East Kill Management Unit 11

Town of Jewett – Mill Hollow Road Bridge (Station 6699) to confluence with Schoharie Creek (Station 0)

This management unit began at Mill Hollow Road Bridge at County Route 17 (#3201130), and continued approximately 6,698 ft. to the East Kill's confluence with Schoharie Creek.

Management Unit 11 location
see Figure 4.0.1 for more detailed map

Stream Feature Statistics

20.4% of stream banks experiencing erosion
12.7% of stream banks have been stabilized
0% of stream banks have been bermed
150 feet of clay exposures
27.3 acres of inadequate vegetation
8,547 feet of road within 300ft. of stream

Summary of Recommendations Management Unit 11	
Intervention Level	Preservation, Passive, Assisted Self-Recovery
Stream Morphology	No recommendations at this time
Riparian Vegetation	Treat, remove and prevent the spread of Japanese knotweed where feasible. Monitor Japanese knotweed and eradicate new introductions.
Infrastructure	Interplant rip-rap installations Installation of stormwater outfall protection at Station 2130 and Stations 6353 - 6260
Aquatic Habitat	Watershed Aquatic Habitat Study
Flood Related Threats	No recommendations at this time
Water Quality	Removal of dump site
Further Assessment	Continue monitoring of Bank Erosion Monitoring Site Consider hydraulic analysis of private bridge openings

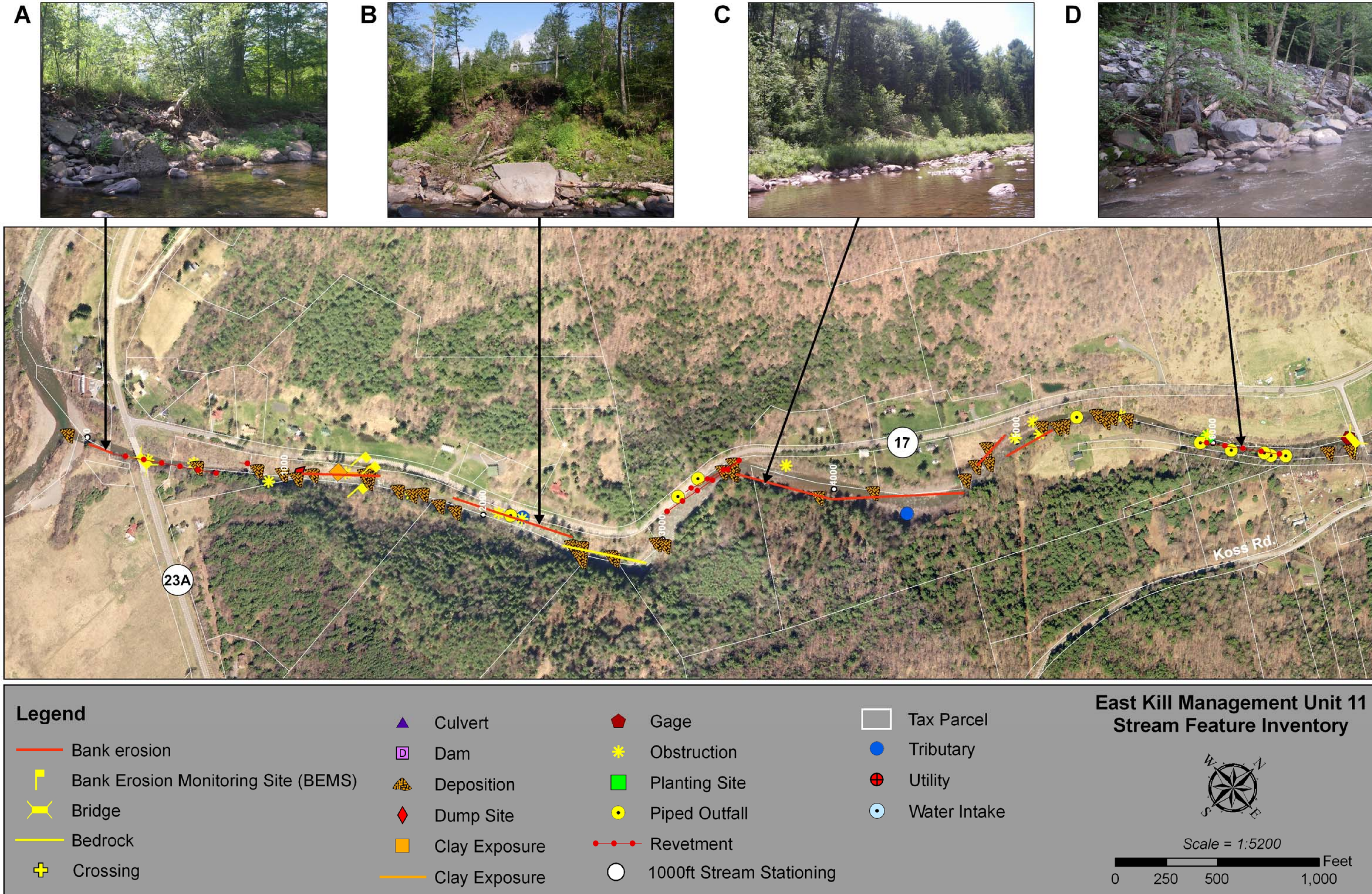


Figure 4.11.1 Management Unit 11 - 2006 aerial photography with stream feature inventory

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 alignment has not changed significantly over the years along this management unit; the channel has remained fairly stable.

As of 2006, according to available NYS DEC records dating back to 1996, there have been three stream disturbance permits issued in this management unit. Following the 1996 flood, two permits were issued for the excavation of sand and gravel to restore stream flows to pre-flood conditions. One permit was along approximately 500 feet of stream channel near station 3549 and the other was along approximately 400 feet of stream channel near station 54. Also in 1996, a third stream disturbance permit was issued for the installation or repair of rock rip-rap along approximately 150 feet of the stream bank near station 543.

Stream Channel and Floodplain Current Conditions (2006)

Revetment, Berms and Erosion

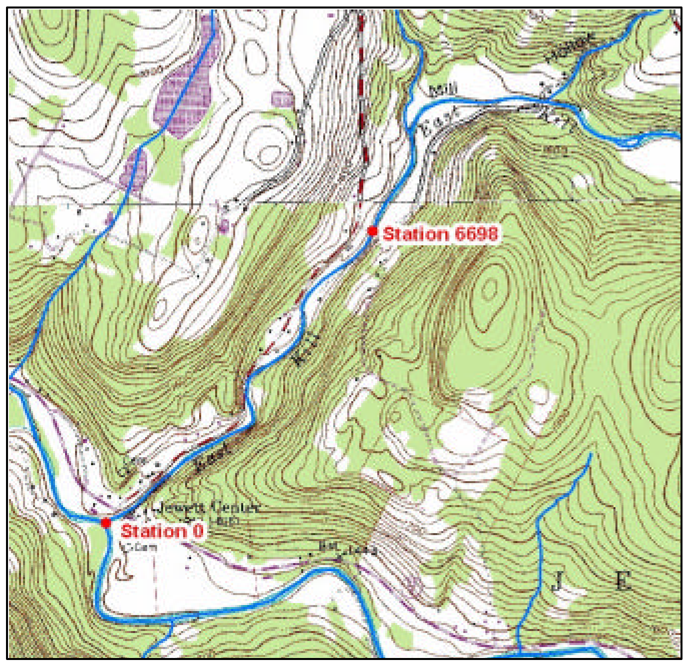
The 2006 stream feature inventory revealed that 20.4% (2,728 ft) of the stream banks exhibited signs of active erosion along the 13,397 ft of total channel length in the unit (Figure 4.11.1). *Revetment* has been installed on 12.7% (1,707 ft) of the stream banks. No berms were identified in this management unit at the time of the stream feature inventory.

Stream Channel Conditions (2006)

The following description of stream channel conditions references insets in foldout, Figure 4.11.1. Stream stationing presented on this map is measured in feet and begins at the confluence with the Schoharie Creek at Jewett. “Left” and “right” stream bank 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.

Management unit #11 began at the Mill Hollow Road Bridge. The drainage area ranged from 35.86 mi^2 at the top of the management unit to 36.62 mi^2 at the bottom of the unit. The valley slope was 0.99%.

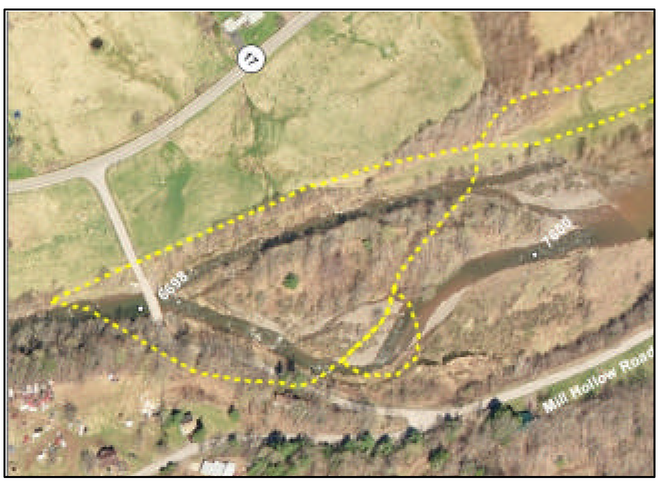
Valley *morphology* in this management unit was laterally controlled along portions of this management unit by a narrow valley floor and is influenced by the encroachment of County Route 17. Generally, stream conditions in this management unit were relatively unstable. There were seven eroding banks documented in this management unit, including four mass failures. Management efforts in this unit should focus on preservation of forested areas and improvements to the riparian buffer by planting *herbaceous* areas and revetted stream banks with native trees and shrubs.



1980 USGS topographic map – Hunter Quadrangle contour interval 20ft

Mill Hollow Road Bridge at Station 6699

This management unit began as the stream flowed under Mill Hollow Road Bridge at County Route 17 (Station 6699, Bridge # 3201130). At the time of the assessment, excessive aggradational conditions were observed upstream of the bridge and continued downstream of the bridge. While the bridge opening seemed to provide an adequate span for low flows, higher flows appeared to backwater, reducing stream velocity, which resulted in upstream aggradation. If this bridge is replaced in the future, it is recommended that a hydraulic analysis be conducted in order to determine the appropriate bridge width that will provide the capacity to convey flood flows through the opening.



Wetland boundaries approximately delineated by NWI (Stations 7543 - 6528)

There was a 4.6 acre palustrine wetland (Stations 7543 – 6528) that began in management unit #10, a small portion of this wetland continued through to management unit #11. This wetland was classified as PFO1A (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 bridge, there was a water-stage recorder and crest-stage gage (Station 6693) on the right stream bank. This gage is operated by the United States Geological Survey (USGS) in cooperation with the NYC Department of Environmental Protection. The gage (#01349700) has a drainage area of 35.6mi^2 and has been collecting continuous data from December 1996 to the present; prior to 1996 the gage collected some data dating back to 1951. All gage information including real time discharge and gage height is available online at the USGS website: http://waterdata.usgs.gov/ny/nwis/uv/?site_no=01349700&PARAmeter_cd=00065,00060; (See section 2.4 for more detailed information).

Gage at Station 6693

Downstream of the bridge, Whaley Road encroached upon the stream channel along the left stream bank. The embankment has been reinforced with rock rip-rap (Stations 6332 – 5931, Figure 4.11.1 Inset D) along approximately 401 feet of the stream channel. The rip-rap was comprised of a combination of large rock, small rock and gravel of differing ages; the rip-rap was in poor structural and functional condition. Along a portion of the rip-rap, there was a rock wall (Station 6088) reinforcing the stream bank, with rip-rap at the toe and top of the bank and a piped outfall entering through the wall. There were some trees throughout the rip-rap, however, the edge of the road was very close to the top of the revetted stream bank, therefore, deeply rooted woody vegetation is critical along the embankment to provide stability and water quality protection. Interplanting the rip-rap with native tree and shrub species and reinforcing the toe of this stream bank with native sedge species is recommended. This planting will help to strengthen the revetment, while enhancing aquatic habitat.

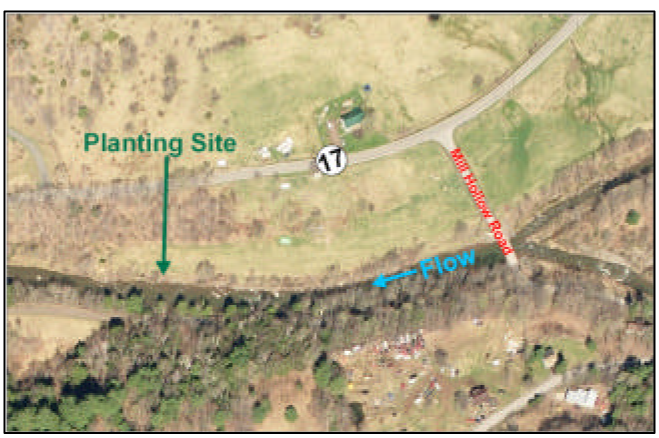
Piped outfall at Station 6260

Along the road embankment on the left, there were five piped outfalls (between Stations 6353 – 5943), that provided drainage for Whaley Road, four of which entered through the revetment. Two of the piped outfalls (Stations 6353 and 6260) had minimal or no outfall protection, while the others had good outfall protection, including the piped outfall (Station 6088) that entered through the rock wall portion of the revetment. Flow through these outfalls was intermittent; at the time of the assessment no flow was observed. During heavy rains, when flow may be present, it is important to have stable and effective outfall protection to minimize further deterioration to the existing revetment and degradation of the road embankment.

One small patch of Japanese knotweed (Station 6100) had become established in the rip-rap along the left stream bank, and two patches (Station 6387 and 5974) were observed opposite the revetment on the right stream bank. 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 very rapidly crowding out more beneficial streamside vegetation. Removal of these Japanese knotweed patches is recommended to prevent the spread if this invasive specie (See Section 2.7 Riparian Vegetation).

Japanese knotweed at Station 6387

Along the right stream bank, the land appeared to be used as an agricultural field for hay. Between the field of herbaceous vegetation and the stream, there was a narrow buffer with a combination of herbaceous, shrubby and forested vegetation. A vigorous buffer with mature trees is important at this site because it may filter nutrients and pollutants, if any, from the adjacent fields while providing improved stream bank stability. During the field assessment, this area was identified as a proposed riparian planting site (Station 5964). Recommendations for this site include augmentation of the existing



Riparian planting site at Station 5964 buffer with the planting of additional 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 functionality and protect the stream from nearby land uses.

Center bar at Stations 5575 - 5500

As the stream meandered to the left, there was excessive sediment deposition (Stations 5575- 4700) along the entire meander bend, starting with a center bar (Stations 5575 – 5500). Along the meander bend the depositional features that were observed included, a side bar along the right channel bed, a series of center bars, a transverse, or diagonal bar, across the channel, full channel aggradation and a *point bar* along the left channel bed. Point bars are depositional features that are caused by a decrease in sediment transport capacity and usually located on the inside of meander bends. There was also an abundant accumulation of woody debris (Stations 5533, 5121, 5118 and 5004) in multiple locations along this meander bend. Some of the debris had fallen from the adjacent stream banks; all provided only minor obstructions during low flows, but may pose a more significant obstruction during higher flows. Some of the accumulated debris appeared to contribute to localized scour and sediment deposition. Aggradational conditions also persisted downstream into the next meander bend. A piped outfall (Station 5323) entered along the right, providing drainage for County Route 17.

Erosion at Stations 5188 - 4925

Along this meander bend, the left stream bank had eroded (Stations 5188 – 4925) for approximately 263 feet. The erosion site was along a low bank with some shrubs and young trees that were leaning and falling into the stream channel, providing only a minor obstruction at low flows. The face of the bank was somewhat bare, exposing roots and cobble, with herbaceous vegetation interspersed along the bank. This erosion site may be a good candidate for remediation using vegetative toe and bank protection, but may self recover with time.

Erosion at Stations 4991 - 4788

Opposite this eroding bank, there was an erosion site (Stations 4991 – 4788) along the right stream bank for approximately 203 feet. It was a relatively high bank with a narrow riparian buffer along the upstream portion of the erosion. Further downstream along this erosion site, the height of the bank decreased, there was herbaceous vegetation to the top edge of the stream bank and a vegetated cobble bar appeared to provide some stability protection for the toe of the bank. Although this bank was a significant erosion site, it appeared to be slowly recovering, with herbaceous vegetation becoming established on the face of the bank. However, without deep-rooted shrub and tree species this bank may continue to erode during future high flows. This erosion site may be a good candidate for remediation using vegetative toe and bank protection. 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. Prior to proceeding with any work, this site may require a more detailed site assessment.

Erosion at Stations 4655 - 4013

As the stream meandered downstream, the hillslope was undermined by toe erosion, resulting in the mass wasting of a 32,086 ft^2 area along 642 ft of the left streambank (Stations 4655 – 4013). The face of the stream bank has been left unvegetated and extremely susceptible to future erosion. A small tributary and seepage along this bank may exacerbate erosion. Stream bank erosion often occurs on the outside of meander bends where the stream velocity is greatest during high flows. This erosion continued for another 489 ft downstream, but was less severe (Station 4013 – 3524, Figure 4.11.1 Inset C). Slumping and fallen trees on the bank face still provide some protection from erosion.

As the stream flowed directly into County Route 17, revetment including a 308 ft stacked rock wall (Station 3540 - 3232) and 436 ft of rip-rap (Station 3540 – 3104) covered the bank and toe of the right streambank. Interplanting the rip-rap with native tree and shrub species and reinforcing the toe of this stream bank with native sedge species is recommended. This planting will help to strengthen the revetment, while enhancing aquatic habitat by providing shade. Two piped outfalls (Stations 3340 and 3200) were located along this revetment. Flow through these outfalls was intermittent; at the time of the assessment no flow was observed.

Revetment at Station 3540-3104

Downstream, 618 ft of the County Route 17 road embankment was threatened by a large mass failure of the streambank that resulted in the loss of mature vegetation from the face of the streambank (Station 2450-1832, Figure 4.11.1 Inset B). Stormwater from the outlet at the top of this bank appeared to be exacerbating erosion at this site (Inset Station 32130). Outlet protection, such as a rock lined channel, should be

Piped outfall at Station 2130

installed to dissipate flow and prevent erosion. To minimize erosion, stormwater outfalls should be designed to outlet near the base of the streambank, set back from the active stream channel, and enter the stream at a low angle.

Continuing downstream, the right stream bank was affected by a *mass failure* (Station 1470 to Station 1084), a large slope failure associated with downcutting stream channels and undermined support of steep slopes. Along this section of stream, the thalweg flowed up against the toe and lower bank undermining the steep slope, resulting in an erosion area of approximately 7,716 ft^2 and compromising mature trees along the bank. During high flows and times of active erosion, a significant amount of clay may enter the stream from the 150 ft long clay/silt exposure along this bank. Fine sediment inputs into a stream can be a serious water quality concern because they increase *turbidity*, degrade fish habitat, and can act as a transport mechanism for other pollutants and pathogens.

Bank erosion, BEMS #06EK2422
Stations 1470 - 1084

To study erosion along this reach, this stream bank has been monumented as a Bank Erosion Monitoring Site (BEMS # 06EK2422, Station 1400). 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. It is recommended that monitoring of this site continue.

At the downstream end of this erosion old metal debris was dumped onto the stream bank. It is recommended that the dump site (Station 1070) be cleared to eliminate the potential safety and pollution hazards associated with the materials.

As the stream approached the County Route 23A bridge, rip-rap had been installed along 518 ft upstream and downstream of the bridge (Station 665-147). The rip-rap, consisting of large rocks laid onto the toe of the streambank, appeared fairly old and had mature vegetation growing throughout.

Near the end of this management unit the stream passed under the NYS Route 23A bridge (Station 300, Bridge # 1017930). Gravel deposits were noted upstream and downstream of the bridge. 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 backwater, resulting in the upstream aggradation. 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.

County Route 23A bridge at Station 300

Downstream from the bridge 127 ft along the left bank had scoured (Station 140-13, Figure 4.11.1 Inset A). Planting this bank with native tree and shrub species and reinforcing the toe of this stream bank with native sedge species is recommended. This management unit ended as the East Kill flowed into the Schoharie Creek.

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).

Sediment transport in this unit is influenced by valley morphology. This unit has experienced wide-spread sediment transport deficiencies. Bed load transported by the stream channel exceeds the transport capacity of management unit #11, resulting in channel aggradation and lateral migration. Sediment storage areas can benefit the general health of the stream system by limiting bed load delivered to downstream reaches during large storm events. Sediment sinks such as this throughout the watershed should be preserved where adjacent land uses permit. Mature riparian vegetation will be important in such settings to limit the extent of lateral channel migration and bank erosion. The ability of the channel to convey sediment was also affected by the County Route 23A bridge that appeared to be contributing to backwater conditions and upstream channel aggradation.

Riparian Vegetation

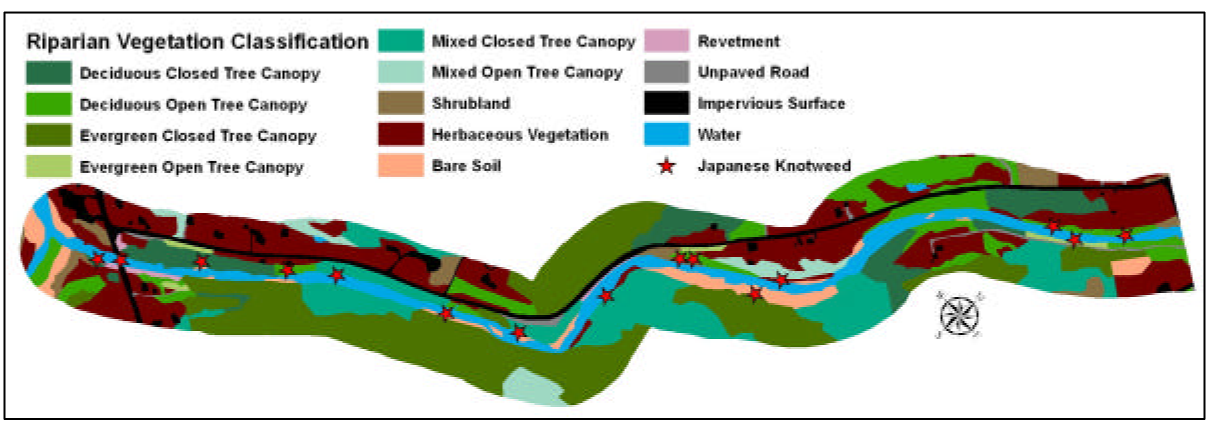
One of the most cost-effective and self-sustaining methods for landowners to protect streamside property is to maintain or replant a healthy buffer of trees and shrubs along the banks and floodplains, especially within the first 50 to 100 ft. of the stream. A dense mat of roots under trees and shrubs 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. One suitable riparian improvement planting site was documented within this management unit. There were also several locations within this unit that would benefit from interplanting of revetted embankments.

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 stream banks. The results can include rapid stream bank 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 2006 (Riparian Vegetation Mapping, Appendix A). The first appearance of Japanese knotweed on the East Kill mainstem does not occur until management unit #7. In total, 15 Japanese knotweed occurrences along an estimated length of 88 ft were documented in this management unit during the stream feature inventory.

Japanese knotweed at Station 2150

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 downstream. Periodic monitoring for knotweed introductions in this unit is recommended.

An analysis of vegetation was conducted using aerial photography from 2001 and field inventories (Riparian Vegetation Mapping, Appendix B). In this management unit, the predominant vegetation type within the 300 ft riparian buffer was forested (62 %) followed by herbaceous (24%). *Impervious* area (6.4 %) within this unit's buffer was primarily the

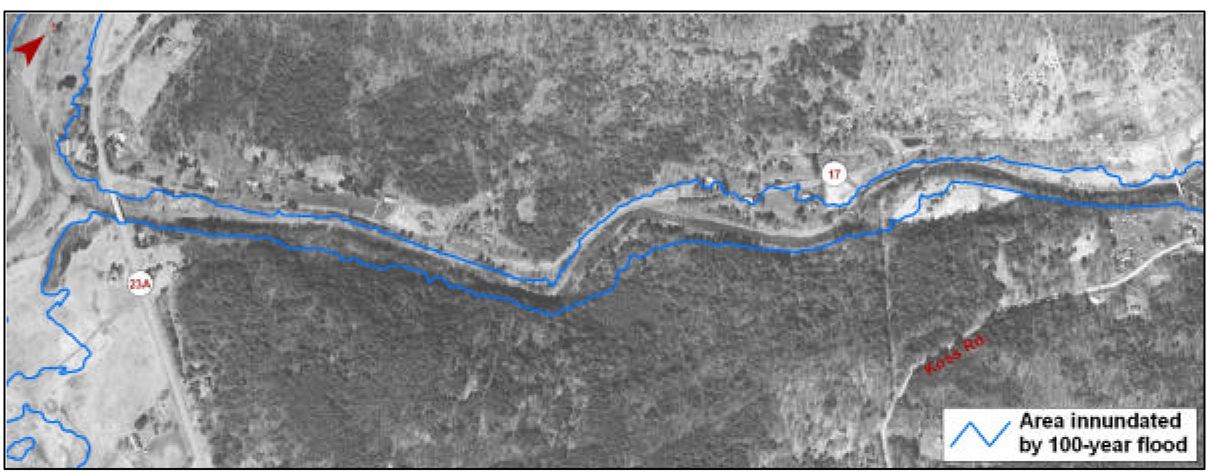


Riparian vegetation classification map based on aerial photography from 2001 local and private roadways, and residential structures. Areas of herbaceous (non-woody) cover may present opportunities to improve the riparian buffer with tree plantings in order to promote a more mature vegetative community along the stream bank 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 East Kill on the basis of recent surveys. The new FIRM hardcopy maps are available for viewing at the Greene County Soil & Water Conservation District Office and the Jewett Municipal Building. 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), one existing structure 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 much of both stream banks. Woody debris within the stream channel was observed throughout the unit. This woody debris was providing critical habitat for fish and insects, and adding essential organic matter that will benefit organisms downstream.

It is recommended that an aquatic habitat study be conducted on the East 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 East Kill. Fine sediment inputs into a stream increase *turbidity* and can act as a transport mechanism for other pollutants and pathogens. There was one significant clay exposure 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 East Kill. The cumulative impact of oil, grease, sediment, salt, litter and other unseen pollutants found in road runoff can significantly degrade water quality. There were nine culverts in this management unit.

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 2005, one 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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