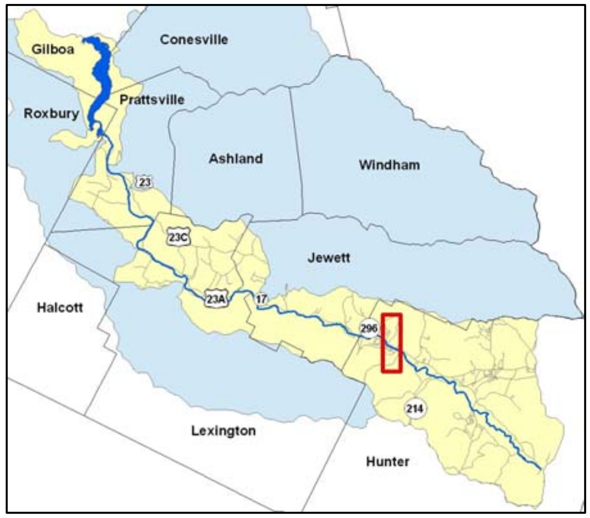
Schoharie Creek Management Unit 6

Town of Hunter – Klein Ave. (Station 108605) to Bridge St. (Station 104521)

This management unit begins at Klein Ave., continuing approximately 4,085 ft to Bridge St. in the Town of Hunter.

Stream Feature Statistics

28.3% of streambanks experiencing erosion
25.2% of streambanks have been stabilized
1% of streambanks have been bermed
366 feet of clay exposures
16 acres of inadequate vegetation
10,860 feet of road within 300ft of stream
36 structures located in 100-year floodplain



Management Unit 6 location
see Figure 4.0.1 for more detailed map

Summary of Recommendations Management Unit 6	
Intervention Level	Passive, Assisted Self-Recovery, Full Restoration
Stream Morphology	No recommendations at this time
Riparian Vegetation	Interplanting of rip-rap at Station 108500, plantings for assisted self-recovery of eroding banks at Stations 108100, 107630, 105960, 105140, and enhancement of riparian buffer at 107430.
Infrastructure	Full restoration of failing streambanks at Station 105140
Aquatic Habitat	Watershed Aquatic Habitat Study
Flood Related Threats	No recommendations at this time
Water Quality	Evaluate potential water quality impacts of stormwater inputs from Shanty Hollow Brook at Station 108100.
Further Assessment	Community-Wide Stormwater Infrastructure Assessment & Planning Resurvey of bank erosion monitoring site at Station 105300 to assess erosion rate.

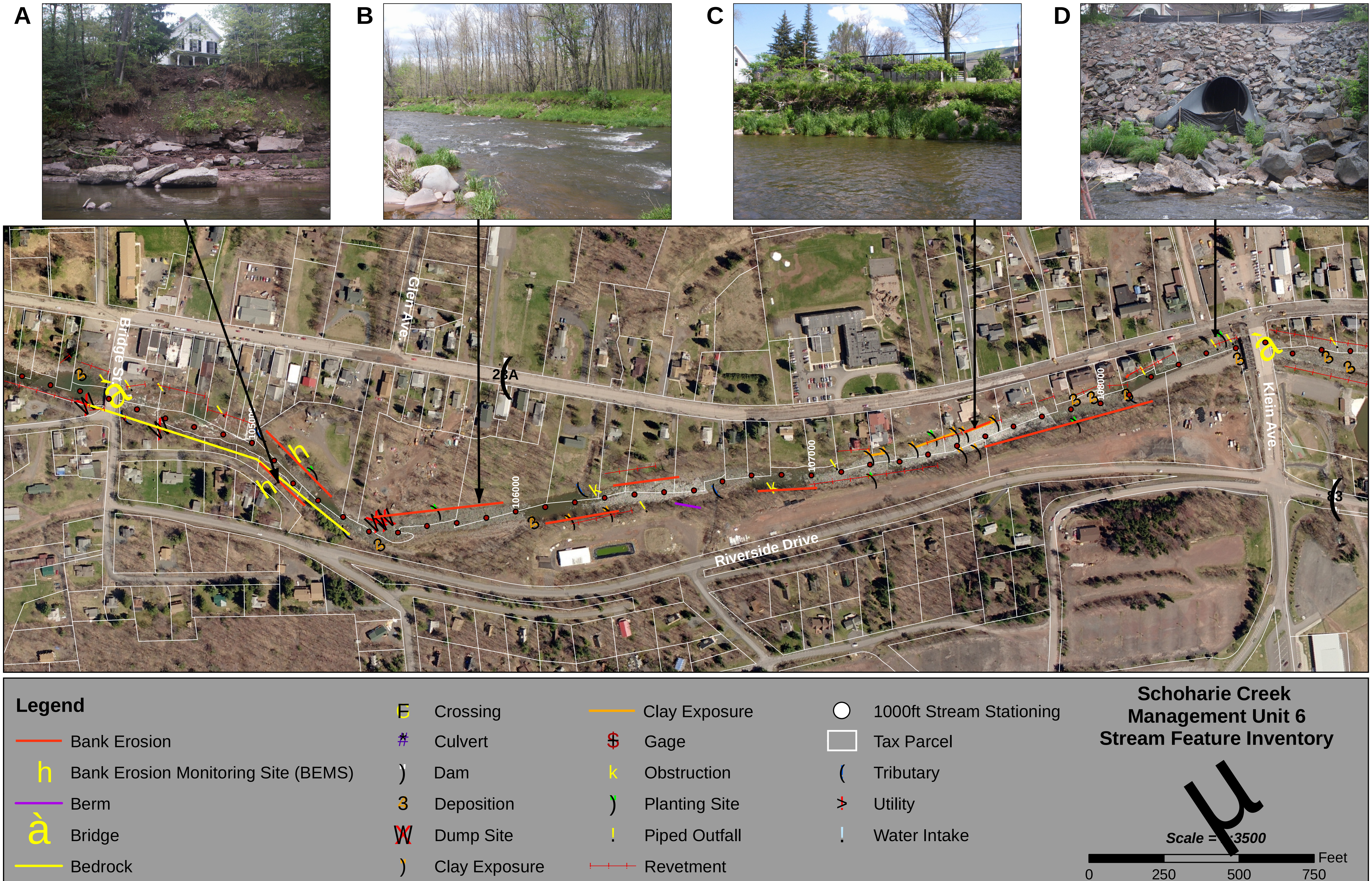


Figure 4.6.1 Management Unit 6 - 2006 aerial photography with stream feature inventory

Historic Conditions

As seen from the historical stream alignments (below), the *planform* of the channel has remained fairly stable since 1959.

Historic stream channel alignments overlayed with 2006 aerial photograph

As of 2006, according to available NYS DEC records dating back to 1996, there have been two stream disturbance permits issued in this management unit. In 2006, a permit was issued to the Village of Hunter as part of the reconstruction of State Route 23A and stormwater drainage improvement project. This permit allowed for the installation of approximately 335ft of rip-rap and concrete stabilization structures to repair slope failures along the Schoharie Creek, as well as installation of a new 5ft round culvert under State Route 23A from Botti Drive to the Schoharie Creek. The second permit issued in 2006 was to a private corporation and allowed for the installation of two outfall pipes as part of the decommissioning of the wastewater treatment plant.

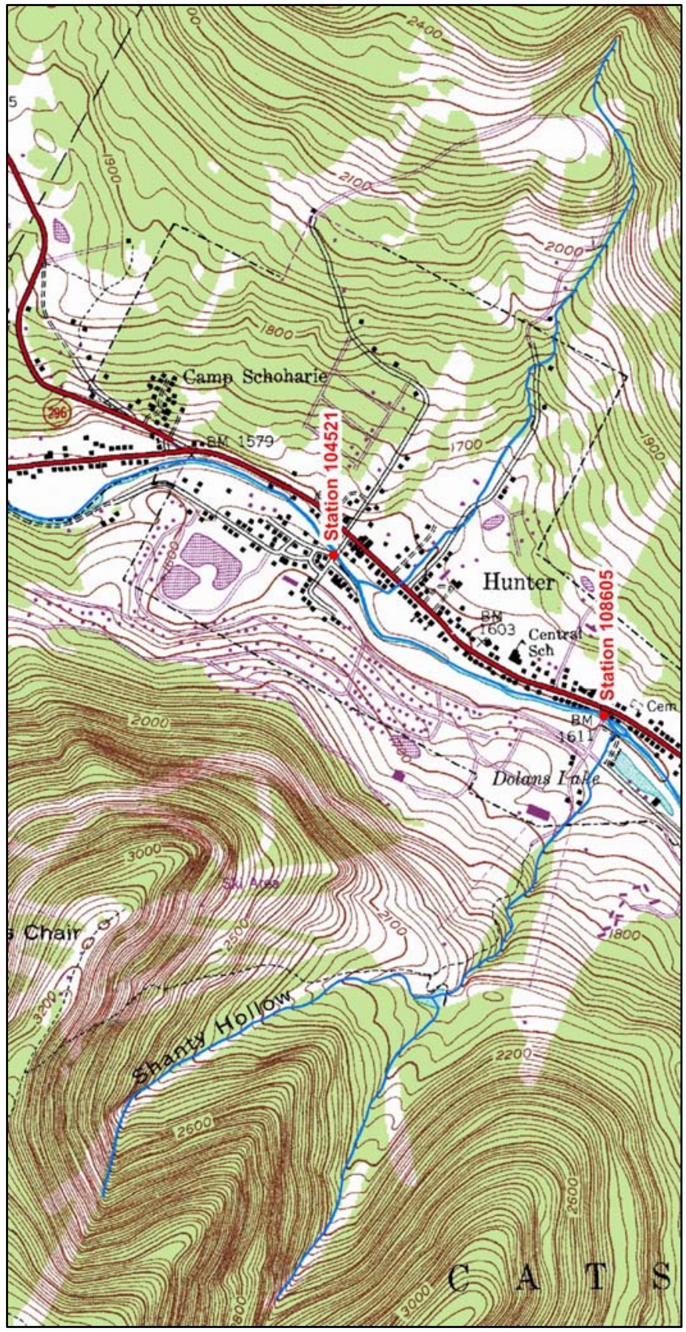
Stream Channel and Floodplain Current Conditions (2006)

Revetment, Berms and Erosion

The 2006 stream feature inventory revealed that 28.3% (2,316 ft) of the streambanks exhibited signs of active erosion along the 8,170 ft of total channel length in the unit (Figure 4.6.1). The total surface area of active erosion totaled approximately 23,034 ft^2. *Revetment* has been installed on 25.2% (2,060 ft) of the streambanks. One berm was so long it covered 1% (82 ft) of the streambanks in the management unit.

Stream Channel Conditions (2006)

The following description of stream channel conditions references insets in foldout, Figure 4.6.1. Stream stationing presented on this map is measured in feet and begins at the Schoharie Reservoir. “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 2006.



1980 USGS topographic map – Hunter Quadrangle
contour interval 20ft

Management unit #6 began at Klein Ave. The drainage area ranged from 38.25 mi^2 at the top of the management unit to 40.22 mi^2 at the bottom of the unit. The valley slope was 0.61%.

Valley *morphology* in this management unit was confined by infrastructure, residential encroachment, and valley form. This unit was characterized by widespread instabilities evident from the high percentage of armored and eroding banks. Management efforts in this unit should focus on enhancing the *riparian* buffer in recommended locations, stormwater management, and prevention of further floodplain development. A full restoration project is recommended to restore bank stability and protect infrastructure at Station 105140.

Wetland boundary approximately delineated by NWI (Station 108605-104521)

The entire stream channel within this management unit was designated as a wetland. This wetland was approximately 7 acres in size and classified as riverine lower perennial, signifying it is contained in the natural channel and characterized by a low gradient and slow water velocity (R2UBH, Station 108605-104521) (see Section 2.6 for detailed wetland type descriptions).

This management unit began as the stream passed under the bridge at Klein Ave (Station 108605). Gravel deposits upstream and downstream of the bridge were noted. Deposits such as these are commonly caused by inadequate sizing of the bridge opening. An undersized bridge opening causes water to back up upstream of the bridge, reducing stream velocity, which results in sediment deposition. While bankfull flows may flow freely through this bridge, higher flows may backwater, resulting in the upstream aggradation.

Rip-rap at Station 108500

Rip-rap with two stormwater outfalls had been installed on the right streambank downstream from the bridge (Inset D, Station 108500). A stand of Japanese knotweed (*Fallopia japonica*) had established in the rip-rap. Japanese knotweed is an invasive non-native species which does not provide adequate erosion protection due to its very shallow rooting system, and also grows rapidly to crowd out more beneficial streamside vegetation. Removal of this Japanese Knotweed stand is recommended to prevent the spread if this invasive species (See Section 2.7 Riparian Vegetation) and native shrub and sedge species should be interplanted through this rip-rap to help strengthen the revetment, while enhancing aquatic habitat.

Shanty Hollow Brook (Station 108100) looking upstream

Shanty Hollow Brook entered from the left streambank (Station 108100). This tributary drains the slopes of Hunter Mountain before it reaches the flatter topography of the valley floor where it enters the Schoharie Creek. As a result of this stream slope change, the tributary lost its ability to transport sediment gathered from the mountain slopes, and began to deposit sediment at its mouth and into the more gently sloped Schoharie Creek. This is a common feature of confluence areas, which often contain extensive sediment bars, function as important sediment storage areas, and are typically among the most dynamic and changeable areas in the stream system. The New York State Department of Environmental Conservation classifies streams and rivers based on their "best use" (NYSDEC, 1994). The headwaters and majority of this tributary were classified as A by the NYS DEC, indicating that the best use is as a source of drinking water. The last 2,473ft of this tributary was classified as C, or its best use is supporting fisheries and non-contact activities.

Shanty Hollow Brook after rainfall event Station 108100 - looking upstream

As shown in the photo, during rainfall events *turbid* water flows into the Schoharie from Shanty Hollow Brook. Turbidity is basically cloudiness of a body of water caused by the suspension of organic and inorganic particles. Turbidity can be a significant problem as these particles absorb and transport contaminants, and make the disinfection process more difficult. In addition to public health risks, turbidity also impacts ecological integrity in the reservoirs and streams. The turbidity source and potential water quality impact at this site should be evaluated. This evaluation could be achieved as part of an initiative to conduct a detailed and comprehensive assessment of existing community stormwater infrastructure with the goal of identifying and prioritizing potential areas for stormwater *best management practices* (BMP's).

This increase in runoff and sediment load from this tributary may have contributed to the streambank erosion on the left streambank (Station 108100). An area of approximately 4,072 ft^2 was experiencing erosion, resulting in the loss of some mature trees along the bank. To prevent future erosion, native vegetation plantings are recommended for site, including vegetative protection of the toe.

Bank erosion at Station 108100

The right streambank had a high concentration of homes within close proximity of the stream. Most of these homes were located within the 100-year flood boundary, or the area which has a 1% chance of being inundated in any given year. Due to their location, many homes have suffered property damage from flood events and in efforts to reduce damage had installed different types of revetment, such as rip-rap and stacked rock walls, along their streambanks (Station 108300-107750).

Downstream of the revetment, the right streambank had been scoured causing numerous clay/silt exposures posing a potential threat to water quality (Inset C, Station 107630). Fine sediment inputs into a stream increase *turbidity* and can act as a transport mechanism for other pollutants and pathogens. Planting of willow *fascines* and

Clay/silt exposure at Station 107630

sedges along the toe of the bank is recommended to provide protection against erosion. Native trees and shrubs, including willows should also be planted on the face of streambank to improve stability.

On the opposite bank large stone rip-rap had been installed (Station 107430). The adjacent land was a dirt parking area with a thin riparian buffer. Buffer width should be increased to improve buffer functionality, such as filtering nutrients and pollutants, if any, from the parking area. Following this rip-rap, the left streambank had begun to erode exposing an area of 1,987ft^2 (Station 107000).

Downstream a stone berm (Station 106600) and stacked rock wall (Station 106400) had been built on the left streambank, perhaps intended to protect the adjacent land. Berms such as this, while created with the best of intentions, tend to raise flood elevations and increase the erosive power of the stream. It is recommended that the berms be evaluated for their influence on floodplain connectivity and stream entrenchment, and that removal should be considered where there is significant negative impact. The streambank below the stacked rock wall had begun to erode exposing an area of 2,489ft^2 with two clay/silt exposures.

SPDES outfall at Station 106425

Near the upstream end of the stacked rock wall, at Station 106425, was an NYS permitted discharge point, permitted to the Hunter Liftside Transportation Corporation (SPDES permit# NY0212288). This permit allowed for the discharge of 0.0810 million gallons per day of treated sanitary wastewater to Schoharie Creek from the Hunter Mountain wastewater treatment plant. This wastewater treatment plant was decommissioned in 2006 and replaced by the Village of Hunter sewage treatment facility, eliminating this discharge to the Schoharie Creek. The State Pollutant Discharge Elimination System (SPDES) program, administered by NYS Department of Environmental Conservation (DEC), governs discharges to surface and ground waters through the issuance of wastewater and stormwater discharge permits.

Downstream, the right streambank showed signs of scour during past high water events (Inset B, Station 105960). Grasses have begun to revegetate the bank face, however, additional plantings of native shrubs and sedges would increase bank stability. At the downstream end of this erosion, an old dump site was documented along the streambank (Station 105550). To prevent introduction of his material, and any possible pollutants, into the stream the dump should be removed.

Dump at Station 105550

Both the left and right streambanks have been eroded downstream (Inset A, Station 105140). A Bank Erosion Monitoring Site (BEMS) was monumented to study erosion along this reach at Station 105300. A cross-section and long profile survey were conducted to collect baseline data. In the future this cross-section can be resurveyed to calculate the bank's erosion rate. Erosion at this site had fractured the lower shale bedrock bank and exposed a large 9,432ft^2 erosional area on the upper hillslope. At the top of the slope, the end of Schoharie Avenue has been forced to close due to safety concerns. Erosion along the right streambank has scoured an area of 2,179ft^2.

Bank erosion on right streambank at Station 105140

Full restoration of the site is recommended, including the use of vegetated reinforced soil slope (VRSS) soil bioengineering system to stabilize the upper bank and grout to address the crack in the bedrock and increase the longevity of the project. VRSS is an earthen structure constructed from living, rootable, live-cut, woody plant material branches, bare root, tubling or container plant stock, along with rock, geosynthetics, geogrids, and/or geocomposites. The VRSS system is useful for immediately repairing or preventing deeper failures, providing a structurally sound system with soil reinforcement, drainage, and erosion control (typically on steepened slope sites where space is limited). With this system, living cut branches and plants are expected to grow and perform additional soil reinforcement via the roots and surface protection via the top growth (Sotir and Fischenich, 2003). Recommendations for the right streambank 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, but increasing the buffer width by at least 100 feet will increase the buffer functionality. In-depth survey and engineering design would be required to plan a stream restoration project at this site. This survey and design started in early 2007.

Downstream from the erosion, an unnamed tributary enters the Schoharie Creek on the right streambank (Station 105000). This tributary drains the slopes of the Jewett Mountain Range before crossing under County Route 23A and joining the Schoharie Creek. This tributary was classified by the NYS DEC as C, or its best use was the support of fisheries and it is suitable for non-contact activities.

From this tributary to the end of the management unit, the right streambank had a high concentration of homes within close proximity to the stream. This entire bank had been treated with different types of revetment, such as rip-rap and stacked rock walls.

Bridge at Bridge Street – Station 104521

At the downstream end of this management unit the stream passed under the county bridge at Bridge Street in the Village of Hunter (BIN# 3201430). This bridge may constrict the floodplain at very high flows, as evidenced by minor deposition upstream, but passes most flows effectively. 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 that promotes water and sediment flow through the bridge opening.

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 3.1 for more details on Stream Processes).

Evidenced by lack of significant aggradation or mass failure of streambanks, this unit appeared to be conveying its sediment load effectively. The only apparent sediment source documented was Shanty Hollow Brook.

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 and 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. Three suitable riparian improvement planting sites were documented within this management unit.

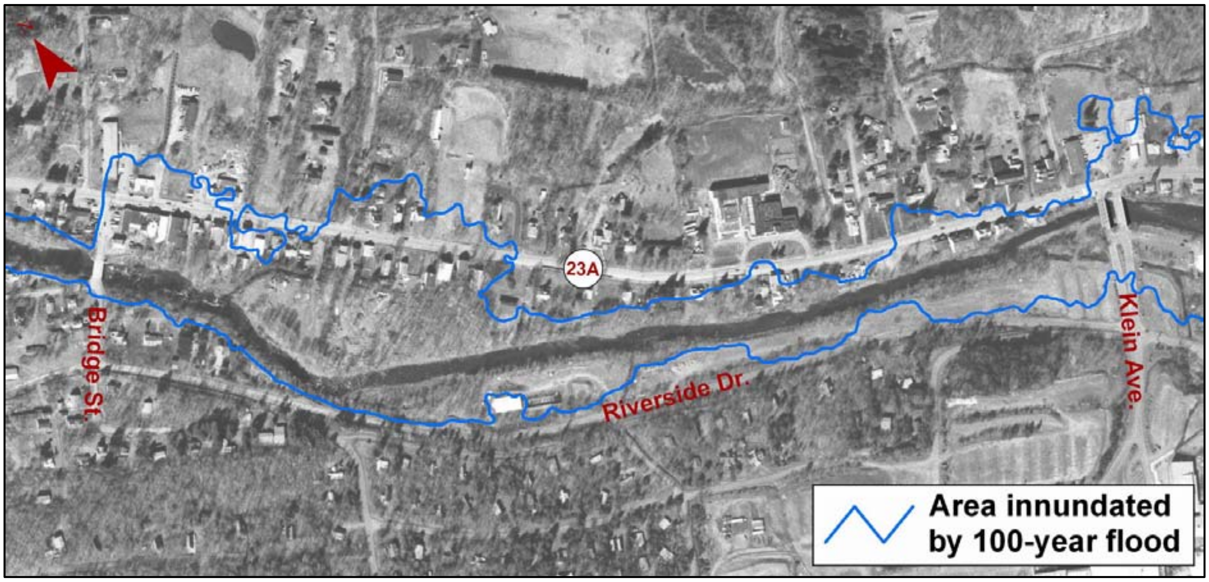
Some plant species that are not native can create difficulties for stream management, particularly if they are invasive. Japanese knotweed (*Fallopia japonica*), for example, has become a widespread problem in recent years. Knotweed shades out other species with its dense canopy structure (many large, 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 results can include rapid streambank erosion and increased surface runoff leading to a loss of valuable topsoil. In total, 33 Japanese knotweed occurrences along an estimated length of 707ft were documented in this management unit during the stream feature inventory. Japanese knotweed locations were documented as part of the stream feature inventory conducted during the summer of 2006 (Riparian Vegetation Mapping, Appendix A).

An analysis of vegetation was conducted using aerial photography from 2001 and field inventories (Riparian Vegetation Mapping, Appendix A). In this management unit, the predominant vegetation type within the 300 ft riparian buffer was forested (31 %) followed by herbaceous (24 %). *Impervious* area (26 %) within this unit's buffer was primarily the local roadways, private residences and associated driveways. 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 Schoharie Creek on the basis of recent surveys. The new FIRM hardcopy maps are available for viewing at County Soil & Water Conservation District Offices and most town halls. The FIRM maps shown in this plan are in draft form and currently under review. Finalization and adoption is expected by the end of 2007.

According to the current floodplain maps (below), thirty-six 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 records. 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 fair throughout this management unit. Canopy cover was inadequate along many streambanks and could be enhanced with plantings in the riparian zone. Woody debris observed within the stream channel was minimal throughout the unit. Woody debris provides critical habitat for fish and insects, and adds essential organic matter that will benefit organisms downstream.

It is recommended that an aquatic habitat study be conducted on the Schoharie Creek 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 Schoharie Creek. Fine sediment inputs into a stream increase *turbidity* and can act as a transport mechanism for other pollutants and pathogens. There were seven 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

Schoharie Creek. The cumulative impact of oil, grease, sediment, salt, litter and other unseen pollutants found in road runoff can significantly degrade water quality. There were eight stormwater culverts in this management unit in 2006.

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. Homeowners with septic systems should inspect their 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 2005, one homeowner within the drainage area of this management unit had made use of these programs to replace or repair a septic system.

Most homes along the Schoharie Creek within this management have public sewer. In 2006, the Village of Hunter completed work on a new sewage treatment infrastructure project. The project constructed approximately 11 miles of sewer collection lines and associated appurtenant structures within the Village of Hunter which will convey water to a wastewater treatment plant designed to treat 326,000 gallons of domestic wastewater per day. In addition to wastewater collected from the new sewer lines, a number of existing wastewater collection systems were consolidated into the Village wastewater collection and treatment system (NYSDEC, 2002).

References

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