F. Chestnut Creek Management Unit 6

1. Summary Description

This section is intended to summarize the overall character and condition of Management Unit 6 (MU6). Subsequent sections will discuss specific issues (e.g., *riparian* land use and public infrastructure, channel stability, etc.) in greater detail.

This unit is approximately 5370 linear feet (1.02 miles) in length and includes the segment of Chestnut Creek from immediately downstream of the Covered Bridge, through the Hamlet of Grahamsville, to the Route 42 Bridge (Photo 1). The drainage areas at the upstream and downstream ends of the management unit are 9.45 and 12 square miles, respectively (MU6 General map, Figure 1).

Because of its location in the heart of the hamlet, the stream corridor along MU6 is the most heavily developed and maintained of the management units.

Photo 1. View looking downstream from cross section 136, Fairgrounds on right of photo, several hundred feet below Covered Bridge.

Land use includes a mix of homes, businesses, and government buildings. Although most of the structures front along Route 55, the *riparian* areas on private land are maintained as mowed lawn with scattered trees and shrubs along the more densely developed sections of the creek (Photos 2 & 3). The land around public buildings is predominantly parking lots and mowed lawn. Storm drainage conveys storm water runoff from these parking lots, as well as from streets, directly to the creek.

This section of Chestnut Creek is reported to have been straightened and *channelized*

Photo 2. Looking upstream at cross section 151, half-way between Davis Lane and River Road bridges.

Photo 3. Reach-view looking downstream from left bank at cross section 161 behind fire house.

at some time in the past from information obtained from an historic 1929 DOT highway map. An analysis of a series of historic aerial photographs covering the period 1963-2001 verifies that any channel modifications occurred prior to 1963. The aerial photographic record also indicates that routine channel maintenance occurred until recently (Aerial Photos 4, 5 & 6).

Field evidence, as well as information obtained from interviews with residents and town officials indicates that MU6 has been the focus of significant maintenance activity. The bed and banks have been armored along many sections of the management unit. Efforts of the Town and landowners to protect infrastructure and property have resulted in nearly 25% of the channel length through this unit undergoing some type of alteration (e.g., *riprap*, *gabion*, and concrete *revetment*). These protective measures appear to have been relatively successful in some areas, while less successful in other areas. Gravel flood *berms* are common along the stream corridor. In addition, it is evident that portions of the *floodplain* have been filled to accommodate development. These channel and floodplain modifications have resulted in a confined channel with a high width/depth ratio, low *sinuosity* and a relatively steep gradient. As such the creek and adjacent floodplain are more susceptible to stability and flooding problems.

2. Riparian Land Use and Public Infrastructure

According to tax maps for 2000, there are 53 developed properties within the stream corridor along MU 6 that include a mix of homes, businesses, and government buildings. As noted above, development

Photo 4. 1963 Aerial Photograph of Management Unit 6.

Photo 5. 1977 Aerial Photograph of Management Unit 6.

Photo 6. 2001 Aerial Photograph of Management Unit 6.

of the riparian corridor has historically involved *floodplain* fill and/or the construction of flood *berms* to protect structures placed in these areas. Recent development has continued these practices. For example, an expansion of the Town Hall was completed in 2001. Although the original structure was already located in the *floodplain*, the expansion has placed the structure and its associated parking lot much closer to the creek, which could pose a threat to both the building and the creek. Construction of the new Post Office in 1999 required placing as much as two feet of fill in the floodplain and resulted in a parking lot and loading dock that are in very close proximity to the creek. Sketches included with the permit application for the Post Office indicate that a flood berm existed along this *reach* of stream prior to the filling of the floodplain. Fill brought the rest of the site to the level of the flood berm.

Maintenance of public infrastructure is always a concern for local municipalities. There are two bridges in MU6, one on Davis Lane (CBN: 70, BIN: 3357040) built in 1953 (Photo 7) and the other on River Road (CBN: 92, BIN: 3357080) built originally in 1933 and rebuilt after flooding in 1996 damaged it (Photo 8). Although bridge inspections in 2000 and 2001 indicate that the decking, abutments, and wingwalls for both structures are in satisfactory condition, inspection reports, as well as the historic aerial photographs and information obtained from residents and town officials indicate that the stream reaches in the vicinity of the bridges have had on-going *aggradation* problems. Large gravel bars were observed upstream and downstream of the bridges during the 2001 Assessment Survey (Photos 8 & 9).

Photo 7. Looking downstream at right span of Davis Lane Bridge.

Photo 8. Looking downstream at River Road Bridge, just above Town Hall. Note the cobbles that are deposited upstream of the bridge in the foreground of the photo.

Photo 9. Looking downstream at left bank cross section 141 at end of center bar and split channel upstream of Davis Lane Bridge.

As pointed out in Introduction to Stream Processes and Ecology, Volume I, Section III, natural streams are composed of three distinct flows that include: a *baseflow* or low flow channel, which provides habitat for aquatic organisms; *a bankfull* channel, which is critical for maintaining sediment transport; and a *floodplain*, which effectively conveys flows greater than the bankfull discharge (i.e., 1 – 3-year peak flow).

Standard engineering practice designs bridges so that they can safely convey large storm flows (e.g., 25-, 50-, or even 100-year peak flows) without overtopping the bridge and associated roadway. In addition, the channel immediately upstream and downstream of bridges is commonly reconstructed (i.e., *channelized*) so that it contains those same storm flows without overtopping the adjacent stream banks. While enlarging the channel to improve its ability to convey storm flows may seem logical, in fact this approach usually creates channels that have poor habitat, are ineffective at transporting sediment, and require constant maintenance. These engineered channels are generally designed to convey all flows (baseflow, bankfull flow, and flood flow) in a single channel that is relatively straight, very wide, trapezoidal in *cross-sectional area*, with a uniform profile.

In these altered channels, base flow is usually very shallow or may actually flow beneath the *substrate* because it is spread out over such a large surface area. The uniform profile replaces the typical *riffle*-pool sequence with a continuous shallow riffle-run that provides no cover for fish to avoid predation or strong flushing currents. A very wide, shallow channel is less efficient at moving sediment under bankfull flow conditions. As a consequence, sediment (e.g., *sand, gravel, cobble*) tends to accumulate, developing lateral and/or mid-channel bars along these altered reaches. Ironically, the accumulation of sediment and the development of bars initially reduces the channel's capacity to convey the large storm slows for which it was designed. Bar development is the stream's way of reducing width, increasing effective depth and improving sediment transport capacity and velocity. Eventually, improves flood conveyance improves by reducing further inappropriate deposition, if allowed to continue to equilibrium. This process can take years, so maintenance is often required before the stream can reach a stable balance.

The Davis Lane Bridge was designed to convey the 25-year storm flow. The channel width in the vicinity of the bridge is 3 times wider than the *reaches* upstream and downstream. The high width to depth ratio of the channel and the presence of the bridge center pier has contributed to *aggradation* problems and large mid-channel bars have developed upstream and downstream of the bridge (Photo 10). These decrease stream effective width, enabling greater sediment transport capacity, reduced by over widening.

Another significant factor contributing to problems in this area was the effect of the sanitary sewer crossing downstream of the bridge on channel slope through this reach (Photo 11). In the 1950's, a sanitary sewer lateral was installed across Chestnut Creek immediately downstream of the Davis Lane Bridge to serve the Fairgrounds. After the sewer line was exposed by a

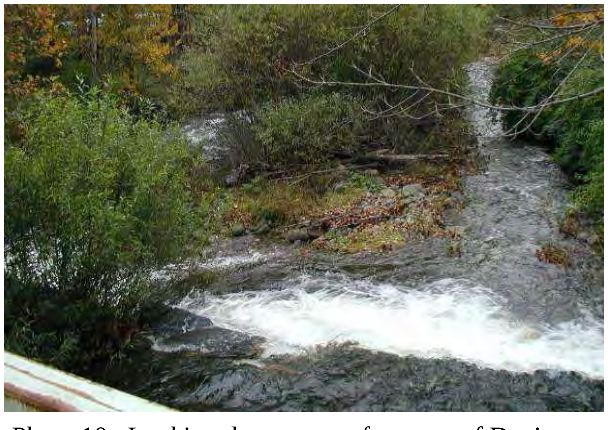

Photo 10. Looking downstream from top of Davis Lane Bridge at split channel below grade control at high flow. Right channel dry in 2001 at low flow. Center bar with cobbles and willow can be seen.

Photo 11. Looking upstream towards Davis Lane Bridge concrete grade control structure over sewer line.

storm in the 1960's it was reinforced with a grouted riprap encasement. The elevation of the original sewer line and subsequent encasement significantly raised the streambed in this reach. This resulted in an extremely flat channel gradient in the vicinity of the bridge upstream, which has undoubtedly contributed to the on-going aggradation problems previously mentioned. The combination of the high width to depth ratio, flat gradient, and center pier of the bridge ensures that material transported from upstream will routinely accumulate in this reach.

The River Road Bridge is also affected by aggradation. However, in this case the problem appears to be the result of a loss of stream energy due to a sharp (120º) meander bend and overwidend reach upstream of the bridge (Photo 12). In addition, the bridge span is narrower than the width of the channel along the reaches upstream and downstream. These factors cause water to back up on the upstream side of the bridge. Under this *backwater* condition, the flow velocity along the upstream reach drops reducing the stream's ability to transport its sediment load. As a result material accumulates along the upstream reach. Water backed up above the bridge during floods tends to form scouring eddies near the banks as the water rushes under the bridge, contributing to bank erosion and further widening of the channel.

At the top of MU6, located below the Covered Bridge, the town maintains a dry hydrant, (located on the map with a drainage culvert symbol). As with many rural communities, streams provide a critical source of water for fighting fires in

Photo 12. Looking downstream at rip rap along sharp curve and culvert on right bank, along River Road upstream of bridge. Flow hits directly into bank near culvert.

the Chestnut Creek Valley. To provide a readily available supply of water, dry hydrant facilities are maintained by the Fire Department at key points of access along Chestnut Creek (Photo 13). These facilities can only function if the water in the area of the pump intake is deep enough to accommodate continuous pumping without being drawn down during an emergency. As designed currently, gravel and other debris tend to accumulate in these areas reducing water depth and available pump volume. Standard practice has been to routinely remove these accumulated gravels to maintain proper function of the facility. An alternative design for dry hydrants that significantly reduces the need for maintenance should be addressed, possibly using structures suggested in the Recommendations at the end of MU6.

As noted above, storm drainage conveys storm water runoff from streets and parking lots directly to the creek. Eight storm drain culverts were identified in this management unit during the 2001 Stream Assessment Survey (Photo 14). The volume as well as the water quality of the runoff is a function of the size and characteristics of the land area each system drains. For example, land areas with a high percentage of impervious surfaces tend to generate considerably more runoff than areas that are predominantly forest or lawn. The size and land use characteristics of the areas draining to the outfalls identified, as well as the potential for storm water retrofit opportunities was not evaluated as part of the initial assessment. However, a review of the aerial photographs indicates that the properties along the corridor with the highest percent impervious surfaces include the Agriculture Center, Bank, Town Hall, Post Office, and Fire Hall. None of these properties have storm water management facilities for controlling runoff.

A planned extension of the existing sanitary sewer system may enable existing residences, currently using on-site treatment and disposal systems to connect

Photo 13. Dry hydrant (out of order, removed) and eroded bank behind Town Hall parking lot-view looking toward left bank & Town Hall from center of stream. (flow left to right)

Photo 14. Culvert in left bank abutment on upstream side of River Road Bridge, view looking downstream from the center of the stream.

to DEP's Grahamsville Sewage Treatment Plant. Four extensions to the existing sanitary sewer system are being planned, three of them emanating out of Grahamsville. One of the extensions being planned will extend along Rte 55 west for approximately 1.5 miles from Clark Road to Armstrong Road, upstream of Scott Brook. In some places the sewer alignment will be close to Chestnut Creek. Depending on its ultimate location, the installation of the sewer system could impact a significant length of the riparian area along the creek. In addition, it may be necessary to install lateral extensions across the creek to serve properties on the opposite side of the creek from the sewer main. Current construction specifications, which require that sanitary sewer lines be installed a minimum of three feet below the streambed should minimize the potential for the laterals to create a situation similar to that at Davis Lane, there is an unnatural grade change imposed by the sewer crossing may adversely that may adversely affect the stream. Careful planning of the main sewer alignment can reduce impacts to the riparian area along Chestnut Creek.

3. History of Stream and Floodplain Work

As noted Chestnut Creek appears to have been straightened and channelized at some time in the past. Channel work to remove gravel deposits and maintain flood conveyance has been routine until recently. Development of the riparian corridor along Chestnut Creek historically involved floodplain fill and/or the construction of flood berms to protect structures placed in these areas. Filling floodplain areas to accommodate development on private as well as public land is still a common practice in the Chestnut Creek watershed. Efforts by the Town, as well as landowners focused on protecting infrastructure and property have involved the installation of riprap, flood berms, gabions, stacked rock walls, and concrete revetment along 25% of the channel length through this management unit (Photos 12, 15 & 16). Maintenance of public infrastructure and the extension of public services have resulted in periodic encroachments on the channel and floodplain.

Photo 15. Bedrock streambed, starting approximately 200' upstream from Route 42 Bridge-view looking upstream from center of stream, stacked rock wall on left of photo.

Photo 16. Concrete wall with box culvert along Route 55 between River Road and Fire House.

General impacts of traditional approaches to stream management have been addressed in the Watershed Recommendations for Best Management Practices, Volume II, Section II.A of this plan. Specific impacts and management considerations in relation to the assessment of MU6 are included with this section of the plan.

4. Channel Stability and Sediment Supply

During the 2001 Stream Corridor Survey, MU6 was divided into ten reaches on the basis of the Level II – Morphologic Description (Rosgen, 1996). Stream classification for Chestnut Creek predominantly follows the Rosgen classification system with a few exceptions (see Intro to Stream Processes Volume I, Section III.D, and Watershed Assessment, Volume I, Section I.E.2). Three reaches in MU5 (#8, 9, and 10) contain very short sections of bedrock, though these reaches are otherwise dominated by cobble-sized sediment. Because locations of bedrock exposure still represent an important control on stream morphology, these sections were documented as a double stream type, such as B1/B3. A B1/B3 reach would be predominantly a B3 (cobble), but would have section(s) of B1 (bedrock) too small to be broken out into a separate reach or reaches. Additional reach type splits may include borderline slope classification, such as B3/B3a, where "a" signifies an A channel slope with a B cross-section morphology.

The largest portion (36%) of this unit includes moderately *entrenched* channel types B-types. With mature vegetation on the banks these types of channels tend to be very stable and are generally effective at moving sediment transported from upstream reaches. Highly entrenched reaches (i.e., F-types) account for 30% of the total length. Approximately 28% of the unit includes reaches in transition from one stream type to another (i.e., B3/F3 and F3/B3c). Because they lack a floodprone area (i.e., an area adjacent to the channel where floodwaters can spread out and reduce the energy against the streambed and banks), highly entrenched reaches experience considerable stress during storm flow and tend to be more susceptible to stability problems, particularly bank erosion and bed scour or *degradation.* In addition, these types of channels route storm flow quickly to downstream reaches where they can contribute to channel instability and flooding. The remaining reaches are C-types, which make up 10% of the total length. Although these channel types are generally stable, woody vegetation is critical to maintaining bank stability. In addition, they are susceptible to stability problems where sediment loads are high. The *morphological* data collected along the reaches is summarized in Table 1 and illustrated in Figure 2.

The general cross-section and *meander* geometry along this management unit is typical of streams that have been channelized and straightened. As evident in the current aerial photographs, the channel *planform* is characterized by low sinuosity and truncated meanders with large radii of curvature. It appears that the reaches in this unit have undergone a series of alterations and adjustments over time that have included flooding impacts, gravel removal and channelization, floodplain alteration, and natural adjustments.

Table 1 - Summary of Morphological Data for Reaches along Management Unit 6. The first reach in MU6 is shared with last reach in MU5.

Reach	Length (ft)	Area (ft^2)	Width (ft)	Mean Depth (ft)	W/D	Ent	Slope (ft/ft)	Stream Type
1	2926	70.5	44.9	1.64	30	1.74	0.020	B3
2	541	70.8	66	1.1	60	2.2	0.020	C3
3	896	67.2	45.3	1.5	30.2	1.9	0.015	B3c
4	312	76.3	36.9	2.1	17.3	1.2	0.014	F3
5	487	81.2	51	1.6	31.9	1.4	0.017	B3c
6	269	66.3	49	1.4	35	1.2	0.012	F3
7	866	80.6	51	1.6	31.9	1.4	0.015	F3/B3c
8	596	82.9	39	2.1	18.5	1.3	0.017	F1/3
9	546	91.4	44.4	2.1	21	1.7	0.013	B3c/B1c
10	414	64.8	40	1.6	25	1.0	0.013	F1/3

Historic bed degradation, floodplain fill, and the construction of gravel flood berms contributed to the current entrenched situation along Reaches 4, 6, 7, 8 and 10. Exposed bedrock currently provides grade control along a significant portion of the unit, thereby preventing further channel degradation. However, field observations and the aerial photographic record indicate that aggradation has been and continues to be a problem along the upper and middle reaches. Information obtained from interviews with residents indicates that aggradation has been an on-going problem in the vicinity of the Davis Lane and River Road Bridges.

As noted above, large mid-channel bars have developed upstream and downstream of the Davis Lane Bridge. The overwidend condition of the channel is likely a result of historic channel maintenance. Although the high width to depth ratio of the channel and the bridge center pier have contributed to the development of the gravel bars, encasement of the sanitary sewer downstream of the bridge has contributed to the problem as well. Analysis of the data from the longitudinal profile field survey shows that the slope of the reach upstream of the bridge is 0.018. When measured through the bridge to a point downstream of the sewer line the slope is also 0.018. However, when measured through the bridge to the top of the sewer line the channel slope is only 0.0012. The combination of the high width to depth ratio, center pier, and the extremely flat gradient significantly affects sediment transport in this reach. Unnaturally high meander geometry (i.e., a tight bend), a high width to depth ratio, and an undersized bridge are the principal contributors to the aggradation problems at the River Road Bridge.

Although eroding banks were observed in some locations, preliminary observations indicate that most of the channel along this management unit is laterally stable (i.e., bank erosion rates are considered low at 4%). Lateral control along one-fourth the channel length is currently provided by rip-rap, gabions, stacked rock, and concrete revetment. These protective measures appear to have been relatively successful in some areas, while less successful in other areas. For example, the banks along the rear of the Town Hall have been rip-rapped during previous maintenance attempts. Currently rip rap has been dislodged, fallen into the channel and is diverting storm flows (Photo 17). Residents have expressed concerns about the riprap revetment on the sharp bend upstream of the River Road Bridge. The riprap was installed in the 1970's to protect the road along the right floodplain. Some of the riprap has been dislodged and scattered along the channel by storm flows during the intervening years.

Mature trees and shrubs provide lateral control along the majority of the management unit. Only 4% of the stream banks exhibited active erosion. Results of the stability assessment show that the banks along the actively eroding areas have high to very high bank erosion potential. In addition, bank to bankfull height ratios along this reach ranged from 1.0 – 2.5, confirming that a significant length of the channel is *incised*. Rosgen (2002) notes that bank to bankfull height ratio is a good measure of vertical stability, as well as an indicator of sediment supply potential.

Photo 17. Dislodged riprap at left bank behind Town Hall parking lot-view looking downstream with dry hydrant partially visible in the background.

Debris jams and other channel obstructions can cause problems by deflecting storm flows into stream banks and trapping sediment which initiates the development of gravel bars and reduces channel capacity. At the time of the 2001 Stream Assessment Survey debris jams were not a significant problem along the reaches in this unit. However, a number of man-made structures were observed including; a wood weir forming a pool for a dry hydrant, and several rock check dams (Photo 18). It was not clear whether these structures are negatively affecting channel stability and/or sediment transport.

As part of the 2001 Stream Assessment Survey *monumented* cross-sections were installed in a number of locations along Chestnut Creek to monitor stream bank erosion and streambed changes (e.g., aggradation) in specific reaches of concern. Two cross-sections were

Photo 18. Wood weir behind Town Hall.

established and surveyed in MU6, one along the reach between the Covered Bridge and Davis Lane and a second along the reach downstream of the Davis Lane Bridge. The cross-sections will be resurveyed and compared to the initial surveys to document the rate at which streambed and stream bank changes occur. Data obtained from these surveys will also allow estimates of sediment loadings to be developed.

Evaluating the reaches along Chestnut Creek to determine whether they are contributing to sediment problems in the Chestnut Creek/Rondout Reservoir System was a component of the Assessment Survey. The preliminary results of the field work indicate that the actively eroding banks and mid-channel bars noted above may be a source of sediment to downstream reaches. Where they accumulate, these sediments may reduce channel capacity and can contribute to localized channel stability problems.

The sediments eroded from the reaches along Chestnut Creek are generally coarse (i.e., sand, gravel and cobble). Unlike other watersheds where exposed silt or clay deposits are a water quality concern because they contribute very fine material to the suspended load, these coarser sediments tend to move as bed load and settle out quickly after storms. As a consequence, sediment eroded from the streambed and stream banks along this management unit does not appear to directly affect water quality within the Chestnut Creek/Rondout Reservoir System.

5. Riparian Vegetation

The riparian area along MU6 can be characterized as a mix of small wooded buffers with mature trees, shrubs, and herbaceous plants; mowed lawns with scattered trees and shrubs; and roads and parking lots with mowed lawn. In riparian areas where wooded buffers are present, their width varies from 25 feet to 350 feet. In general these areas are less than 100 feet wide. With the exception of the reaches in the immediate vicinity of Davis Lane, River Road, and Route 42, the riparian vegetation along the right floodplain (looking downstream) has been least affected by clearing, routine yard maintenance, and other land use activities. The properties along the stream corridor with the lowest percent of riparian vegetation and buffer include the Bank, Town Hall, Post Office, and Fire Hall. The results of the Assessment Survey indicate that control of multiflora rose has been a problem in some areas. Japanese knotweed did not appear to be a problem in this management unit. For more information, see Riparian Vegetation Issues in Stream Management, Volume I, Section IV.B.3.

6. Restoration and Management Recommendations

As presented previously, the Chestnut Creek Management Plan will be utilized to guide and facilitate stakeholders in their efforts to correct stream channel instability problems, restore and maintain natural floodplain functions, control runoff from developed areas to reduce pollutant loadings from channel and upland sources, restore and protect in-stream habitat, and reduce the need for future channel maintenance.

This section includes specific restoration and management recommendations in Management Unit 6 for the Chestnut Creek Watershed. The SCSWCD, NYCDEP, and other agencies and organizations will be working with the community to implement the restoration and management strategies outlined in this Management Plan. It is critical that stream and upland area projects be integrated to avoid potential conflicts in their respective objectives. Therefore, this section also includes comments and recommendations regarding the integration of proposed strategies in upland areas, in particular floodplain management and storm water management practices.

Restoration and Management Recommendations Management Unit 6

1. Repair and stabilize the worst erosion sites along the tributaries draining to MU6.

2. Implement storm water management for the properties with the highest percent impervious surface along the corridor, including the Agriculture Center, Bank, Town Hall, Post Office, Fire Hall, and any other significant impervious areas identified during the field reconnaissance. The storm water management facilities should be designed to provide water quality management for the first half-inch of runoff and quantity management that reduces the peak discharge runoff rate for the 1 – 3-year storm flows.

3. Convert the existing F-types and unstable transition reaches to stable B-types channels by removing existing mid-channel bars, removing poorly sited and/or poorly functioning check dams, removing gravel flood berms, and reconstructing these overwide and entrenched channels with lower width/depth ratios and wider floodprone areas.

4. Reconstruct the channel in the vicinity of the Davis Lane Bridge by removing the mid-channel bars upstream and downstream of the bridge, narrowing the width to depth ratio, steeping the slope by reinstalling the sanitary sewer line downstream of the bridge under current construction specifications, and constructing a W-Weir to direct bankfull flows through one opening, while allowing flood flows to pass through both openings.

5. Evaluate the River Road Bridge to determine the best method for improving sediment transport and conveyance of bankfull and flood flows.

6. Reconstruct the River Road reach to provide a larger radius of curvature and install rock vanes to divert flow away from the reconstructed banks.

7. Establish a better angle on unstable banks and lower the bank to bankfull height ratio by removing gravel flood berms and grading high, vertical banks. Stabilize the banks and provide long-term lateral control by reestablishing bank vegetation composed of native trees, shrubs and grasses.

8. After conducting detailed assessments consider providing grade control structures (e.g., cross vanes), upon field assessment, at key points along the channel to maintain bed stability as opposed to traditional bank hardening methods.

9. Install flow diverting structures (e.g., rock vanes, J-Hook vanes, etc.) at key points along the channel to reduce stress in the near bank region as opposed to traditional bank hardening methods, again in conjunction with detailed assessments.

11. Reconstruct problematic dry hydrant sites utilizing cross vanes to provide low maintenance facilities.

12. Evaluate the extent of multi-flora rose and evaluate an invasive vegetation eradication and control program.

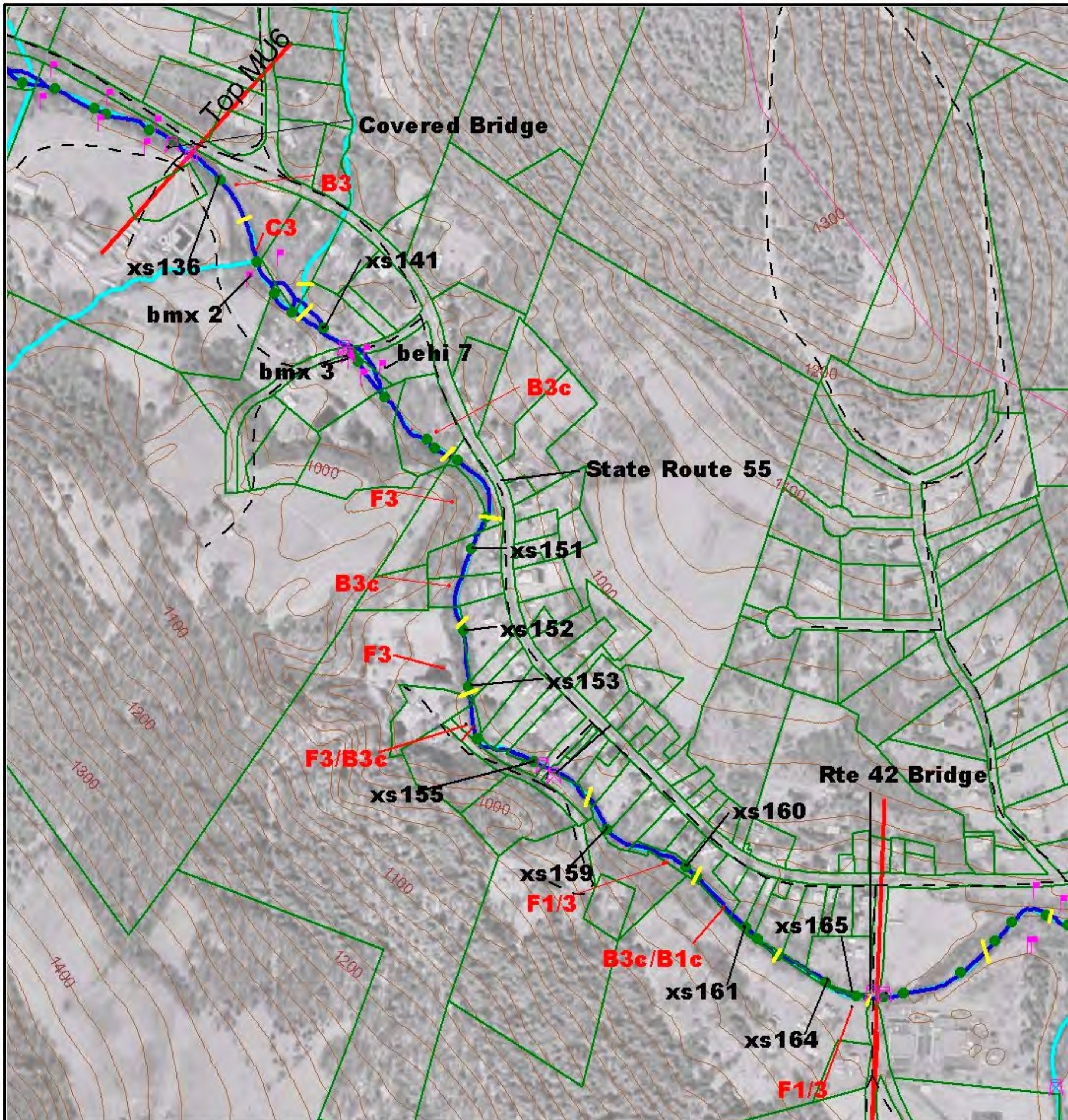

Figure 2. Chestnut Creek MU6 Stream Types and Cross Sections

Stream Assessment Survey 2001

N

Contour Interval 20 feet

300 0 300 600 900 Feet

1:7,000

*See Disclaimer

Legend

- Management Unit Limits
- Cross Sections
- Monitoring cross section
- B3 Rosgen Stream Types
- Roads
- Neversink Parcels
- Mainstem Chestnut-GPS CL
- Digitized stream location
- Stream type breaks
- Stream Crossing (bridges show inlet/outlet)

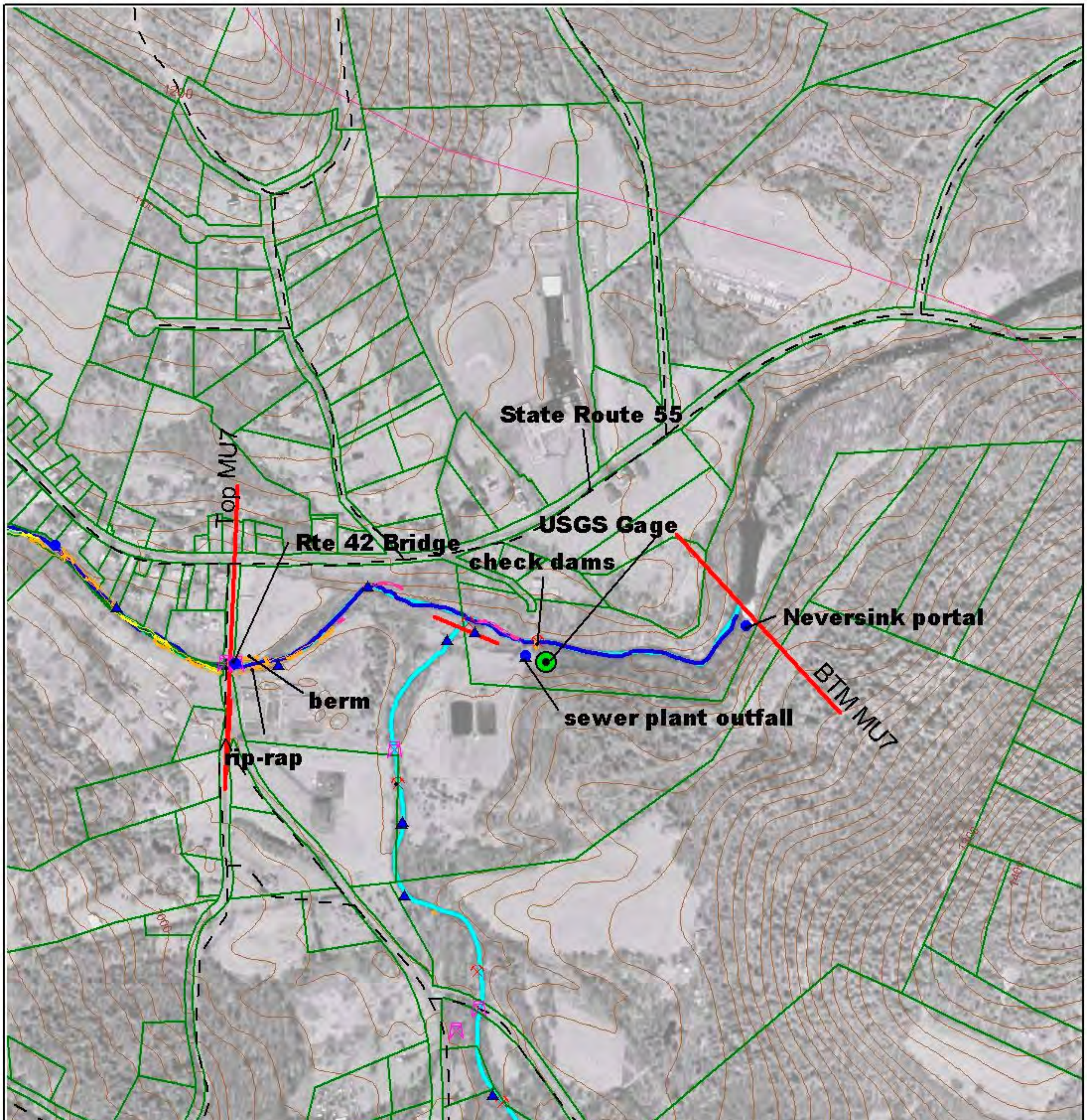

Figure 1. Chestnut Creek Management Unit 7

Stream Assessment Survey 2001

N

Contour Interval 20 feet

400 0 400 800 Feet

Scale 1:7,500

*See Disclaimer

Legend

- Neversink Parcels
- Management Unit Limits
- Revetment
- Road
- Stream Crossing (bridges show inlet/outlet)
- Drainage culvert
- Digitized stream location
- Mainstem Chestnut-GPS CL
- Landfills
- Tributary confluence
- Bedrock
- Erosion
- Debris Jams or Dams
- Knotweed