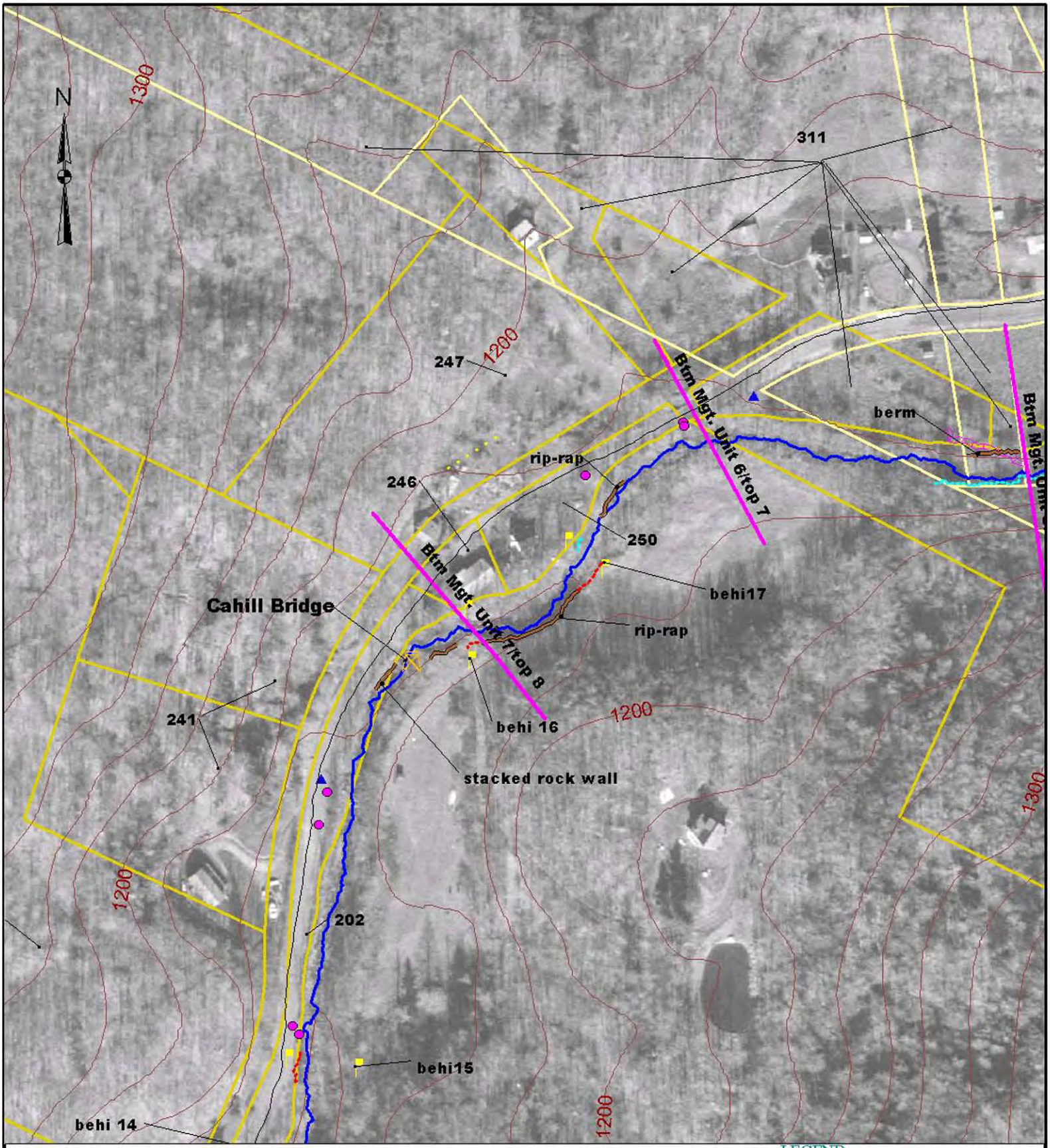

GIS Parcel, Contour and Wetland coverages are edited and provided by NYC DEP, 2000, UTM NAD 27, Zone 18 North, meters. Aerial Photography provided by UCSWCD & NYC DEP November 2001. All other coverages were developed using GPS in the UTM, Zone 18 North projection, NAD CON (Conus), datum. GPS data collected 2001, by UCSWCD & NYC DEP SMP.

Note: G.I.S. data are approximate according to their scale and resolution. Data may be subject to error and are not a substitute for on-site inspection or survey. Parcel coverages are based on Ulster County Real Property tax maps 2000 and may not reflect actual surveyed property boundaries.

Broadstreet Hollow Management Unit 7

Contour Interval 20 feet

50 0 50 100 150 200 Feet

Scale 1:2,400

LEGEND

- 247 Street Address/911 code
- Greene parcels
- Ulster parcels
- Land fills
- Managment units
- Stream Center (Thalweg)
- Culvert
- Wetland
- Clay exposure
- Revetment
- Eroding bank
- Tributary
- Behi pin
- Bridge
- Broadstreet Hollow Road
- Knotweed

Broadstreet Hollow Management Unit 7

General Description:

Management Unit 7 (MU7), is approximately 530 feet in length, located in Ulster County, NY, starting about 520 feet below the Ulster-Greene County line (Photo 1). The top of MU7 is marked by the joining, or *confluence*, of the second-largest side stream, or *tributary*, to the mainstem of the Broadstreet Hollow (the largest is Jay Hand Hollow, running along Timberlake Road). The Broadstreet Hollow stream is close to the road at the top of MU7, then bends, or *meanders*, away from the road downstream[1&2].

Photo 1. Looking upstream into the top of MU7, Broadstreet Hollow Road at

I. Flood and Erosion Threats

A. Infrastructure and Private Property

There are five known property owners for five parcels in MU 7. Three of these properties contain or are bounded by the stream[1].

The centerline of Broadstreet Hollow Road ranges from 25 to 170 feet from the deepest part of the stream, or *thalweg* in this unit. The road in this area is well above the stream at its closest point.

MU7 Culverts

Two culverts were found during the stream assessment survey in 2001. One large culvert (approximately 4 feet in diameter) provides a road crossing for a major tributary stream to the main Broadstreet Hollow (Photo 2). The tributary was flowing at the time of the survey, during the lowest stream flow period of the year, or *summer base flow*, following drought conditions in summer, 2001. Culvert function under flooding conditions was not

Photo 2. Four-foot diameter culvert, providing a crossing over Broadstreet Hollow Road for a major tributary to the main Broadstreet Hollow Stream. Flow in the main stream is from right to left.

Photo 3. Culvert outlet swale on floodplain, right bank, Broadstreet Hollow stream is behind the viewer, flowing right to left.

(Photos 3 and 4). The culvert outlet swale is in good condition and well-vegetated, reducing erosion that can be caused by flowing water concentrating into a gully. Culvert inlet condition was not documented as part of the stream assessment survey in 2001. There may be other culverts within this unit the survey did not observe.

documented, though culvert outlet condition appeared to be relatively stable at the time of the survey, despite evidence of previous stabilization measures (very old concrete slabs and rip-rap, primarily) along the road fill.

The second culvert, dry at the time of the survey in 2001, drains the roadside ditch to a 50 foot-long swale in the floodplain before entering the stream

Photo 4. Close-up view of culvert outlet under Broadstreet Hollow Road (see also Photo 3).

B. History of Stream Work

Approximately 250 feet, or 25%, of the stream bank length in MU7 has been stabilized using *rip-rap* or other stabilization method, or *revetment*, along the stream bank. This rip-rap occurs in two sections[1].

Lower Rip-rap Section:

The lower rip-rap section is older (actual age unknown), at the bottom of MU7 (Photo 5). This rip-rap covers approximately 200 feet on the left bank (looking downstream), is partially vegetated, and consists of large boulders, either *non-quarried natural boulders* from outside the stream, or local, *native* material from the stream channel itself [3&7]. Much of the rip-rap in this section is falling into the stream, as the bank in this area is fairly steep, poorly vegetated and between five and ten feet high. The top of the bank is at a maintained field, vegetated primarily with grasses, with a few small shrubs near the crest of the bank (Photo 6).

Photo 5. Looking upstream at slumping riprap on left bank of MU 7.

This rip-rapped bank is flanked on each end with an eroding bank area, a common feature at the edges of hardened stream banks (upstream eroding bank is described below, downstream eroding bank is in MU8). Rip-rap tends to act to accelerate water over its relatively smooth surface (compared to a bank covered with trees and small shrubs, see the opposite bank in Photo 6). A transition between a hardened area of stream bank and a "softer" area tends to produce erosion, especially if the banks are disturbed or unprotected by vegetation, which is often the case following stream bank work. Both the rip-rapped bank area and the two eroding bank areas on either end would benefit from additional vegetation, or *bioengineering*, to increase and preserve bank stability and other benefits of a healthy streamside, or *riparian* area[3& 8].

Photo 6. Looking upstream at native boulder rip-rap on left bank at the bottom of MU7.

Photo 7. Looking upstream at stacked rock wall revetment on the right bank of MU 7.

<u>Upper Rip-rap Section:</u>

The upstream revetment consists of approximately 50 feet of newer stacked rock wall (Photo 7) along the right bank in the upstream half of MU7. The bank behind this wall is lightly wooded, and contains several large trees that provide shade riparian, habitat function[7].

C. Exposed banks

Approximately 60 feet, or 6%, of the stream bank in MU7 was mapped as eroding or exposed bank area in 2001, in one section just upstream of the Lower Rip-rap section (Photo 8). The eroding bank has been monumented at a representative location for future monitoring (designated as "monitoring cross-section 17") to determine erosion rates and priority for potential

Photo 8. Eroding bank at forested floodplain on left bank, just above lower rip-rap section at the bottom of MU7, monitoring cross-section 17.

restoration[3]. This site has been assessed and ranked based on calculation of a *Bank Erodibility Hazard Index* (BEHI) using data collected at the time of the stream assessment survey in 2001[4]. Riparian vegetation on these banks consists of a narrow riparian area with large trees and some saplings. There is some marked erosion on the residential lawn on the opposite bank[7].

II. Water Quality

A. Sediment

The eroding bank at monitoring cross-section 17 may cause increased turbidity in this reach from fine sediments (silt and clay) coming from stream bank and bed material (see Photo 8). In addition to this eroding area, stream assessment survey in 2001 documented a 20 foot exposure of *glacial lake clay* in the stream bed near the right bank opposite the eroding bank at monitoring cross-section 17 (Photo 9)[10]. This section should be visually monitored to assess any changes in stream bed condition in MU7 that may contribute to further instability or water quality problems, but no further detailed assessment or management is recommended at this time. This location did not appear to be actively eroding at the time of the stream assessment survey in 2001.

Photo 9. Stream bed clay exposure near monitoring cross-section 17, stream flow from right to left. Note riparian trees holding stream bank in place, despite high stream energy.

B. Landfills/Dumping Sites

The stream assessment conducted in 2001 did not reveal any current *dumping sites* in or near the stream in MU7 that could contribute to water quality impairment from leaching of toxic materials.

C. Other Water Quality Issues

Investigation of other possible sources of contamination was not part of the stream assessment conducted in 2001. However, no evidence was found for *nutrient* or *pathogen* contamination in the stream (i.e., odors or discolored water). Any runoff from roadside ditches and culverts that may contain salts or other pollutants was not specifically investigated, but lack of well-vegetated streamside or riparian buffer areas could reduce the capacity of the stream banks to assimilate, or slow the input of, contaminants to the stream[7].

III. Stream Ecology

A. Aquatic Habitat and Populations

No specific aquatic habitat or population monitoring was conducted in MU7 as part of the stream assessment survey in 2001. However, as part of the stream restoration

demonstration project completed in MU3 in 2000, fish and aquatic insect population data have been gathered yearly since 1998 within the stable reference reach (MU1), the project site (MU3) and the control reach (MU17). These data show the Broadstreet Hollow self-supports, without stocking, populations of all three common trout species (rainbow, brook and brown) as well as a healthy and diverse community of aquatic insects[6&9].

B. Riparian Vegetation

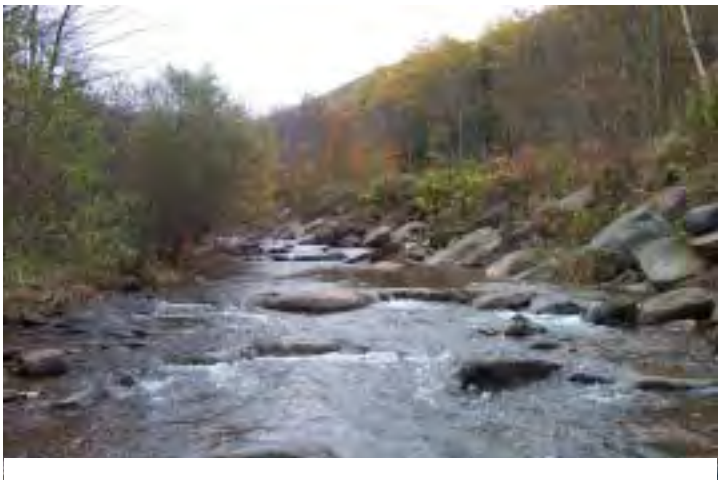

Photo 10. Looking upstream at native boulder rip-rap on left bank at the bottom of MU7. Note dense native riparian vegetation on the opposite bank, and sparse vegetation all along the rip-rap bank.

Stream assessment conducted in 2001 did not investigate specific streamside (riparian) plant species or density condition, other than to note areas of insufficient or stressed vegetation that could affect stream stability, flooding or erosion threats, water quality or aquatic habitat for trout species. Based on these general observations, riparian vegetation throughout most of the upstream half of MU7 appears to be in good condition, but in specific locations is insufficient to provide the full benefits of a healthy riparian zone. Under-vegetated areas in the vicinity of the stacked rock wall, the eroding bank at monitoring cross-section 17, and the long rip-rap section at the bottom of MU7 (Photo 10), should be vegetated with a mixture of native riparian species to improve shade, cover and water temperature conditions for aquatic habitat[7&9]. The vegetation will also improve bank stability and reduce the need for ongoing or future bank stabilization work that could cause or increase stream ecosystem disturbances[3].

No *Japanese Knotweed* [7], a non-native, *invasive* plant was noted in this reach at the time of the assessment survey.

[1]Broadstreet Hollow Management Unit 7 Map
[2] Volume II Appendix 3.1.5 Management Unit 7 Workbook.
[3] Volume II Section 2.2 Watershed Management Recommendations
[4] Volume II Section 2.2.1-Monitoring Cross Section and Summary Tables
[5] Volume I Sections 3.2.1&2 Stream Processes, Morphology and Classification
[6] Volume I Section 3.5 Fisheries and Wildlife
[7] Volume I Sections 3.4 & Volume II 2.2.2 Riparian Vegetation Issues and Recommendations
[8] Volume II 2.0 Stream Stability Restoration Projects, Techniques and Contact Information & Appendices
[9] Volume I Sections 3.4 & Volume II 2.2.2 Riparian Vegetation Issues and Recommendations
[10] Section 3.2.4.2 Broadstreet Hollow Geology