

Reach 4b (Valley View Farm to VanEtten Trucking)

Reach 4b is 5,600 feet in length and runs parallel with NYS Route 23 in the Town of Ashland (**Map VI-5**). The reach begins at the Valley View Farm and ends at a point behind VanEtten Trucking. The drainage area of reach 4b ranges from 43.1mi² at Valley View Farm, to 50.8mi² at the bottom of the reach. Tributaries within the reach include the larger North Settlement Creek, as well as one smaller unnamed tributary. The reach is located in Valley Zone 2 (**Figure V-11**) with an average valley slope of 0.3%. The valley morphology is defined by a broad floodplain, with extensive belt width available for stream migration. Multiple river terraces exist along the reach. The upper reach has a steep upland slope on the right bank for approximately 1/3 of its length, but most of the reach is dominated by low floodplain on both sides of the channel. The results of the Phase I Inventory and Assessment (1997) were used to further divide reach 4b into two sub-reaches. Part of this reach was sufficiently unstable and threatening water quality that it was selected in 1998 to serve as a demonstration project reach. See Section VII for a full description of the demonstration project. This section describes the pretreatment condition that formed the basis of GCSWCD's response.

Stream Morphology/Stability

In July 1997, the GCSWCD initiated more detailed assessments of reach 4b. Initially, the GCSWCD surveyed four cross sections and approximately 700 feet of longitudinal profile in the upper reach. The very upper section of reach 4b, where it runs adjacent to the high terrace, was classified as a B4c stream type. As the channel continues down valley, and the high steep terrace gives way to a defined floodplain on both banks, the stream type transitions to C4 due to the decrease in stream entrenchment with the presence of floodplain on both sides of the stream channel. In general, the upper 1/3 of reach 4b appears to be fairly stable (**Figure VI-49, photo D,H**), though influences of Japanese knotweed on the stabilizing riparian vegetation should continue to be monitored.

Based on observations of significant bank instability in the summer of 1997, the lower section of the reach was considered a priority for additional monitoring. The GCSWCD field crew observed several meanders in this area that were actively eroding, with the worse sites located behind both the Brandywine Restaurant and The Space Place. The Phase I Inventory and Assessment indicated that reach 4b averaged 3.2 ft² of exposed streambanks per linear foot of stream length, with 45% of the reach experiencing accelerated rates of erosion. The upper half of the reach, as noted above, was found to be relatively stable, with the majority of inventoried erosion present in the lower half of the reach.

Time series analysis of aerial photographs from 1959 to 2000 confirmed that the lower reach has been experiencing accelerated channel migrations, while the upper section had remained relatively stable (**Figure VI-44**). As shown in the side by side comparison of

aerials from 1959, 1980 and 1997, the lower section of reach 4b has been highly unstable, with evidence of active lateral adjustments present during the entire 40 year period. Extensive channel migration and several channel avulsions have resulted in oxbow cutoff formations in the area downstream of the confluence with North Settlement Creek (**Figure VI-44, right photo**). The analysis of historic channel alignments revealed that over 980 feet of lateral migration had occurred in the lower reach between the years of 1959 and 1997. The presence of these oxbow cutoffs can be distinctly seen in the aerial photographs taken by the GCSWCD in the summer of 1999 (**Figure VI-45**). While this dynamic activity is natural in rivers, GCSWCD held that it was occurring in an accelerated fashion as a result several factors. Because the stream was cutting freshly into clay deposits, it was continually renewing inputs of clay into the Batavia Kill. The Batavia Kill Project as a whole is seeking to determine if water quality can be improved through reducing rates of stream migration to a natural minimum.

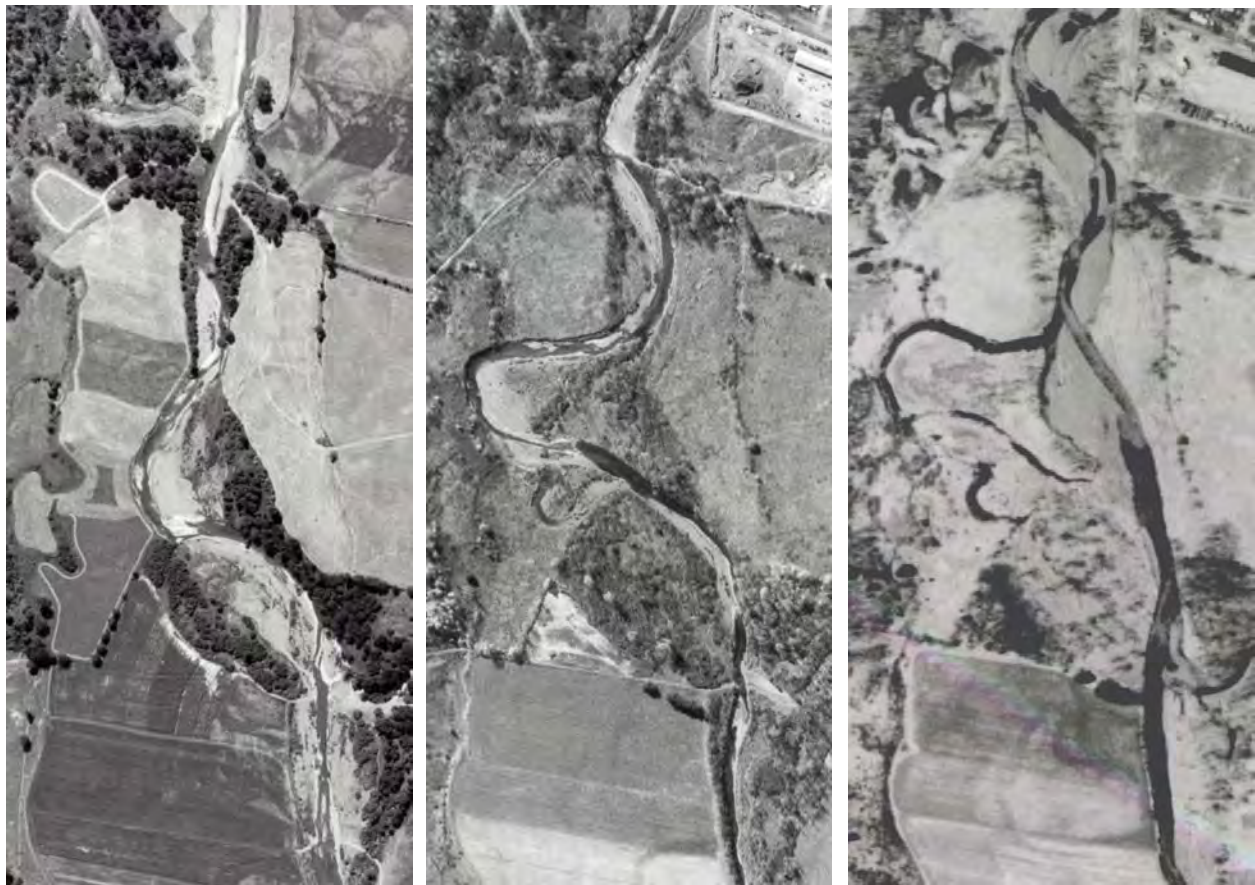


Figure VI-44: Historical aerial photograph progression of Brandy Wine site, left to right 1959, 1980, 1997.

In the summer of 1997, the GCSWCD initiated a detailed assessment of the lower portion of reach 4b in anticipation of undertaking a restoration project. The GCSWCD installed two monitoring sections along approximately 3,350 linear feet of the channel, as well as a detailed survey of the stream profile through this portion of the reach. The monitoring surveys were re-measured in 1998, and again in 1999 just prior to construction of the



Figure VI-45: July 1999 photograph of oxbow formations present through sections of reach 4b.

restoration project. A comparison of changes at the cross sections allowed the GCSWCD to determine the active stream process that required attention. Stream stability assessment was completed using Phase III/IV techniques as discussed previously in this SMP.

In addition to monitoring the cross section for changes in the channel's morphological form, the GCSWCD conducted an assessment of the stream channel bed material (pebble counts), as well as particle size analysis of the point bar substrate. Assessment of the sediment supply was necessary for completion of the detailed hydraulic calculations required for the final restoration design. Evaluation of the monumented cross sections quickly revealed the extent and magnitude of the active erosion on the two meander bends being monitored. On the most upstream meander bend (cross section #1) measurements revealed erosional losses of 52ft² of erosion between 1997 and 1999 (**Figure VI-46**). This cross section was located at the active farm fields being used by Valley View Farm.

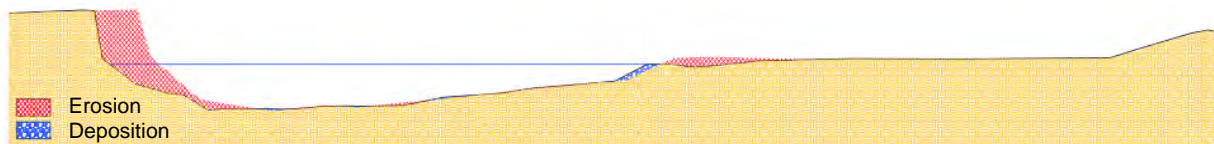


Figure VI-46: Overlay of cross section #1 on the Brandywine site, 1997 - 1999.

On the lower end of reach 4b, cross section #2 was located on an active erosion area behind the Space Place storage units. A total of 80ft² of erosional losses was recorded between 1997 and 1999 (**Figure VI-47**). As shown on both cross section drawings, lateral migration of the channel was not being matched by deposition on the opposite side, and the stream channel was trending towards an over widened condition, with an increasing bankfull width and development of a high width to depth ratio.

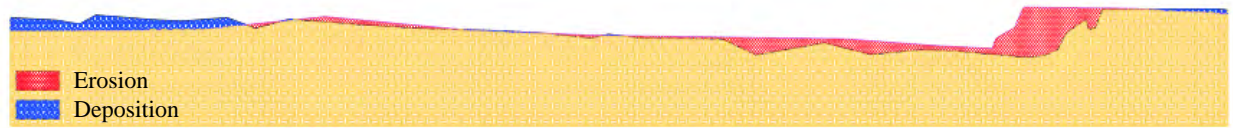


Figure VI-47: Overlay of cross section #2 on the Brandywine site, 1997 - 1999.

In both cases, the GCSWCD did not observe any significant degradation of the stream channel at the cross sections. While the cross sections may appear to indicate minor downcutting, the change in the stream channel invert is related to a transition from a shallower riffle to a deeper pool as the meander migrates downstream.

Based on the Phase I Inventory and Assessment, as well as Phase II, III, and IV monitoring, the GCSWCD found that reach 4b is a C4 stream type, dominated by coarse gravel (although the particle size fluctuates and sometimes can classify as C3). Additionally, the GCSWCD observed that the streambanks in the lower end of reach 4b were predominantly a gravelly loam soil, with a finer silty-loam topsoil layer. This soil typically is deeply stratified and is found on the sides of terraces and convex portions of outwash plains. The soils have a loose structure, little rock content, and are highly subject to erosion. In 1999, glacial lacustrine clay was inventoried in the bottom of several scour pools within the reach. Presence of lacustrine clay is a principal concern due to the negative impacts on water quality and fisheries habitat.

Riparian Vegetation

The state of the riparian vegetation in reach 4b can be characterized as poor. While the upper reach contains fairly good riparian vegetation on the north bank, much of the reach has a narrow buffer, if one is present at all. Along the top of the reach a narrow forested buffer on the Valley View Farm averages less than 50' in width, with the buffer disappearing by the time the stream reaches the Brandywine property. While the existing woody vegetation is a benefit to stream channel stability, the narrow band of forest and shrubs is less than the recommended width for buffer zones associated with active farm fields.

As you move down the reach, the riparian condition changes and the reach becomes dominated by grasses, some willow and large communities of dense Japanese knotweed. While the grasses, and to a lesser extent the knotweed, provided adequate buffering of impacts related to upland runoff, the riparian zone did not include critical woody species that provide the deep rooting required for streambank stability. The existing riparian vegetation also did not provide the shading necessary for good fisheries habitat.

Reach 4b is one of the first reaches in the Batavia Kill valley where Japanese knotweed (*Polygonum cuspidatum*) was thought to be a significant factor in stream instability. While knotweed is present in upstream reaches, it has colonized significant portions of the streambanks and floodplain throughout reach 4b. The dominance of knotweed through the

reach results in a very low potential for self recovery of natural riparian vegetation. In addition to a poor quality vegetation community, reach 4b is also impacted by agricultural activities that currently do not provide for an adequate woody buffer.

Water Quality

The GCSWCD has not identified any significant water quality impacts in reach 4b above and beyond the fine clay particulates entrained in the Batavia Kill during flood events from natural streambed scour and streambank adjustment processes. Structures and on-site waste water systems are an ample distance from the stream, and runoff from roadways appears to be adequately buffered by the distance between NYS Route 23 and the stream channel. Impacts from erosion and sedimentation would be improved by establishment of effective riparian buffers along the existing agricultural fields.

Currently, land use practices at the VanEtten Trucking facility, as well as the material storage area behind The Space Place, do not appear to present a threat to water quality. All facilities are elevated above the floodplain and numerous measures have been taken to protect water quality. The business constructed a salt storage shed to protect runoff of chlorides solution, and while some runoff has been observed from the storage piles, several hundred feet of dense floodplain growth is considered adequate to trap these materials. The main garage facility contains a fuel storage system which has double protection including a double wall tank and a concrete containment structure. The maintenance facility also contains a grit/oil separator on the floor drainage system. The GCSWCD proposes that additional water quality benefits could be realized by enhancing riparian buffers, and treating runoff from the gravel parking areas.

Infrastructure

There are no infrastructure issues in reach 4b.

Habitat

During the initial assessment of the reach, the GCSWCD observed fair to good habitat conditions in the upper reach, with poor conditions present through the lower half. At the time of the assessment, the GCSWCD noted only a single pool in 3,350 feet of stream profile being monitored. This represents almost 75% of the entire reach length. In addition to the lack of pool structure, large sections of the streambed were aggraded with a significant portion of the summer base flow running subsurface. While the reach was not found to completely lose its base flow, it was substantially reduced by the gravel deposition. Additionally, the lack of riparian vegetation resulted in elevated water temperatures through the reach.

Flooding Issues

Flood issues in reach 4b are limited to excess erosion of the streambanks as well as a private access road at the Brandywine restaurant. The roadway is the landowners only access to their land on the other side of the stream. The roadway had been damaged by past floods, generally by erosion from North Settlement Creek. The crossing over the Batavia Kill was also impacted by bank erosion and aggradation. All structures are located a safe distance from the stream, and the reach has a sufficient floodplain with minimal impacts from fill. No structural flooding or infrastructure impacts were noted in reach 4b.



Figure VI-48: View of restored channel looking upstream from behind the Brandywine.

Reach 4b Summary

While the upper 1,500 feet of the reach appears to be relatively stable, the lower 3,300 feet was determined to be highly unstable. The lower section of the reach is characterized as a C4 stream type, and has been experiencing significant changes in planform for over 50 years. The reach assessment determined that the channel was characterized by an overwidened condition with a high width/depth ratio.

The principal channel process observed was lateral migration related to meander migration. Monitoring between 1997 and 1999 revealed that meanders were eroding as much as 17 feet a year even in the absence of any substantial flows. In 1999, the GCSWCD initiated a restoration project along this reach, and work is ongoing to monitor the project and establish an effective riparian buffer (**Figure VI-48**).

Note: For additional information on the demonstration project see Section VII or visit www.gcsxcd.com/stream/bataviakill/brandywine.

Table VI-12: Management Recommendations Reach 4b.

Reach 4b: Valley View Farm to VanEtten Trucking.	
Intervention Level	Preservation/Full Restoration (demonstration project completed 2000)
Stream Morphology	<ol style="list-style-type: none"> 1. The Brandywine demonstration project was constructed to restore a stable stream morphology. The GCSWCD will monitor the project reach, including upstream and down stream reaches, to assess the effectiveness of the restoration work. 2. The upper reach should be carefully managed to avoid any further entrenchment of the reach or loss of riparian buffer.
Riparian Buffers	<ol style="list-style-type: none"> 1. Evaluate feasibility of developing additional non-agricultural buffers on those properties where riparian condition is poor. 2. Request Watershed Agricultural Program review for potential CREP buffers on fields used by Valley View Farm. 3. Monitor invasive species and consider vegetation control plan. Reach is likely candidate for knotweed control demonstrations.
Water Quality	<ol style="list-style-type: none"> 1. The GCSWCD will continue to work with Valley View Farm to assist in implementation of the farm's Whole Farm Plan. 2. Monitor future development/roadway improvements for stormwater impacts. Work with developers/project sponsors to implement management practices as required. 3. Evaluate stormwater treatment opportunities associated with VanEtten Trucking location.
Infrastructure	See General Recommendations
Habitat	See General Recommendations
Flooding	See General Recommendations
Future Assessments	<ol style="list-style-type: none"> 1. Continue to monitor demonstration project to evaluate effectiveness in restoring reach stability.



A



B

Rock Cross Vane



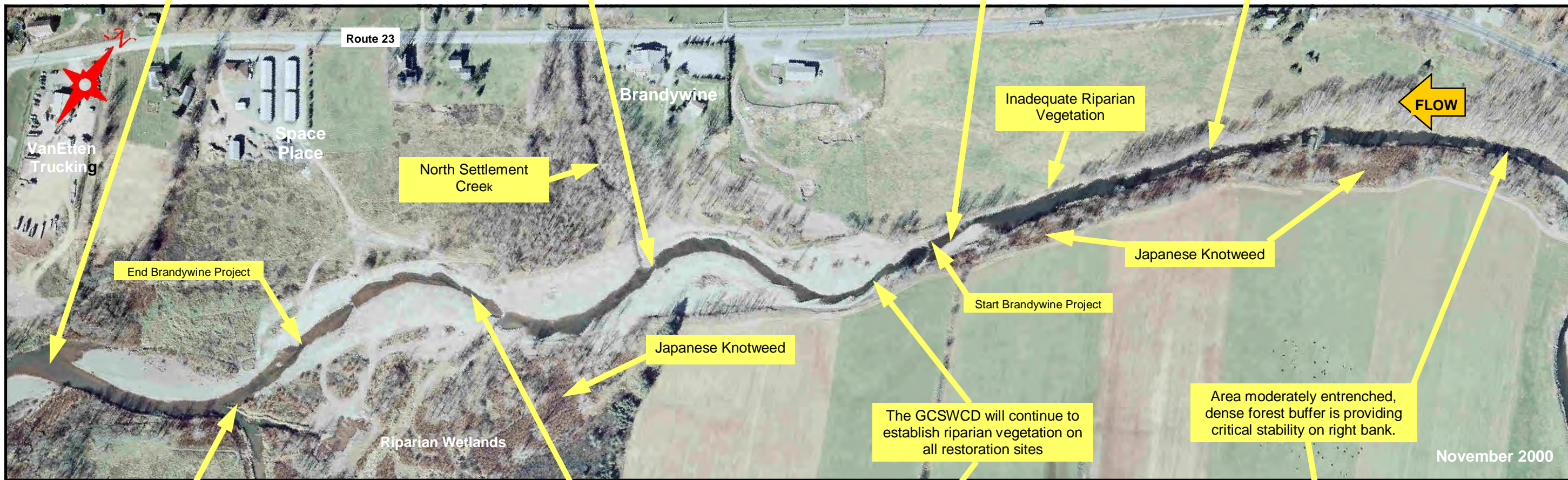
C

Rock Vane on Left Bank



D

Area exhibits moderate entrenchment, avoid floodplain fills and channel disturbances which would promote channel degradation



E



F

Post-restoration, rock vane structure on right bank



G



H

Figure VI-43: Reach 4b