximately 3,956 ft², exposing roots and compromising

mature trees along the upstream and downstream portions of the bank. The vegetation along this site had been mowed to the edge of the bank. During the field assessment, this bank was identified as a proposed Bank Erosion Monitoring Site (BEMS) to study erosion along this reach. To monitor BEMS, a cross-section and long profile may be conducted to collect baseline data. Once the baseline data has been collected, this cross-section can be resurveyed in the future to calculate the bank's erosion rate.

Boulder at Station 8322

Along this erosion clay was exposed in the bed and bank for approximately 10 feet. Clay inputs into a stream are a serious water quality concern because they increase turbidity, degrade fish habitat, and can act as a transport mechanism for other pollutants and pathogens. Large boulders in the stream contributed to aggradation as well as the scouring of pools along the erosion. Multiple large trees (Stations 8346) had fallen into the stream channel contributing to minor scouring and deposition. Woody debris such as this is beneficial to a stream system; it provides critical habitat for fish and insects, and adds essential organic matter that will benefit organisms downstream.

Downstream of the erosion, a tributary entered from the left bank. This tributary drains upland slopes before reaching the flatter topography of the valley floor where it enters the Manor Kill. As a result of the slope change, the tributary lost its ability to transport sediment and began to deposit gavel at its confluence with the Manor Kill. Flow of this tributary was subsurface at the time of the assessment.

Revetment at Stations 8260-8165

Along the right streambank, rip rap had been installed for approximately 83 feet. This rip rap provided scour protection and appeared to be in good structural and functional condition. Interplanting native

shrub and sedge species through the rip rap and along the toe of this streambank is recommended. This planting will help to strengthen the revetment, while enhancing aquatic habitat.

Bridge at Station 8167

Continuing downstream, the Manor Kill flowed under Pangman Road Bridge, ID 2228550 (Station 8167). In 1994 a permit was issued by the NYSDEC to Schoharie County for the replacement of this bridge. This bridge appeared to be in good structural and functional condition, conveying most flows freely; however some damage to the toe of the abutments was noted. Flood damage to bridges is typically caused by inadequate hydraulic capacity of the bridge, misaligned piers and/or abutments, or accumulation of debris. As bridges are replaced over time these issues should be evaluated and adjusted if necessary to lessen the probability of flood damage by providing a more effective conveyance channel for water and sediment. Gabion baskets had been placed on and upstream of the bridge abutments to provide additional scour protection. Rock-filled gabions, or large wire-mesh baskets, are not generally a recommended management practice. They have a tendency to be unsightly, and when installed incorrectly they frequently blow out of the bank and scatter rocks and cages downstream, particularly following ice flows. Their correct use requires professional installation and maintenance.

Downstream of the bridge, the stream meandered to the right and the thalweg flowed up against the left streambank causing a second mass failure. The face of this erosion was vegetated with some grasses and trees while vegetation along the erosion was mowed to the edge. This mass failure resulted in an approximate erosion area of 9,215 ft² exposing roots and

Mass Failure at Stations 8123-7800

compromising trees. Clay was exposed for the length of the erosion along the toe and into the bed of the stream. Opposite the mass failure a point bar had formed along the right streambank. 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 streambed.

Following the mass failure, rip rap (Stations 7792-7657) had been installed along the right streambank for approximately 135 feet. The upstream portion of this riprap consisted of cobble and some small boulders; continuing downstream large pieces of concrete had been placed with some smaller rock. This rip rap appeared to be in fair functional and structural condition, providing some scour protection. A thin line of trees separated the revetment from Pangman Road. Interplanting native shrub and sedge species through the rip-rap and along the toe of this streambank is recommended to help to strengthen the revetment, while enhancing aquatic habitat. Continuing from the rip rap, there was erosion (Station 7657) for approximately 134 feet along the right streambank. The bank was overhanging along a portion of this site, exposing roots and compromising trees. Along this section of stream there were several aggradational features including side, transverse and point bars.

Revetment at Stations 7792-7657

As the stream flowed directly into State Route 990V, rip rap covered the bank and toe of the right streambank for approximately 33 feet. This revetment appeared to provide scour protection and be in good structural and functional condition. Some herbaceous vegetation had grown along the rip rap, and it is recommended that additional native shrub and sedge species be

Revetment at Stations 7400-7367

interplanted into the rip rap. As the stream turned sharply to the left, bedrock (Figure 4.8.1, Inset B, Stations 7368-6336) extended from the top of the bank along State Route 990V into the channel of the right streambank and bed for approximately 1,032 feet. This bedrock at times covered the full bed of the stream channel. The bedrock provides lateral control along the right bank 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.

At Station 7191 there was a water-stage recorder and crest-stage gage on the right bank. This gage is operated by the United States Geological Survey (USGS) in cooperation with the New York Power Authority. The gage (#01350080) has a drainage area of 32.4 mi² and has been collecting continuous data from July of 1986 to the present. All gage information including real time discharge and gage height is available online at the USGS website: http://waterdata.usgs.gov/ny/nwis/dv/?site_no=01350080&PARAmeter_cd=00060,00065; (see Section 2.4 for more detailed information).

Gage at Station 7191

Continuing downstream there was a side bar along the left streambank. Behind the side bar there was minor hydraulic erosion (Stations 7137-6821) along the bank for approximately 316 feet. This bank was undercut and slumping in areas exposing roots and compromising some trees. Clay was also exposed along the length of the erosion. It appears that during high flows water flows behind the side bar contributing to the erosion. Approximately 287 feet downstream of the erosion there was an additional 8 foot clay exposure along the left bank.

Clay Exposure at Station 6475

As the stream continued along State Route 990V, there was a large stacked wall that appeared to be an old foundation. A portion of the wall was perpendicular to the stream, extending to the top of the bank; the other portion paralleled the stream for approximately 70 feet.

Continuing downstream, the stream was experiencing full channel aggradation (Station 5916) composed of boulders, cobble and gravel for approximately 30 feet. Aggradation continued downstream with an additional center and a side bar. Opposite the deposition, the right bank was reinforced with rip rap for approximately 200 feet (Stations 5995-5800). This revetment appeared to be old, was in fair structural and functional condition and did not appear to provide any scour protection. At station 5420, a small tributary entered from the left streambank. There was no flow at the time of assessment.

Side Bar at Station 5204

Along the right bank the first stand of Japanese knotweed was observed in this management unit. Japanese knotweed is an invasive non-native species which does not provide adequate erosion protection due to its very shallow rooting system; knotweed also grows rapidly and tends to crowd out more beneficial streamside vegetation. The best means for controlling knotweed is prevention of its spread. Therefore, efforts should be taken to ensure that existing stands are not fragmented via unnatural processes (i.e. mowing without removal of all mowed material) and transported into downstream areas. Small stands should be eradicated immediately to avoid further spread within this unit and to downstream management units. There are removal methods that may be used for larger stands (see Section 2.7), but these methods

Japanese Knotweed at Station 4555

should be used with caution and carefully executed to avoid further spread of Japanese knotweed. Downstream a flood chute flowed behind a well-vegetated side bar along the right streambank for approximately 200 feet.

Continuing downstream, an unnamed tributary (Figure 4.8.1, Inset A, Station 4552) entered from the right streambank. This tributary was classified A by the NYS DEC, indicating that the best uses for this stream are drinking, supporting fisheries and other recreational activities. At the mouth of the tributary, and along the upper portion of the stream bank, a large stand of knotweed was observed. Management Unit 8 ended just downstream of the tributary at Station 4523.

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, relatively steep valley slope, Pangman Road Bridge and the encroachment of State Route 990V. Evidenced by lack of significant aggradation, the stream appeared to be conveying its sediment load effectively throughout most of this management unit.

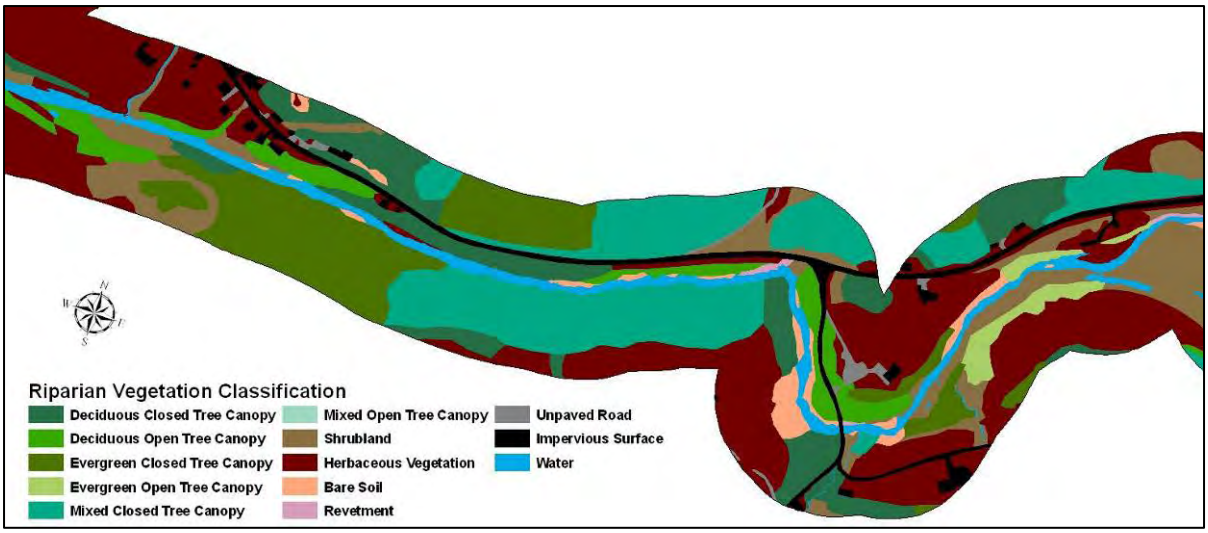
Riparian Vegetation

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 three riparian improvement planting sites documented within this management unit; proposed planting sites cover approximately 6.55 percent of the streambanks in this unit.

Japanese knotweed at Station 4567

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). In total, two Japanese knotweed occurrences, covering an estimated length of 55 feet, were documented during the stream feature inventory. The best means for controlling knotweed is prevention of its spread, therefore, efforts should be made 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 and to downstream management units.

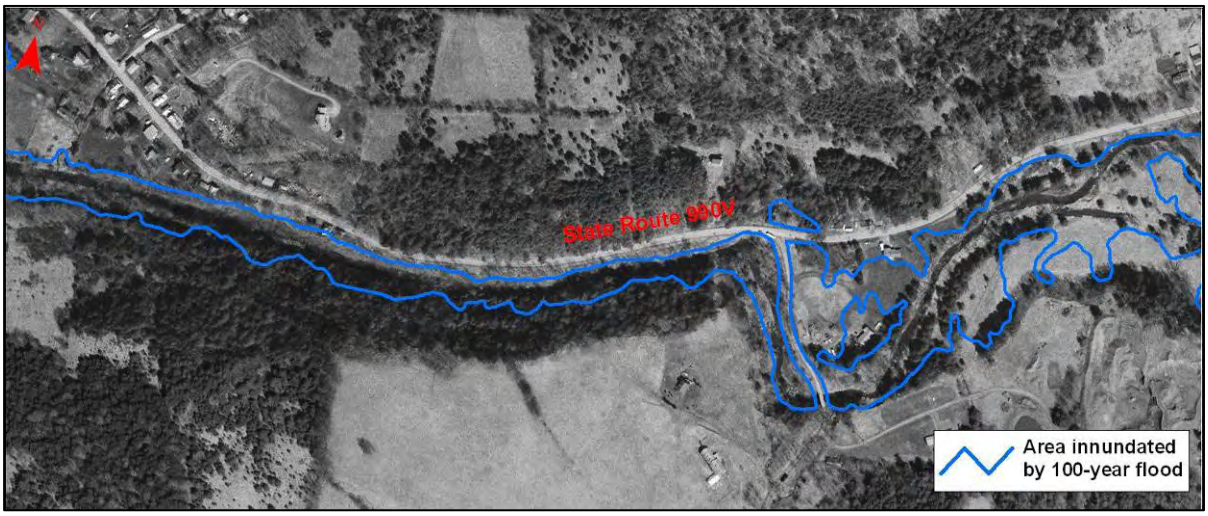


Riparian vegetation classification map based on aerial photography from 2006

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 (52.61%) followed by herbaceous (25.2%). *Impervious* area (4.92 %) 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.



100-year floodplain boundary map

According to the current floodplain maps (above), 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.

Aquatic Habitat

Generally, habitat quality appeared to be fair throughout this management unit. Canopy cover was adequate along a significant portion of the left streambank but could be enhanced along the upper portion of the management unit with plantings in the riparian zone as well as the interplanting of rip-rap along the right bank. Woody debris observed within the stream channel was minimal throughout the unit. Woody debris provides critical habitat for fish and insects, and added essential organic matter that will benefit organisms downstream.

In 2008, researchers from SUNY Cobleskill conducted macroinvertebrate and fish surveys along the Manor Kill. There were two sampling sites within Management Unit 8. 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 five significant clay exposures 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 homeowners within the drainage area of this management unit had made use of these programs to replace or repair a septic system.

References

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