Reach 4f (Tompkin's Quarry to Holden Property)

Reach 4f is located entirely in the Town of Ashland and represents approximately of 5,028 feet of stream length. The reach starts at Tompkin's Quarry bridge, and continues around a single long meander bend to the boundary of property owned by Suzanne Holden on the southeast side of the stream **(Map VI-5, Figure VI-71)**. The drainage area of the reach ranges from 60.4mi^2 to 61.8mi^2, with one small unnamed tributary located within the reach. Reach 4f in located in Valley Zone 2 **(Figure V-11)**, which is characterized by a broad floodplain and a flat valley slope (0.23%). Streams within these valley settings are typically sinuous and exhibit low entrenchment. Land use in the stream corridor includes a gravel mining operation on the right (east) side of the stream, some development near the top of the reach, former agricultural fields, and dense forest where the stream runs along the steeper slopes at the base of the mountain. There is no development in the immediate stream corridor; residential and other structures are all located some distance from the stream.

Stream Morphology/Stability

The Phase I Inventory and Assessment completed in 1997 noted significant signs of active channel erosion in reach 4e. Erosion was found intermittently along the entire reach length, with the majority found on the right bank below the Tompkin's Quarry bridge. The inventory measured 3,145 feet of the eroded bank, or 63% of the total streambank length impacted. Overall, the reach was characterized as having an average of nearly 2.8 ft^2 of erosion per linear foot of stream channel. The banks were actively being undercut by the stream, leading to mechanical failure throughout the reach. Much of the erosion was fresh at the time of the assessment, and is attributed to the January 1996 flood event. By 2000, many of the banks appear to be attempting to reach a stable form, with new vegetation taking hold.

To evaluate long term changes in the reach, the GCSWCD reviewed historical aerial photographs from 1959 to 1995 **(Figure VI-69)**. By reviewing stream conditions between 1959 and 1995, the GCSWCD noted minor changes in channel planform, as well as changes in sediment storage within the reach. The aerial images do clearly indicate historic channel meanders which pre-date 1959, but are generally not very old. These are primarily located at the very bottom of the reach.

The changes to channel planform between 1959 and 1995 were somewhat localized, with some active movement of the channel seen at the top and bottom of the reach. The aerial photos also revealed changes in sediment storage within the reach. In 1959 **(Figure VI-69, left)** the channel does not appear to exhibit significant deposition. By 1980 (center) and 1995, the aerials show increasing deposition of sediment, with the 1995 photo showing distinct signs that central bars are developing throughout the reach. The formation of center bars is typical in those situations where the stream channel has become wider and the width to depth ratio has been increasing. As seen in **Figure VI-71, photo J**, the center

bars have started to become vegetated, which is further evidence of reduced shear stress and loss of sediment transport competence in the reach.

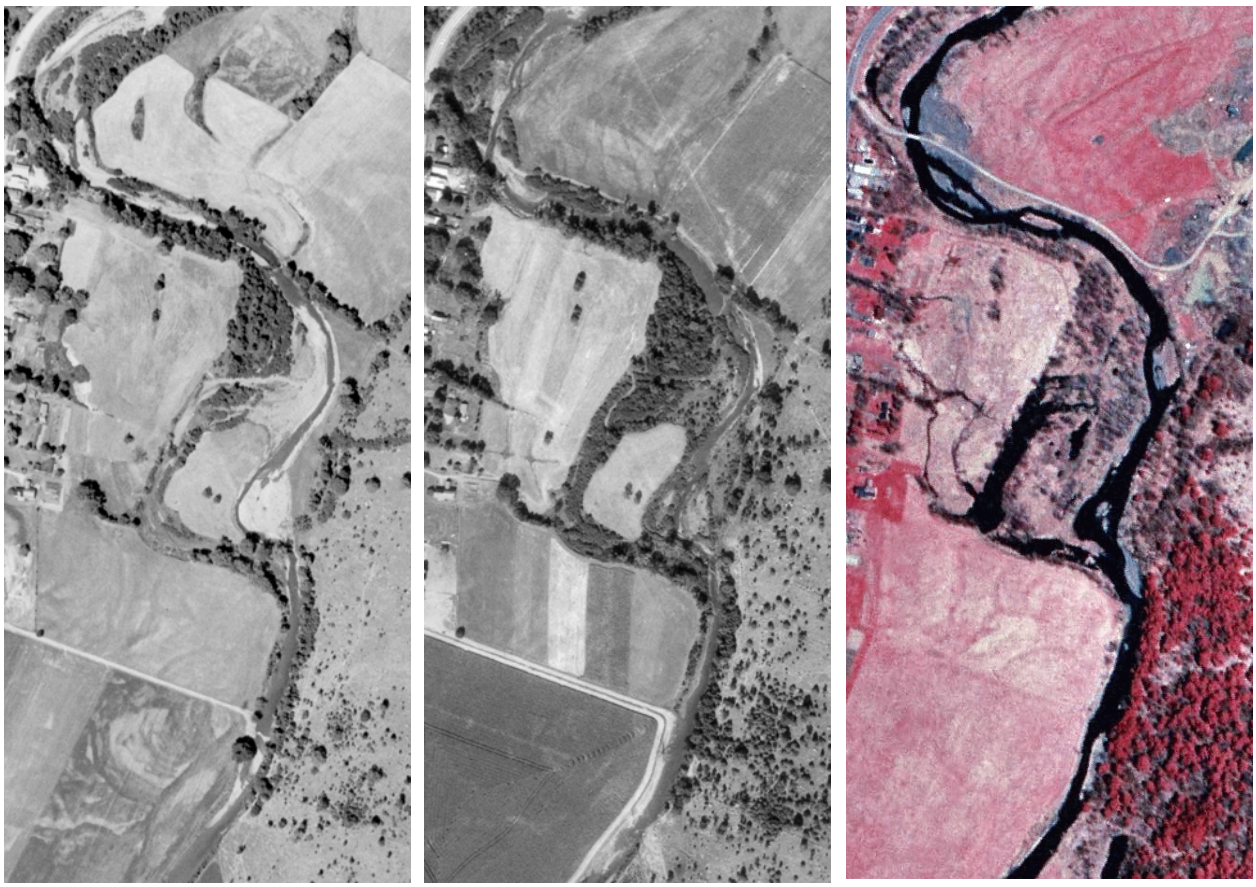


Figure VI-69: Review of aerial photos from reach 4f from 1959 (left), 1980 (center) and 1995 (right). Note development of center bars and the loss of active farming on the floodplain.

After the Phase I Inventory and Assessment, the GCSWCD conducted only minimal assessment of the reach. In 1989, a single cross section was installed at the lower end of the reach to verify the stream classification. The classification survey also included several hundred feet of stream profile to determine channel slope, as well as an analysis of channel sediment regime. Analysis of the cross section data indicated the reach was dominated by a C3 stream type, with the dominant channel material bordering between very coarse gravel and small cobble sediment class. The channel's width to depth ratio and entrenchment ratio were determined to be within the range of values typical for this stream type.

The cross section was surveyed again in 2000 to measure any changes that may have occurred at the cross section **(Figure VI-69)**. A comparison of the cross section in 1988 and 2000 revealed some lateral erosion on the right bank, with a small amount of aggradation. No degradation was noted at the cross section. Between 1998 and 2000 the

channel appeared to have been widening, with its width to depth ratio increasing. The finding that some aggradation had occurred at the cross section was not unexpected as it is a typical response to channel widening. Considering the magnitude of the flood event that occurred between the two surveys (September 1999), the changes seen at the cross section were not a major concern, but the reach should continue to monitored for signs of increasing instability.

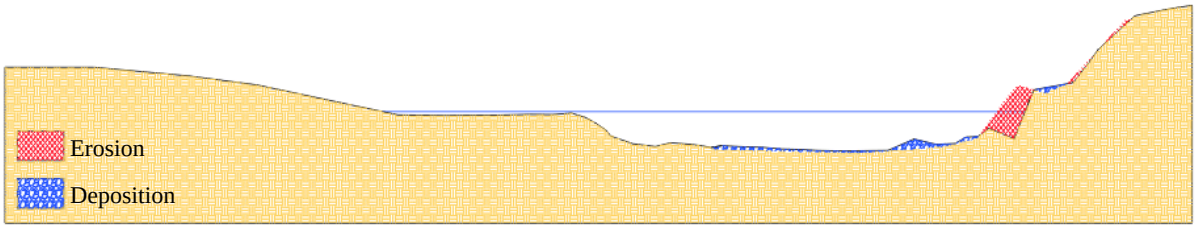


Figure VI-70: Overlay of monitored cross section in reach 4f, 1998 and 2000 surveys shown.

As previously noted in the discussion of reach 4e, the instability seen in the lower end of reach 4e and the upper section of reach 4f can most likely be attributed to the location/design of the private bridge, and the periodic maintenance of the bridge approach and access road. In addition to the bridge's impact on sediment transport, the bridge structure and approach fills present a significant obstacle during flood flows **(Figure VI-68 photo B,D,F)**. Diversion of stream flow around the bridge on the floodplain results in variable angles at which stream flows approach the downstream meander bend, contributing to the lateral erosion.

Based on the limited data available, the GCSWCD is unable at this time to make a definitive judgement regarding the primary cause of the instability in the reach. While the lack of riparian vegetation is a strong factor, the impact of the private bridge needs further evaluation. The location/size of the bridge, its impact on sediment transport, the impact of deflected flood flows, and the routine channel modifications required to keep the access road passable are all factors that are contributing to channel instability. Based on a review of the aerial photographs **(Figure VI-69)**, the bridge does not appear to have been constructed until sometime after 1980. In the 1959 and 1980 aerials, it is clear that the opposite floodplain was accessed at this point, but it appears that no bridge was present.

The GCSWCD proposes that natural stability in reach 4f cannot be expected without mitigation of impacts caused by the bridge and access road. The GCSWCD is sensitive to the importance of the bridge for the operation of the gravel operation and suggests that further evaluation of the bridge and any access alternatives be done cooperatively with the landowners.

Riparian Vegetation

The riparian vegetation condition in reach 4f is currently very poor. Much of the reach has limited if any woody vegetation, and Japanese knotweed has substantially invaded the floodplain and immediate stream corridor. The west (right) floodplain contains a substantial wetland area. While some sections of wetland contain a good mix of willow, sedges and other wetland species, much of the area has been invaded by Japanese knotweed. The wetland areas are associated with low areas that are historic meander scrolls, as well as beaver activity on the main Batavia Kill channel, and a small drainageway that passes through the floodplain.

The majority of the left bank, where the quarry access road is located is void of any woody vegetation, and the thin zone of grasses is less than adequate to provide any real benefit to water quality, habitat or bank stability. While some woody vegetation is present in the riparian buffer on the lower end of the reach on the left bank, but as seen in **Figure VI-68 photo G&H**, the lower banks are not provided adequate protection from erosion.

Water Quality

The primary water quality concern identified in reach 4f is associated with the gravel mining operation on the left floodplain. As noted in the discussion of reach 4e, the owner of the gravel operation has been working with NYCDEP and others to implement an effective sediment and erosion control plan for the mine. The GCSWCD proposes that additional water quality benefits could be realized by the establishment of riparian buffers in the area between the mining operation and the stream. The GCSWCD did not note the presence of any clay exposures during the Phase I Inventory and Assessment.

Infrastructure

The primary infrastructure concern in this reach is related to the private bridge at the top of the reach. The impact of the bridge has been addressed in reach 4e as well as above.

Habitat

While the GCSWCD did not complete a detailed fish habitat assessment on the Batavia Kill, habitat conditions in reach 4f could be classified as poor at best. Shifting channel sediments, the lack of pools, and no shading of the channel all present significant limitations to effective habitat. During summer low flows, the aggradational nature of the channel results in very low water levels with the lack of vegetative cover causing elevated water temperature.

Flooding Issues

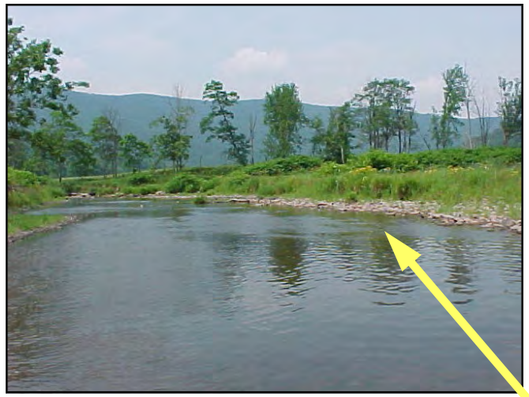
Flooding issues in reach 4f are primarily related to erosional damage to the streambanks, private bridge and access road to the quarry. No structural flooding or other problems have been noted.

Reach 4f Summary

In general, reach 4f exhibits only moderate stability, with the majority of the streambanks experiencing some level of erosion. Stream condition can most likely be attributed to impacts from the private bridge, as well as repetitive maintenance activities. Stream instability is compounded by the lack of an effective riparian buffer. As stated above, the GCSWCD feels that natural recovery of the reach should not be expected as long as the bridge remains at its current location and its maintenance continues.

Table VI-16: Management Recommendations Reach 4f.

Reach 4f: Tompkin's Quarry Bridge to Holden Property.	
Intervention Level	Assisted Restoration (full restoration)
Stream Morphology	Reach 4f is experiencing a slow rate of instability. Lateral meander migration has been noted at the monitored cross section and other areas in the reach. Observations appear to indicate that the channel is widening, the width to depth ratio is increasing, and sediment transport problems are getting worse. The reach requires additional assessment to determine the impact of the bridge, and maintenance activities associated with the bridge, on long-term reach stability.
Riparian Buffers	While some sections of the reach would benefit from immediate buffer establishment, further evaluation is necessary to determine if buffers will be effective without channel adjustments.
Water Quality	1. Assist Tompkin's Quarry with implementation of sediment and erosion control practices. 2. Work with Tompkin's Quarry to see if the access road can be moved away from the stream. Relocate the roadway to allow riparian buffer establishment and improve channel stability.
Infrastructure	1. Observe status of private bridge to Tompkin's Quarry. In the event of loss or damage, work with landowner to re-site bridge or alter design.
Habitat	See General Recommendations
Flooding	1. Avoid new development within the floodplain limits. Prohibit fill and additional construction in flood vulnerable areas. 2. See General Recommendations.
Future Assessments	1. Continue Phase III/IV monitoring. Install additional cross sections as required to determine on-going stream process. 2. Undertake detailed evaluation of the Tompkin's Quarry bridge.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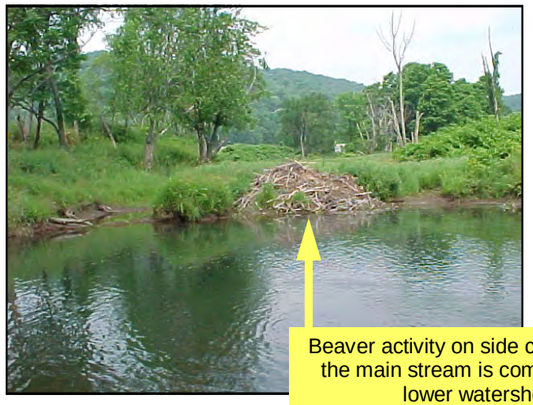
B


C


D

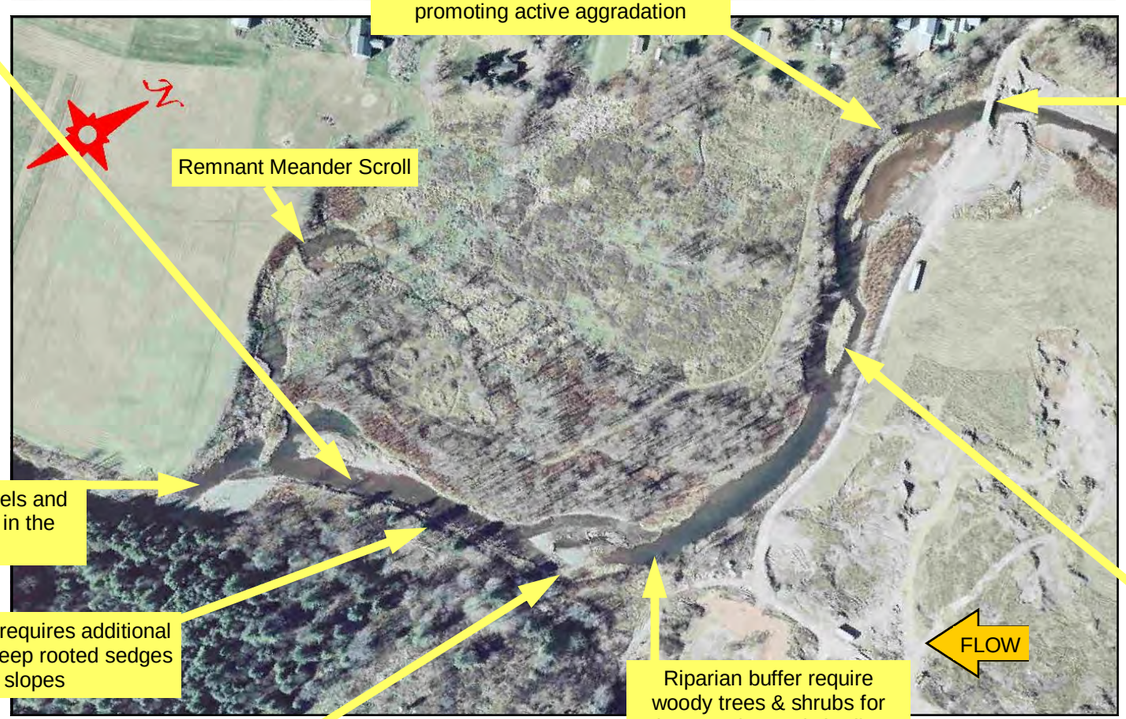
Batavia Kill Stream Management Plan


E

Beaver activity on side channels and the main stream is common in the lower watershed

Overwiden channel below bridge is promoting active aggradation

Floodplain fills increase channel entrench-ment and divert floodway forces



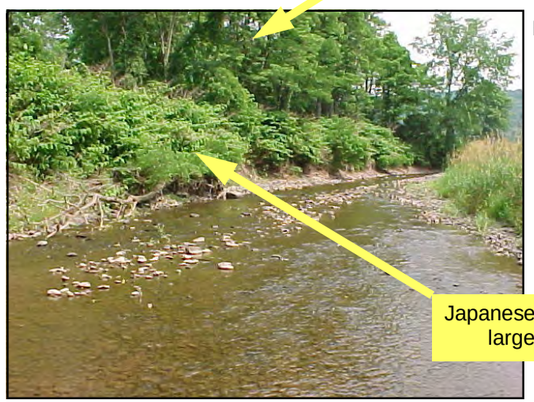

F

Riparian vegetation requires additional woody shrubs and deep rooted sedges on lower slopes

Riparian buffer require woody trees & shrubs for deep rooting and shading

Central bar formation is typical when the stream channel is over widened


G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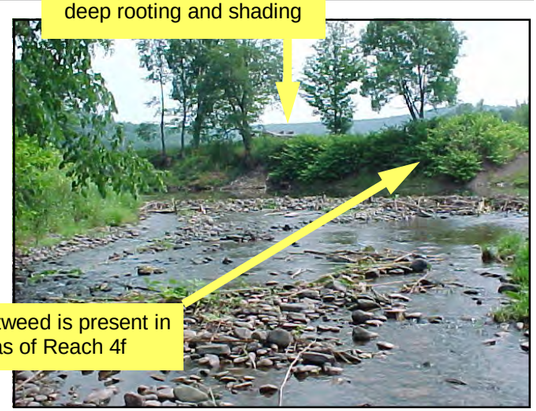
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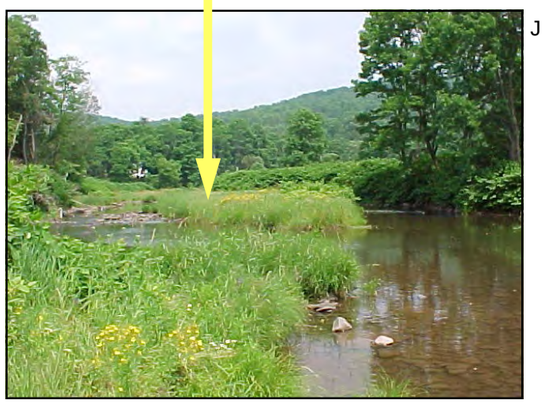
J

Japanese knotweed is present in large areas of Reach 4f

Figure VI-68 Reach 4f