East Kill Management Unit 9

Town of Jewett –Station 15760 to Mill Hollow Road Bridge (Station 11254)

This management unit began at Station 15760, and continued approximately 4,506 ft. to Mill Hollow Road Bridge (#3201140).

Management Unit 9 location
see Figure 4.0.1 for more detailed map

<u>Stream Feature Statistics</u>

23.7% of stream banks experiencing erosion
3.7% of stream banks have been stabilized
0% of stream banks have been bermed
1,644 feet of clay exposures
4.0 acres of inadequate vegetation
169 feet of road within 300ft. of stream

Summary of Recommendations Management Unit 9	
Intervention Level	Assisted Self-Recovery; Full Restoration
Stream Morphology	Consider modification of channel morphology to minimize erosion and clay inputs at mass failure (Stations 13961 - 13005)
Riparian Vegetation	Treat, remove and prevent the spread of Japanese knotweed where feasible. Monitor Japanese Knotweed and eradicate new introductions.
Infrastructure	No recommendations at this time
Aquatic Habitat	Watershed Aquatic Habitat Study
Flood Related Threats	No recommendations at this time
Water Quality	No recommendations at this time
Further Assessment	Consider establishing a Bank Erosion Monitoring Site for mass failure (Stations 13961 – 13005). Consider hydraulic analysis of bridge opening.

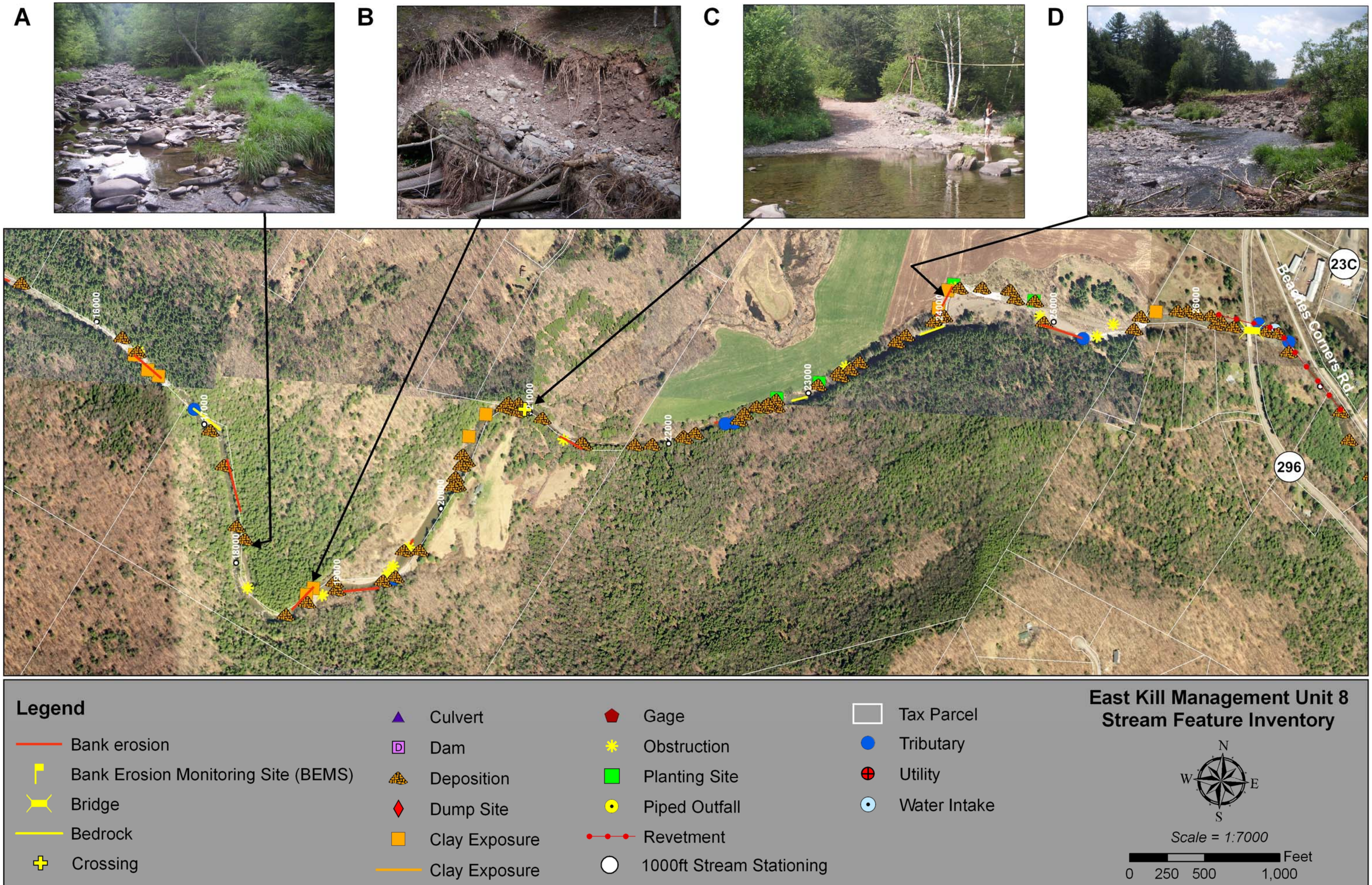
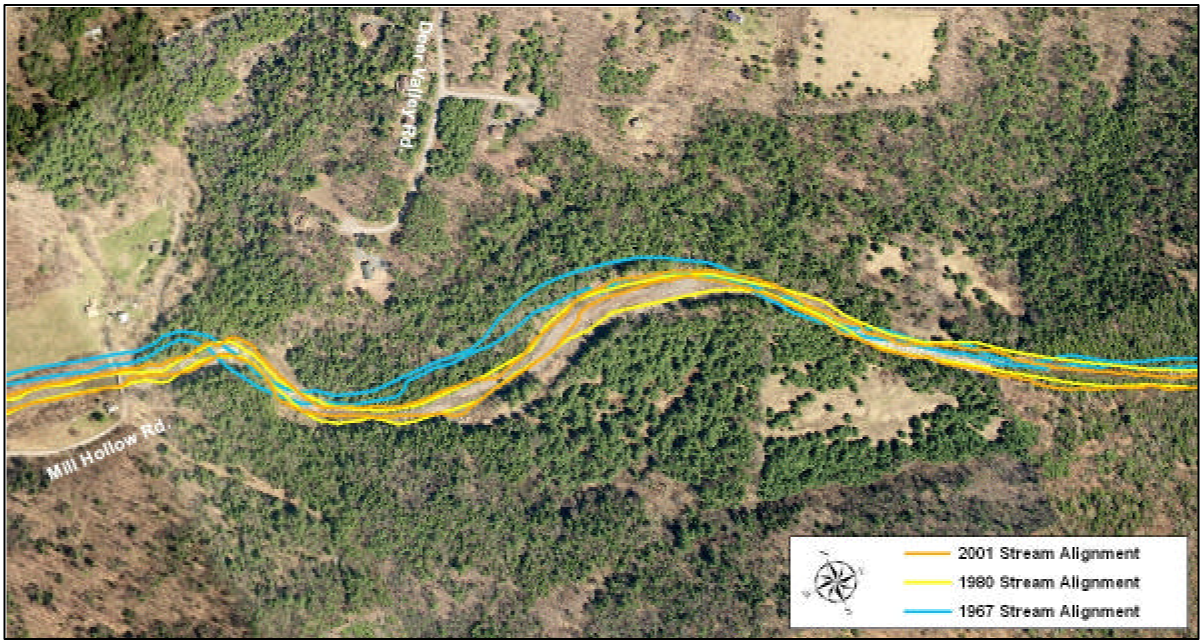


Figure 4.8.1 Management Unit 8 - 2006 aerial photography with stream feature inventory

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 no stream disturbance permits issued in this management unit.

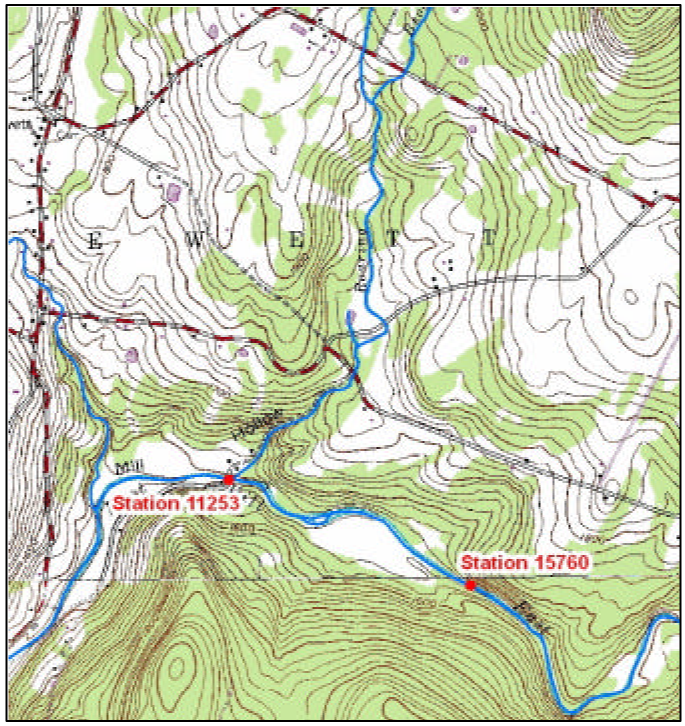
Stream Channel and Floodplain Current Conditions (2006)

Revetment, Berms and Erosion

The 2006 stream feature inventory revealed that 23.7% (2,132 ft.) of the stream banks exhibited signs of active erosion along the 9,012 ft. of total channel length in the unit (Figure 4.9.1). *Revetment* had been installed on 3.7% (336 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 4.9.1. 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.



1980 USGS topographic map – Ashland and Lexington Quadrangles - contour interval 20ft

Management unit #9 began at Station 15760. The drainage area ranged from 29.33 mi^2 at the top of the management unit to 30.34 mi^2 at the bottom of the unit. The valley slope was 1.12%.

Valley *morphology* in this management unit was laterally controlled for a short distance at the top and bottom of the unit by a narrow valley floor. For much of the unit, valley morphology was relatively unconfined with a broad glacial and *alluvial* valley flat. Generally, stream conditions in this management unit were somewhat impaired. There were four eroding banks documented in this management unit, including two mass failures that were causing significant clay exposures along the length of the erosions sites. 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 and revetted stream banks with native trees and shrubs.


Sidebar at Stations 15431 - 14222

This management unit began (Station 15760) as the stream flowed through a narrow valley with forested vegetation along both sides of the stream. Downstream of the start of the unit, there was a side bar (Station 15431) along approximately 1,209 feet of the right channel bed. The side bar was well vegetated with grasses, sedges and willows. Side bars result from *aggradation*, or the deposition of material that has eroded and transported from other areas.

Erosion at Stations 15360 - 15319

Continuing downstream there was erosion (Stations 15360 – 15319) along approximately 41 feet of the left stream bank. There was a narrow line of trees with exposed roots along the stream bank. Along the top of the bank there was a hiking/all-terrain vehicle trail on the terrace, beyond the trail, the hillside was forested. Although this erosion site did not appear to pose a significant threat to water quality, if it continues to erode, the trail may be compromised. This erosion site may be a good candidate for remediation using vegetative toe and bank protection. Reinforcing the toe of this streambank with native shrub and sedge species is recommended.

Channel crossing at Station 14675
Photo orientation – looking at

Further downstream, there was a channel crossing (Station 14675) that disrupted the forested riparian buffer on the right and left stream banks. The land cover along both sides of the stream was primarily forested with some areas of open field with woody vegetation. The crossing appeared to be used for recreational purposes to access a field beyond a relatively narrow buffer along the left bank.

Continuing downstream, there was a more significant erosion site (Stations 14656 – 14093) along approximately 563 feet of the left stream bank. The stream had caused an erosion area of approximately 3,938 ft^2 along

Woody debris at Station 14281
Erosion at Stations 14656 - 14093

this low bank, and resulted in exposed roots, slumping trees, and multiple lacustrine clay exposures (Station 14593, Figure 4.9.1 Inset D, and Stations 14251 – 14094). Both clay exposures were along the stream bank and channel bed of this erosion site, with the first affecting approximately 18 feet of the stream along the upstream portion of the erosion and the second affecting approximately 157 feet of the stream channel further downstream. 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. There was a fallen tree along the eroding bank (Station 14281) that appeared to contribute to scour upstream of the debris and caused a minor obstruction at low flows.

Opposite the erosion, there was a small patch of Japanese knotweed (Station 14161) along 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 rapidly, crowding out more beneficial streamside vegetation. Removal of this Japanese knotweed is recommended to prevent the spread if this invasive species (See Section 2.7 Riparian Vegetation).

Just downstream of the erosion site, the left stream bank was reinforced with a rock wall (Station 14083 – 13809) for approximately 274 feet. The rock wall was in fair structural and functional condition.

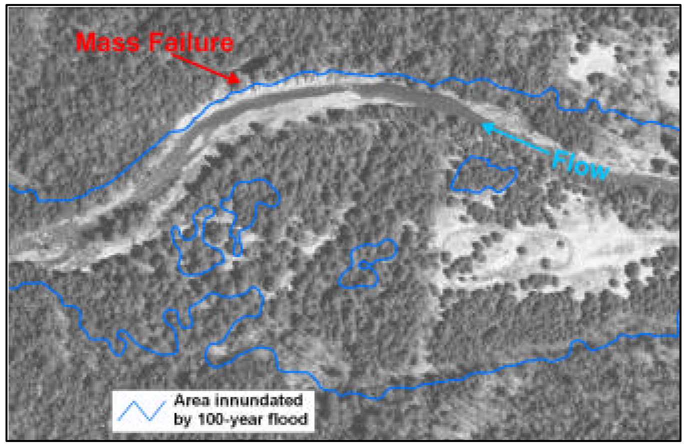
Rockwall at Stations 14083 - 13809

As the stream meandered to the left, there was a *point bar* (Stations 14088 – 12959) along the left channel bed. A point bar is a depositional feature usually located on the inside of a meander bend, and is typically caused by a decrease in sediment transport capacity. There were willows and herbaceous vegetation, including grasses and sedges, interspersed along the bar. There was also a significant amount of clay along the bar that appeared to be deposited from the failing stream bank on the right.

Clay deposited along Stations 14088 - 12959 photo orientation – looking at

Along this meander bend, there was a *mass failure* (Stations 13961 – 13005) along the right stream bank. Stream bank erosion often occurs on the outside of meander bends where the stream velocity is greatest during high flows. Along this section of stream, the *thalweg*, or deepest part of the stream channel, flowed up against the right stream bank undermining the vertical slope, resulting in an erosion area of approximately 28,673 ft^2, exposing mixed till and compromising mature trees at the top of the bank. There were two woody debris accumulations (Stations 13700 and 13536) within the stream channel along this eroding bank, they posed minor obstructions at low flows and one (Station 13536) of them appeared to contribute to localized aggradation. There was a continuous lacustrine clay exposure (Stations 13961 – 13005) along the eroding bank and across the entire channel bed. During high flows and times of active erosion, a significant amount of clay enters the stream from this bank; this poses a water quality threat due to the turbidity associated with clay exposures. Further exacerbating the erosion and mass failure at this site, were the multiple small seeps along this bank, including an unnamed intermittent tributary (Station 13727) and an unnamed perennial tributary (Station 13480, Figure 4.9.1 Inset C). To study erosion along this reach, it is recommended that this site be considered for a potential Bank Erosion Monitoring Site (BEMS). To monitor BEMS, a cross-section and long profile may be conducted to collect

Mass failure and clay exposure at Stations 13961 – 13005 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.



Mass failure at Stations 13961- 13005
100-year floodplain

This stream bank may cause a considerable amount of turbidity during high flow, if conditions persist, with the stream bed continuing to incise and the bank continuing to erode, water quality will continue to be impaired due to clay inputs. Full restoration at this site may be necessary to minimize these potential impacts. Restoration techniques may include the installation of *rock vanes*, which protect the stream bank by redirecting the thalweg away from the stream bank and towards the center of the channel; these structures tend to improve in-stream habitat through scour, oxygenation, and cover. To restore this site, it may be necessary to move the channel away from the vertical stream bank along the right by utilizing the wide floodplain area along the left. Full restoration would also involve *bioengineering* techniques that utilize live vegetation, either alone or in combination with harder materials such as rock or (dead) wood, to stabilize soils associated with stream banks or hill-slopes. Roots stabilize the soil, while stems, branches and foliage slow high velocity water, reducing erosion and encouraging deposition of fine sediment. If this site is to be considered for full restoration, an in-depth survey, a thorough morphological assessment and a project design would be required.

Wetland boundary approximately delineated by NWI
(Stations 13800 - 12385)

Also along this meander bend, there was a large federally designated wetland complex comprised of a 3 acre riverine wetland (Stations 13800 – 12800) and a 1 acre palustrine wetland

(Stations 12800 – 12385). These wetlands are classified as R3USA and PFO1A respectively (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.

Mass failure along Stations 12416 – 11845
Woody debris Station 12123

As the stream meandered to the right, there was a mass failure (Stations 12416 – 11845, Figure 4.9.1 Inset B) along approximately 571 feet of the left stream bank. This mass failure resulted in an erosion area of approximately 22,860 ft^2, exposing lacustrine clay (Stations 12349 – 11833) and compromising mature trees along the bank. The height of this bank is variable; it starts low and then increases going downstream, until it tapers off at the end of the erosion site. There was a significant amount of woody debris (Station 12123) along the erosion site that appeared to contribute to upstream aggradational conditions and localized scour, exacerbating the erosion of the bank. Opposite the eroding bank, there was excessive sediment deposition that formed a side bar (Stations 12454 – 12249) and point bar (Stations 12238 – 11800) along the right channel bed.

Continuing downstream, a small unnamed intermittent spring seep entered along the right bank through herbaceous vegetation including grasses and sedges; there was flow at the time of the assessment. As the stream meandered to the left, there was a point bar (Stations 11736 – 11264) that stretched for approximately 472 feet along the left channel bed and ended just upstream of the Mill Hollow Road Bridge. There was abundant woody debris accumulated in multiple

Point bar at Stations 11736 – 11264
Woody Debris at Station 11700

locations along the point bar, none of these caused an obstruction at low flow. The woody debris (Station 11700) along the upstream portion of the point bar did not appear to have a significant impact on stream channel conditions while the two debris accumulations (Stations 11493 and 11364) further downstream did appear to contribute to minor localized scour.

Rock wall and Roaring Brook at Station 11312

Continuing downstream, Roaring Brook (Station 11312, Figure 4.9.1 Inset A, photo orientation – looking at) entered along the right stream bank. This tributary drains the slopes of Cave Mountain before it reaches the flatter topography of the valley floor where it enters the East Kill. 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 East Kill. 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). Roaring Brook was classified C(t) by the NYS DEC, indicating that the best uses for this stream were the support of fisheries, including trout fisheries, and other non-contact activities. There was a rock wall installed perpendicular to the East Kill, reinforcing the right stream bank of Roaring Brook; it was in fair structural and functional condition. The rock wall was part of the remains of an old Mill.

Mill Hollow Road Bridge at Station 11254

The management unit ended as the stream flowed under the Mill Hollow Road Bridge (Station 11254, Bridge # 3201140). At the time of the assessment, excessive sediment deposition was observed upstream of the bridge. Such aggradation conditions 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. 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.

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 was influenced by valley morphology. The unconfined valley form and topography suggest that this unit was a sediment storage zone. This unit has experienced wide-spread sediment transport deficiencies. Bed load transported by the stream channel exceeded the transport capacity of management unit #9, resulting in channel aggradation and some 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 Mill Hollow Road Bridge that appeared to be contributing to backwater conditions and upstream channel aggradation. Installation of floodplain drainage under bridge approaches may reduce the backwater conditions and improve sediment transport continuity.

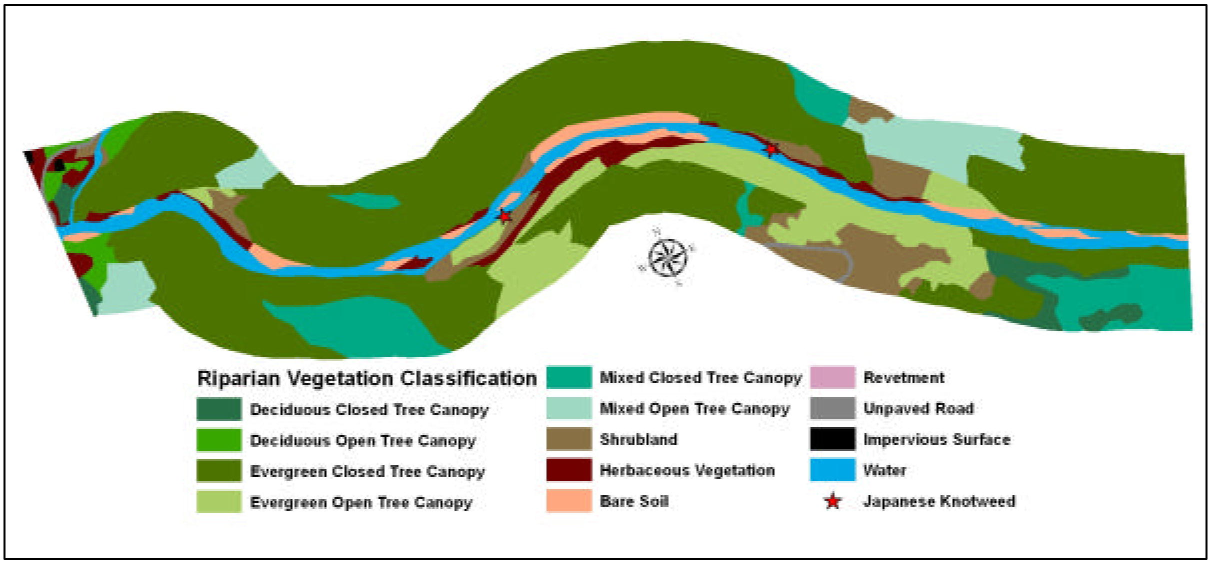
Riparian Vegetation

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 proposed riparian improvement planting sites identified 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 stream banks. The result 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 B). The first appearance of Japanese knotweed on the East Kill occurred in management unit #7, although there are some significant stands of knotweed in management unit #7, the knotweed occurrences in management unit #9 were primarily small patches. In total, 2

Japanese knotweed at Station 13045

Japanese knotweed occurrences along an estimated length of 23 feet were documented in this management unit 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 downstream management units. The Japanese knotweed patches that were observed in this unit may be removed to prevent further spread, see appendix B for more information on knotweed removal methods.



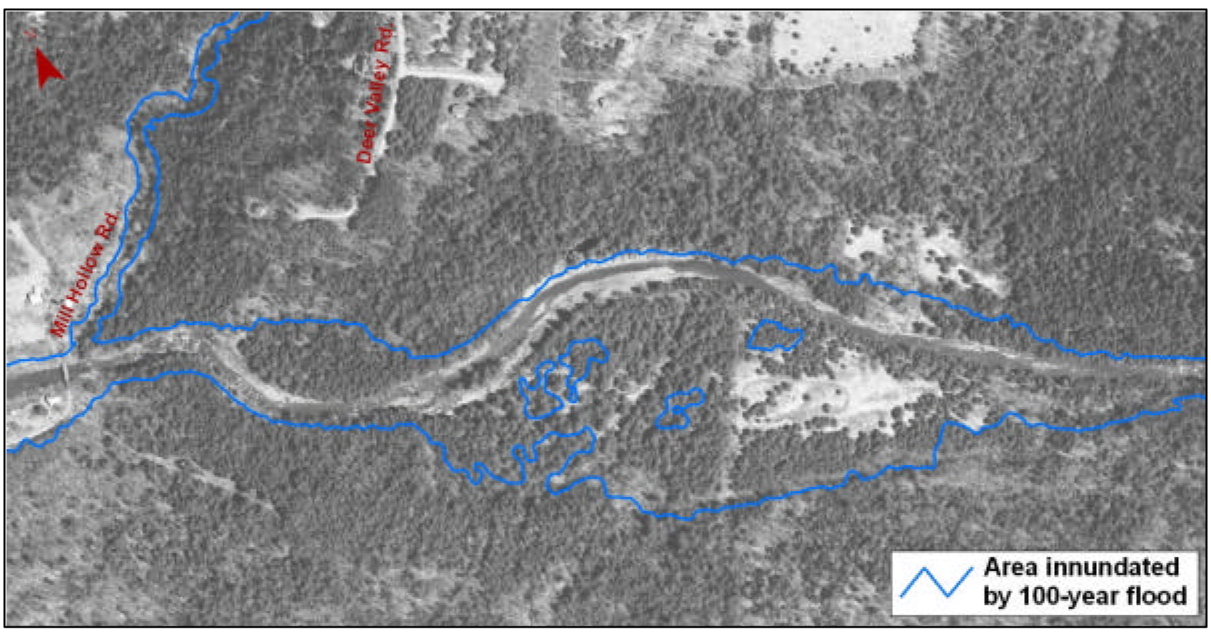
Riparian vegetation classification map based on aerial photography from 2001

An analysis of vegetation was conducted using aerial photography from 2001 and field inventories (see above map and Riparian Vegetation Mapping, Appendix B). In this management unit, the predominant vegetation type within the 300 ft. riparian buffer was forested (86 %) followed by shrubland (7%). *Impervious* area (0.10 %) within this unit's buffer was primarily the 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), 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 are 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 someone impaired along portions of this management unit. Canopy cover was adequate along much of both stream banks and woody debris within the stream channel was observed throughout the unit. This woody debris was providing critical habitat for fish and insects, and added essential organic matter that will benefit organisms downstream. Though canopy cover and woody debris were present, there was a significant amount of clay observed along the channel bed and banks, which may have a negative impact on fish habitat.

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 were four 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 East 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 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. 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.

References

NYSDEC, 1994. New York State Department of Environmental Conservation. Water Quality Regulations: Surface Water and Groundwater Classifications and Standards, NYS Codes, rules and regulations, Title 6, Chapter 10, Parts 700-705.

NYSDEC, 1998. New York State Department of Environmental Conservation. Rules and Regulations: Classifications- Surface Waters and Groundwaters, 6NYCRR Part 701, effective 1967, last amended March 1998, NYSDEC, Albany, New York. http://www.dec.state.ny.us/website/regs/part701.html

ACE, 1998-1999 (updated 2005) National Inventory of Dams Data Dictionary. Army Corps of Engineers. 1998-1999, updated 2005. http://crunch.tec.army.mil/nid/webpages/nid.cfm

Koltun, G.F., Landers, M.N., Nolan, K.M. & Parker, R.S. (1997) Sediment transport and geomorphology issues in the water resources division. In *Proceedings of the U.S. Geological Survey (USGS) sediment workshop: expanding sediment research capabilities in today's USGS, February 4-7, 1997, Reston, VA. and Harpers Ferry, WV*. Reston, VA: US Geological Survey.