Manor Kill Management Unit 4

Town of Conesville – Station 26995 to Station 24315

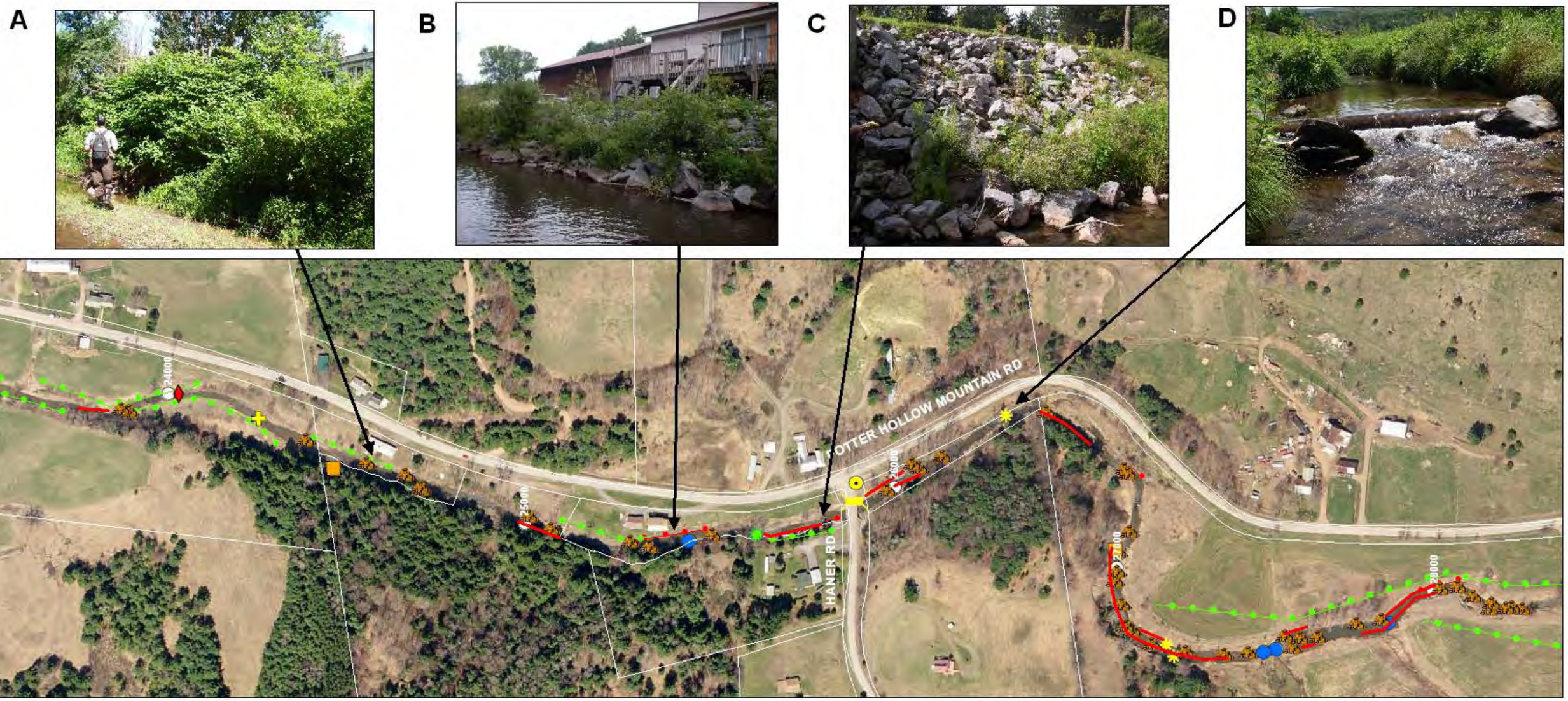
This management unit begins at Station 26995, continuing approximately 2,680 ft to Station 24315 in the Town of Conesville.

Stream Feature Statistics

13% of streambanks experiencing erosion
4.82% of streambanks have been stabilized
0% of streambanks have been bermed
9.0 feet of clay exposures
13.32 acres of inadequate vegetation
3,077 feet of road within 300 feet of stream
11.89% of streambanks are proposed for planting

Management Unit 4 location
see Figure 4.0.1 for more detailed map

Summary of Recommendations Management Unit 4	
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	Interplanting of rip rap at South Mtn Road Bridge (Bridge # 3354990, Station 25880, also known as Haner Road).
Aquatic Habitat	Watershed Aquatic Habitat Study
Flood Related Threats	Flood proof the structures within 100 year floodplain; possibly plan for potential flood buyout program.
Water Quality	Building owners adjacent to the stream should inspect their septic systems annually to make sure they are functioning properly, and participate in the CWC septic programs.
Further Assessment	No recommendations at this time.



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 4
Stream Feature Inventory

N W E S

Scale = 1:3,000

0 130 260 520 Feet

Stream flow

Figure 4.4.1 Management Unit 4 - 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 along this management unit; the channel has remained fairly stable.

As of September 2008, according to available NYS DEC records dating back to 1998, there have been two stream disturbance permits issued in this management unit. In 2000, a permit was issued to Schoharie County for the replacement of the South Mountain Road Bridge, also known as Haner Road. In 2008, a permit was issued for 100 feet of rip rap repair, installation of new rip rap, and minor fill and grading in pre-disturbed lawn areas. This permit did not allow in-stream work; all revetment materials had to be placed above the waterline at the time that repair work was completed. This permit expires on September 30, 2009.

Stream Channel and Floodplain Current Conditions (2008)

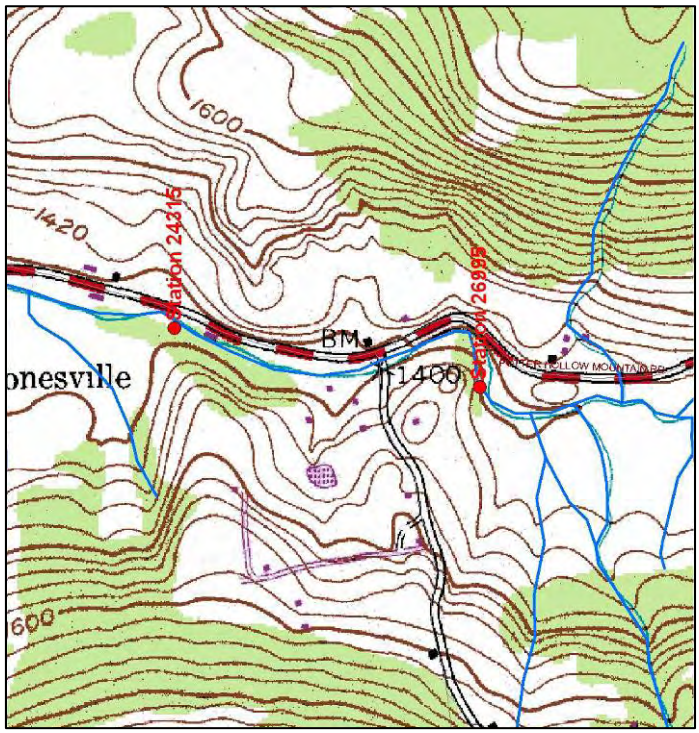
Revetment, Berms and Erosion

The 2008 stream feature inventory revealed that 13% (679 ft.) of the streambanks exhibited signs of active erosion along the 5,360 ft. of total streambank length in the unit

(Fig. 4.2.1). *Revetment* has been installed on 4.82% (259 ft.) of the streambanks, and there were no berms in this management unit

Stream Channel Conditions (2008)

The following description of stream channel conditions references insets in foldout, Figure 4.4.1. Stream stationing presented on this map is measured in feet and begins at the confluence with the Schoharie Creek in Conesville. "Left" and "right" streambank references are oriented looking downstream, photos are also oriented looking downstream unless otherwise noted. Italicized terms are defined in the glossary. This characterization is the result of an assessment conducted in 2008.



1980 USGS topographic map – Livingstonville Quadrangle contour interval 20ft

Management unit 4 began at Station 26995. The drainage area ranged from 16.26 mi^2 at the top of the management unit to 16.65 mi^2 at the bottom of the unit. The valley slope was 0.78%.

Valley morphology in this management unit was laterally controlled through much of the unit by a narrow valley floor and was influenced by the encroachment of Potter Hollow Mountain Road. Generally, stream conditions in this management unit were somewhat unstable, with deficient sediment transport ability resulting in aggradational conditions throughout, and approximately 679 feet of erosion. There were six eroding banks documented in this management unit, including one mass failure. Management efforts in this unit should focus on preservation of existing forested areas and improvements to the riparian buffer by planting *herbaceous* areas and revetted streambanks with native trees and shrubs.

Mass Failure at Stations 27163 - 26938

Management unit 4 began as the stream valley narrowed and the adjacent vegetation along the left streambank changed from herbaceous to forested. As the stream meandered to the right, a *mass failure* (Stations 27163 – 26938) began in management unit 3 and continued downstream into this management unit. Streambank 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, flows up against the toe of the bank undermining the steep slope, resulting in erosion along 64 feet in management unit 4 (161 feet of erosion in management unit 3). There was a mixture of herbaceous vegetation and open forest along this mass failure; mature trees were compromised and had fallen along the streambank. At the downstream portion of the mass failure the erosion had caused a lacustrine clay exposure (Station 26951) along the left channel bed. Clay inputs into a stream are a serious water quality concern because they increase *turbidity,* degrade fish habitat, and can act as a carrier for other pollutants and pathogens. The erosion site appeared to be self-recovering, with sedges along the toe of the bank and herbaceous vegetation, shrubs and willows establishing along the face of the bank. Although, future high flows may result in continued erosion along this meander bend.

Continuing downstream, there was excess sediment deposition including, a small well-vegetated center bar (Station 26959), with sedges and other herbaceous species, and a side bar (Stations 26897 - 26867) stretching along approximately 30 feet of the left channel bed.

Center Bar at Station 26959

Revetment at Stations 26750 - 26712

As the stream meandered to the left, there was a rock wall (Station 26760) followed by rip rap (Stations 26750 – 26712) along the right streambank. Both areas of revetment appeared to be relatively old. The rock wall was in poor functional condition and fair structural condition, and had herbaceous vegetation established throughout. The rip rap appeared to have been dumped along the toe of the streambank, had failed structurally and was in poor functional condition.

Continuing along this meander bend, there was log across the stream channel providing grade control (Figure 4.4.1, Inset D, photograph orientation looking upstream, Station 26687). The log appeared to have been placed to provide fish habitat, and may contribute to upstream aggradational conditions, including transverse and center bars. Water flows around the structure along the right side.

Downstream of the grade control structure, there was a channel *divergence* (Station 26644) where a secondary channel split off from the main channel. At the time of the assessment, this channel had subsurface and surface flow, but it appeared to function primarily as a flood chute. Flood chutes convey flow through a secondary channel during periods of high flows; this secondary channel converges (Station 26428) with the main channel approximately 216 feet downstream.

Continuing downstream, the first occurrence of Japanese knotweed (Station 26626) in this management unit was documented; this was a very small patch. Japanese knotweed is a non-native invasive species which does not provide adequate erosion protection due to its very shallow rooting system; knotweed also grows rapidly

Japanese knotweed at Station 26626

and tends to crowd out more beneficial streamside vegetation. The best means for controlling knotweed is prevention of its spread. Therefore, efforts should be made 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 downstream management units. There are removal methods that may be used for larger stands (see Section 2.7), these methods should be used with caution and carefully executed to avoid further spread of Japanese knotweed.

Erosion at Stations 26588 - 26432

Further downstream, the left streambank was eroding (Stations 26588 – 26432) for approximately 156 feet. The streambank and upland area were forested; the erosion caused undercut banks, exposing roots and compromising mature trees. Starting along the lower portion of the eroding bank and continuing downstream, there was a side bar (Station 26541) for approximately 40 feet along the left channel bed.

Downstream of the side bar, there was a beaver dam (Station 26343). While beaver impoundments can sometimes be a nuisance, beavers have historically played a beneficial and ecologically important role in the stream system. Beaver activity adds organic debris (trees, leaves, etc. which provide the base of the food chain), reduces water velocities and flood-related hazards downstream, and creates wetland areas that filter sediment and release water to the stream and groundwater slowly throughout the year. Although the dam is across the entire channel, water is able to flow underneath the dam. During higher flows, the dam poses a more significant obstruction to

Beaver Dam at Station 26343

Side Bar at Stations 26149 - 26070

flow; it appeared that higher water levels flowed along both sides of the beaver dam.

Further downstream, there were several more patches of Japanese knotweed (between Stations 26200 and 25900) along the left and right streambanks. There were also well-vegetated side bars along approximately 79 feet of the right channel bed (Stations 26149 – 26070) and 101 feet along the left channel bed (Stations 26080 - 25979). At the time of the assessment, there was flow through the sedges along and behind the side bar along the right streambank.

Continuing along this stretch of stream, there was some minor hydraulic erosion (Stations 26074 – 26001) along the left streambank for approximately 73 feet. Along the opposite streambank, there was more significant erosion (Stations 29641 - 29525) for approximately 116 feet. There was a relatively narrow buffer between the stream and Potter Hollow Mountain Road; the streambank was vegetated with herbaceous vegetation, shrubs and trees. Along the downstream end of the erosion there were exposed roots and compromised trees. Although the stream did not appear to impose an immediate threat to the road, future high flows may cause more significant erosion and streambank stabilization may be necessary. There was a piped outfall (Station 25896) on the right, providing drainage for Potter Hollow Mountain Road.

Downstream, the Manor Kill flowed under South Mountain Road Bridge (Bridge # 3354990, Station 25880, also known as Haner Road). This bridge, which was replaced in 2000, was in good structural and functional condition, and appeared to have adequate height and width to convey most flows. There was rip rap along the bridge abutments upstream and downstream of the bridge.

Bridge at Station 25880

Along the left streambank, rip rap (Figure 4.4.1, Inset C, Stations 25833 – 25797) began at the bridge abutment and continued downstream for approximately 36 feet. The revetment was in good structural and functional condition and provided scour protection at the toe of the bank. Interplanting the rip-rap and reinforcing the toe of this streambank with native shrub and sedge species is recommended. This planting will help to strengthen the revetment, while enhancing aquatic habitat. The riparian buffer beyond the rip-rap installation was sparse, with some mature trees and mown grass to the edge of the bank. The risk to bank stability can be minimized by maintaining mature trees along the critical 100 foot buffer zone. The buffer width should be increased by the greatest amount agreeable to the landowners. In addition to interplanting the rip rap, recommendations for this proposed riparian planting site (Stations 25833 – 25673, photograph orientation looking upstream) include planting native trees and shrubs along the streambank and the upland area. Downstream of the revetment, and continuing along the proposed riparian planting site, the left streambank was eroding (Stations 25785 – 25632) for approximately 153 feet. At the downstream end of the erosion, there was a fallen tree (Stations 25632) with accumulated woody debris; it appeared to contribute to localized scour of the channel bed and the toe of the streambank. Prior to proceeding with any vegetative plantings, a more detailed site assessment may be necessary. The conditions at this site should be given careful consideration when identifying the appropriate species and locations for plantings.

Riparian Planting Site at Stations 25833 - 25673

Woody Debris at Station 25632

Continuing downstream, there were a few small patches of Japanese knotweed (Stations 25532, right bank, 25434 and 25195, left bank) and multiple locations of excess

Rip rap at Stations 25485 - 25301

sediment deposition, including full channel aggradation (Station 25503) and a transverse bar (Stations 25337 – 25285). A small unnamed tributary (Station 25438) entered from the left streambank; there was a relatively large patch of Japanese knotweed just downstream of the tributary. Along this stretch of stream, the right streambank was reinforced with rip rap (Figure 4.4.1, Inset B, Stations 25485 – 25301) for approximately 184 feet. The rip rap was in good structural and functional condition and provided scour protection along the toe of the streambank. Along the upstream portion of the rip rap there was mowed lawn to the edge of the bank. Interplanting the rip-rap and reinforcing the toe of this streambank with native shrub and sedge species is recommended. Although this site was not identified as a proposed riparian planting site, planting native shrub and tree species along the upland area is recommended. As mentioned previously, a permit was issued for 100 feet of streambank rip rap repair, installation of new rip rap, and minor fill and grading in pre-disturbed lawn areas, in order to prevent the stream from undermining the adjacent home. This permit expires on September 30, 2009.

Beginning along the downstream portion of the revetment and continuing downstream, there was a proposed riparian planting site (Stations 25345 – 25104) for approximately 241 feet of the right streambank. Herbaceous vegetation was maintained to the edge of the stream for a portion of the site length; there were some areas with a few shrubs and trees that provided a thin wooded buffer. Recommendations for this site include discontinued mowing to the stream's edge, establishing a buffer where none exists, and augmentation of the existing buffered areas by planting native trees and shrubs along the streambank and

Riparian Planting Site at Stations 25345 - 25104

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, where feasible, will increase buffer functionality and protect water quality by slowing stormwater runoff and pollutants associated with nearby land use.

Erosion at Stations 25098 - 24981

Continuing downstream, there was erosion (Stations 25098 – 24981) along the left streambank for approximately 117 feet. The streambank and upland areas were forested; the erosion exposed roots, compromising mature trees and caused a fallen tree along the downstream portion of the erosion. There was a large boulder in the stream channel that directed flow toward the left bank, exacerbating the erosion at this site. There was also a side bar (Stations 25069 – 25004) along the right streambank for approximately 65 feet. Three small patches of Japanese knotweed (Stations 25072, 25047 and 24900) also grew along the right, and one on the left (Station 24900).

Further downstream, excess sediment deposition continued, including full channel aggradation (Station 24720), a transverse bar (24713 – 24662) and a point bar (Stations 24562 – 24393). The channel was over-wide starting where there was full channel aggradation and continuing downstream until it began to narrow along the point bar. Along the right streambank, there was a proposed riparian planting site (Stations 24639 – 24407) for approximately 232 feet. There was mowed lawn to the top of the bank, and a mixture of herbaceous vegetation and shrubs along the face of the streambank. As with the previous planting site, recommendations for this site include discontinued mowing to the top of the bank, establishing a buffer where none exists, and augmentation of the existing buffered areas providing a buffer width of the greatest

Riparian Planting Site at Stations 24639 - 24407

amount agreeable to the landowner. There were two significant stands of Japanese knotweed (Station 24586, Figure 4.4.1, Inset D, and Station 24500) along this planting site. Prior to beginning planting efforts, these stands should be removed if feasible, or effort should be made to avoid spreading this invasive plant.

Opposite the proposed planting site, there was erosion along the left streambank that appeared to be self-recovering. This area was vegetated with a mature closed evergreen forest and herbaceous vegetation had reestablished along the face of the bank. However, there was a relatively small clay exposure (Station 24520) along the left channel bed and toe of the streambank for approximately three feet. This management unit ended just downstream at Station 24315.

Clay Exposure at Station 24520

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. Sections of this unit experienced sediment transport deficiencies. In some locations, bed load transported through this unit exceeds the transport capacity of the management unit, resulting in multiple areas of channel aggradation.

Riparian Vegetation

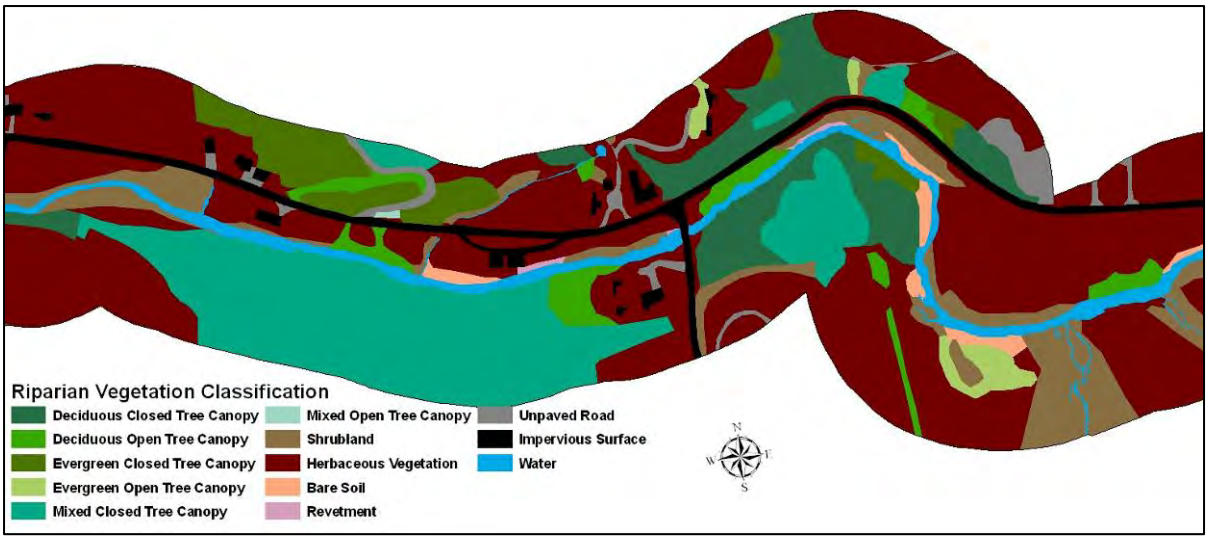
One of the most cost-effective and self-sustaining methods for landowners to protect streamside property is to maintain or replant a healthy buffer of trees and shrubs along the banks and floodplains, especially within the first 50 to 100 ft. of the stream. A dense mat of roots under trees and shrubs 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. 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 five riparian improvement planting sites documented within this management unit; proposed planting sites cover approximately 11.89 percent of the streambanks in this unit.

Japanese knotweed at Station 25434

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, 18 Japanese knotweed occurrences along an estimated length of 122.50 feet were documented during the stream feature inventory. The best means for controlling knotweed is prevention of its spread, therefore, effort 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.



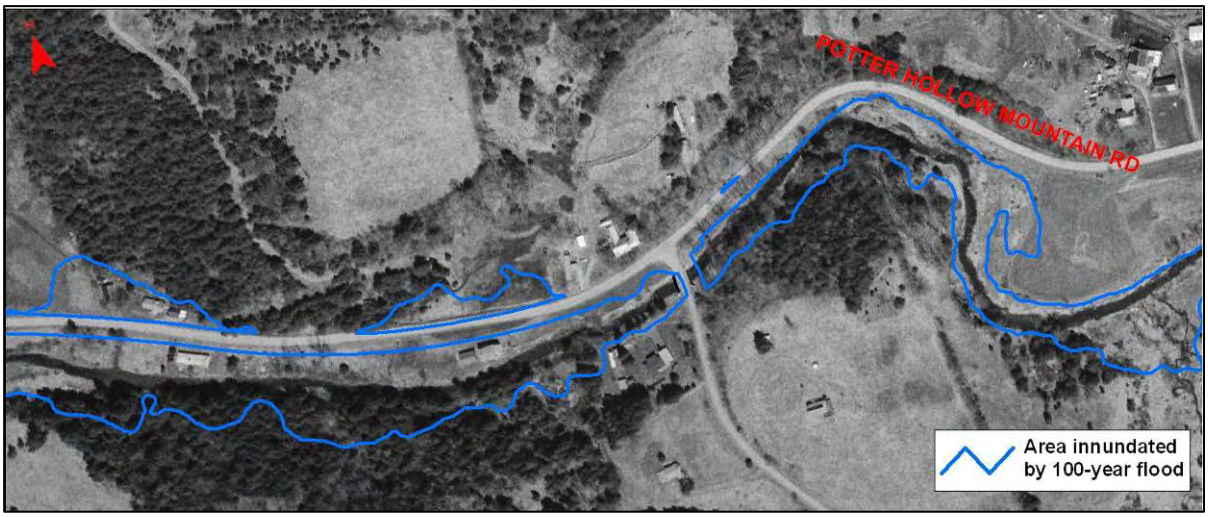
Riparian vegetation classification map based on aerial photography from 2006

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 (45.66%) followed by herbaceous (17.12%). *Impervious* area (4.48 %) within this unit's buffer was primarily the local and private roadways. Areas of herbaceous (non-woody) cover may present opportunities to improve the riparian buffer with tree plantings in order to promote a more mature vegetative community along the streambank and in the floodplain.

Flood Threats

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

According to the current floodplain maps (below), six existing structures in this unit appeared to be situated within the estimated 100-year floodplain. The 100-year floodplain is



100-year floodplain boundary map

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 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 added essential organic matter that will benefit organisms downstream.

In 2008, researchers from SUNY Cobleskill conducted macroinvertebrate and fish surveys along the Manor Kill. However, there were no sampling sites within Management Unit 4. 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 two 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 was only one stormwater culvert 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.

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