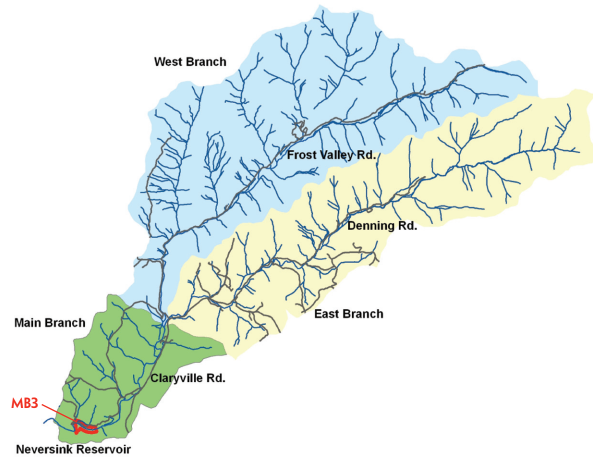
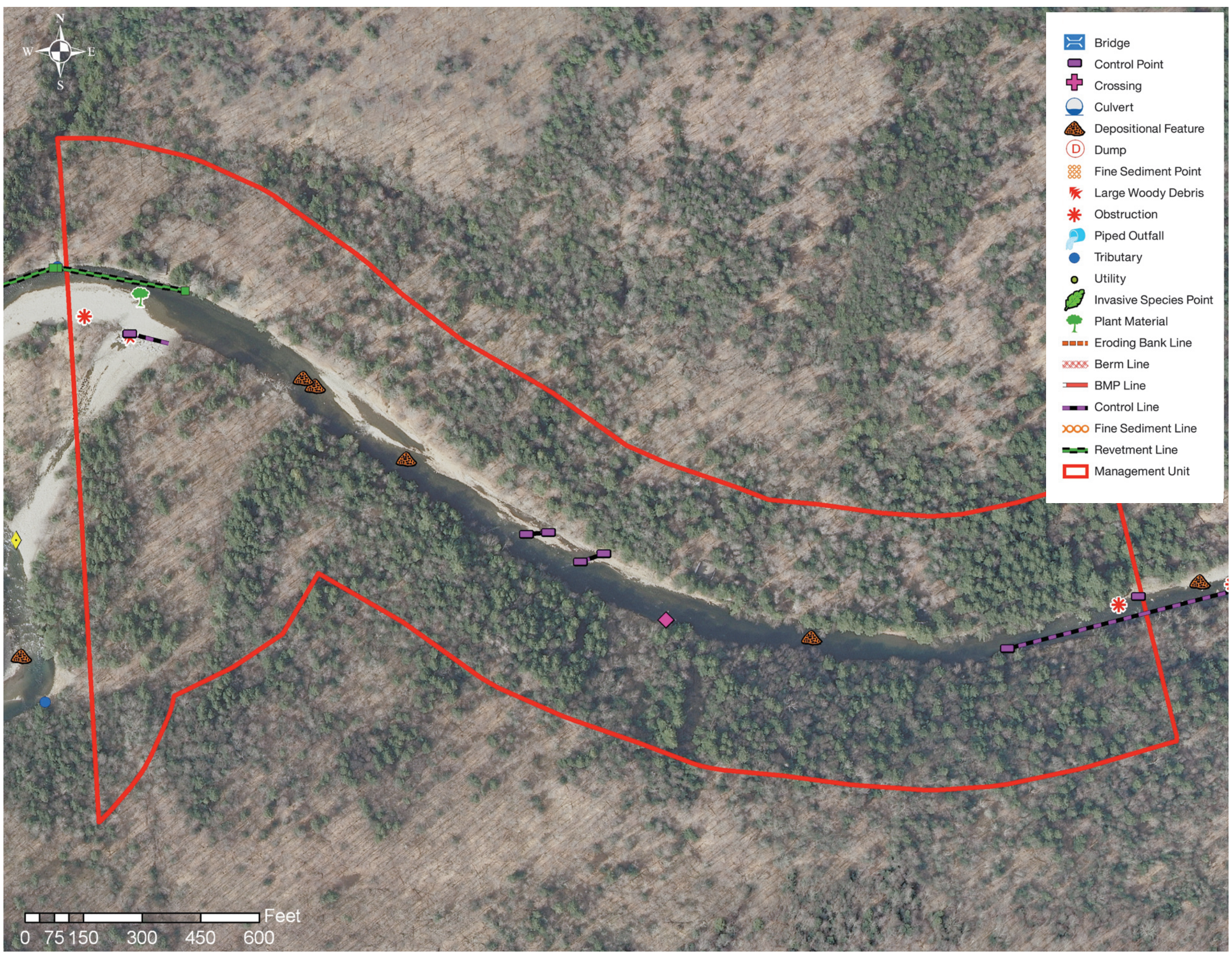
Neversink River Main Branch

MANAGEMENT UNIT 3

STREAM FEATURE STATISTICS

- None of the stream length is experiencing erosion
- 5.45% of stream length has been stabilized
- 2.05 acres of inadequate vegetation within the 100 ft. buffer
- None of stream is within 50 ft. of the road
- There are three structures located within the 100-year floodplain boundary





Stream Feature Inventory 2010 (Figure 1)

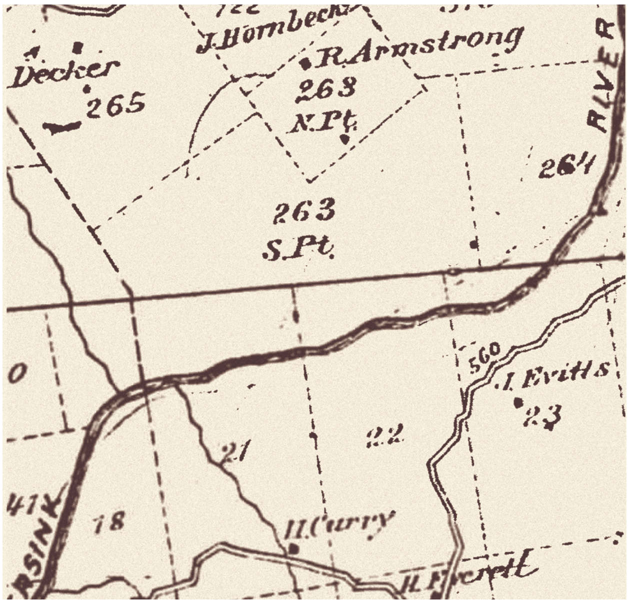
Management Unit Description

This management unit begins at a confluence with Dry Brook at Station 6300, continuing approximately 3,032 ft. to a change in valley type at Station 9300. The drainage area ranges from 68.8 mi^2 at the top of the management unit to 70.0 mi^2 at the bottom of the unit. The valley slope is 0.62 %. The average valley width is 960.93 ft.

Summary of Recommendations Main Branch Management Unit 3

Intervention Level	None.
Stream Morphology	Conduct baseline survey of channel morphology.
Riparian Vegetation	None.
Infrastructure	Investigate history and original objectives of control structures.
Aquatic Habitat	Fish population and habitat survey.
Flood Related Threats	None.
Water Quality	None.
Further Assessment	Include MU3 in comprehensive Local Flood Hazard Mitigation Analysis of Claryville MUs.

Historic Conditions

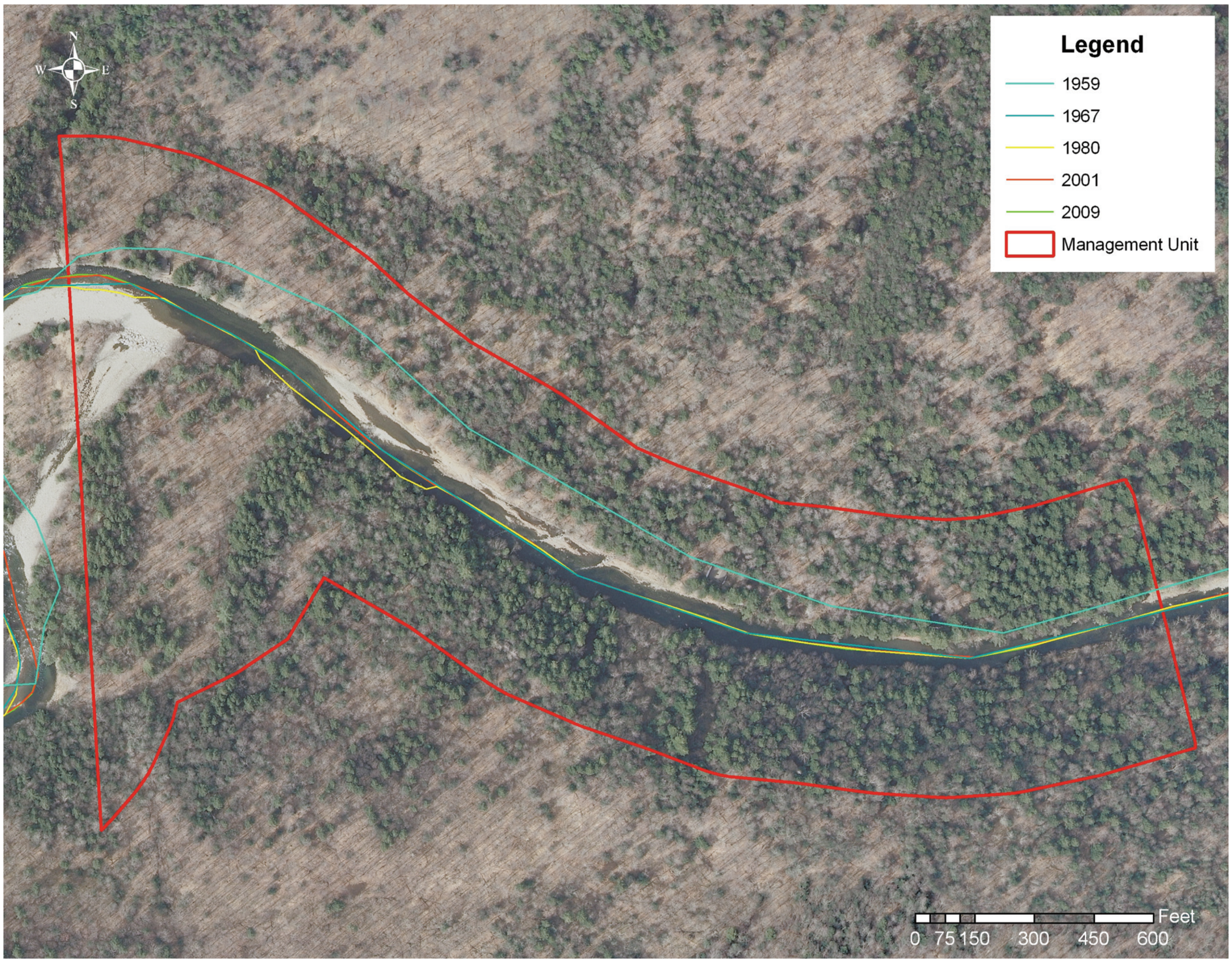


Excerpt from 1875 Beers Map (Figure 2)

As the glaciers retreated about 12,000 years ago, they left their "tracks" in the Catskills. See Section 2.4 *Geology of Upper Neversink River,* for a description of these deposits. These deposits make up the soils in the high banks along the valley walls on the Neversink mainstem and its tributaries. These soils are eroded by moving water, and are then transported downstream by the River. During the periods when the forests of the Neversink watershed were heavily logged for bark, timber, firewood and to make pasture for livestock, the change in cover and the erosion created by timber skidding profoundly affected the Neversink hydrology and drainage patterns.

The 1875 Beers Atlas of this area indicates that by that time, the stream had been harnessed for manufacturing, primarily saw mills, woodworking shops and tanneries *(Figure 2).* Raceways were built in the floodplains to divert water to ponds for use as needed. Floodplains were profoundly altered in the process, as these watercourses also became areas of preferential channelized flow when floodwaters inundated the floodplains. When woody debris jams blocked the primary channels, these raceways sometimes eroded out to become major secondary channels, or even took over the full flow to become a new primary watercourse.

During large runoff events, floodplains adjacent to the confluence of major tributaries receive large slugs of material eroded out of the steep streams draining the valley walls. Overwhelmed the Neversink's ability to transport it, creating an alluvial fan. Like changes in the floodplains made by humans, these episodes can result in catastrophic shifts in channel alignment. In the roughly one hundred and twenty centuries since the retreat of the glaciers, the position of Neversink River has moved back and forth across its floodplain numerous times in many locations. A comparison of historical channel alignments *(Figure 3, following page)* and in-stream observations made during a stream feature inventory in 2010 *(Figure 1, page 1)* indicate little lateral channel instability, and only no NYS Article 15 stream disturbance permits have been issued in this management unit, according to records available from the NYSDEC DART database (**http://www.dec.ny.gov/cfmx/extapps/envapps/**).



Historical channel alignments from five selected years (Figure 3)

Stream Channel and Floodplain Current Conditions

MBMU3 begins at Station 9300 with exposed bedrock constraining the stream bed and left bank (continued from MBMU4) and a large bolder obstruction forming a small gravel bar and scour pool on the right bank. The exposed bedrock ends at Station 8950, where the main channel widens slightly, leading to some aggradation in the reach downstream. *(A249)*

At Station 8080 there is a relict habitat structure which begins a reach that appears to have been managed historically for fish habitat. *(B527)* Approximately 300 feet downstream, at Station 7800 and Station 7650 there are two placed stone bars projecting approximately 55 feet from the bank into the main channel angled 45 degrees downstream. *(A256)* Both structures were documented in good structural condition; because the purpose and past use of the structures remain unclear the functional condition cannot be assessed. Overall, the reach-scale affect of the barbs appears to be formation of a depositional side bar on the right bank extending downstream approximately 400 feet. There is a house located on the right bank up slope of the depositional bar within the FEMA mapped 100-year floodplain near Station 8120.

Widening and aggradation of channel (A249)

Features like these barbs were observed frequently on the main branch of the Neversink River. It is difficult to decipher the original design objectives; they may have been designed to improve or enhance aquatic habitat or to protect banks. It is recommended that the history and original objectives of these features be investigated to better understand their current function and ongoing hydraulic effects. Long term monitoring of the structures is also recommended.

Relict habitat structure (B527)

The aggradation continues downstream with the side bar extending from Station 7300 to Station 7000, and a transverse bar centered at Station 6970 which directs flow at the forested terrace on the right bank. *(B530)* A flood chute was detected in aerial photography diverging from the main channel into the left floodplain near Station 7150. This chute re-joins the main channel near Station 5000 in MBMU2. It is likely that this chute conveys flow through a forested floodplain that is inundated during high flow events. *(insert Bing image looking southeast centered to view entire S-curve. consider calling out flood chute location)*

Stone barb (A256)

At Station 6600 the main channel enters an S-curve with a relatively large amplitude, known locally as the Big Bend, that begins with a wide meander to the left. A 330-foot long sloped stone revetment was observed on the right bank from Station 6600 to Station 6270, which appears to protect the bank at a residential property with two cabins and a private access road (including a bridge over Dry Brook) within the 100-year floodplain. This revetment was documented in good structural and functional condition. *(A263)* The revetment ends at the confluence of a tributary with the main channel in MBMU2.

Aggradation and transverse bar (B530)

A 117-foot long placed boulder and log check dam was observed on the left bank from Station 6600 to Station 6483. The check dam is functioning as a grade control for the stream bank elevation and may have been designed to block flow from a side channel that cuts off the point bar, instead directing flow around the wide meander. The check dam was documented in good structural and functional condition. *(B533)* The forested floodplain that forms the inside of this meander bend is inundated during high flow events, as evidenced by numerous cobble bed flood chutes and woody debris piles. *(A267)*, include in call-outs on Bing showing entire bend) The willows and sedges observed vegetating the point bar downstream of Station 6500 were documented as a possible plant source for restoration projects throughout the watershed. *(A266)*

Sloped stone revetment on right bank (A263)

MBMU3 ends at confluence of Dry Brook on the right bank at Station 6300.

Photo 4.4.3. 6 Check dam on left bank (B533)

Cobble and debris on flood plain (A267)

Willows on point bar (A266)

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 3.1 for more details on Stream Processes).

This management unit is at the end of a short series of sediment transport reaches in a valley pinchpoint from Station 13000 to Station 9000. Transport reaches are in a state of *dynamic equilibrium,* effectively conveying sediment supplied from upstream during each flow event. Storage reaches act as a "shock absorber", holding bedload delivered during large flow events in depositional bars and releasing it slowly over time in more moderate flood events. These depositional features are very dynamic. While there is little change in the channel alignment associated with these processes in this management unit, the features store and release significant volumes of bed load with each major flow event.

Sediment storage reaches can result from natural conditions—such as they are in this location, defined by larger topographic features—or as the unintended consequence of poor bridge design, check dams or channel over-widening.

To better understand sediment transport dynamics of this section of the Neversink, a baseline survey of channel form and function is recommended for this management unit.

Riparian Vegetation

One of the most cost-effective methods for landowners to protect streamside property is to maintain or replant a healthy buffer of trees and shrubs along the bank, especially within the first 30 to 50 ft. of the stream. A dense mat of roots under trees and shrubs bind the soil together, and makes it much less susceptible to erosion under flood flows. Mowed lawn does not provide adequate erosion protection on stream banks because it typically has a very shallow rooting system. Interplanting with native trees and shrubs can significantly increase the working life of existing rock rip-rap placed on stream banks for erosion protection. Riparian, or streamside, forest can buffer and filter contaminants coming from upland sources or overbank flows. Riparian plantings can include a great variety of flowering trees and shrubs, native to the Catskills, which are adapted to our regional climate and soil conditions and typically require less maintenance following planting and establishment.

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 it's 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 stream banks. The result can include rapid stream bank erosion and increase surface runoff impacts.There were no occurrences of Japanese knotweed documented in this management unit during the 2010 inventory.

An analysis of vegetation was conducted using aerial photography from 2001 and field inventories *(Figure 5).* In this management unit, the predominant vegetation type within the 100 ft. riparian buffer is evergreen-closed tree canopy (42.63%) followed by mixed-closed tree canopy (31.45%). *Impervious* area makes up .09% of the total land cover in this unit's buffer.

There are 9.65 acres of wetland (17.2% of MBMU3 land area) within this management unit mapped in the National Wetland Inventory as one classification (see Section 2.5, *Wetlands and Floodplains* for more information on the National Wetland Inventory and wetlands in the Neversink watershed). Wetlands are important features in the landscape that provide numerous beneficial functions including protecting and improving water quality, providing fish and wildlife habitats, storing floodwaters, and maintaining surface water flow during dry periods (See Section 2.5 for wetland type descriptions and regulations). This wetland classified as Riverine is 9.65 acres in size.

Flood Threats

INUNDATION 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 upper Neversink River is scheduled to have its FIRMs updated with current surveys and hydrology and hydraulics analysis in the next few years, and the mapped boundaries of the 100-year floodplain are likely to change.

Three structures in MBMU3 lie at least in part within the 100-year floodplain as identified on the FIRM maps. Due to the relatively low elevation of the terrace on the right bank, the risk of flood inundation is relatively high for most of the structures in this management unit, as well as the private access road for these cabins adjacent to the main channel in MBMU2. FEMA provides guidance to homeowners on floodproofing at: **http://www.fema.gov/library/viewRecord.do?id=1420**

BANK EROSION No areas of erosion were documented during the stream feature inventory of this management unit.

INFRASTRUCTURE 5.45% of the stream bank length in this management unit has been treated with revetment. A 330-foot long sloped stone revetment was observed on the right bank from Station 6600 to Station 6270. This revetment was documented in good functional and structural condition and appears to protect nearby residential property. There were no berms documented in this management unit.

Aquatic Habitat

Aquatic habitat is one aspect of the Neversink River ecosystem. While ecosystem health includes a broad array of conditions and functions, what constitutes "good habitat" is specific to individual species. When we refer to aquatic habitat, we often mean fish habitat, and specifically trout habitat, as the recreational trout fishery in the Catskills is one of its signature attractions for both residents and visitors. Good trout habitat, then, might be considered one aspect of "good human habitat" in the Neversink River valley.

Even characterizing trout habitat is not a simple matter. Habitat characteristics include the physical structure of the stream, water quality, food supply, competition from other species, and the flow regime. The particular kind of habitat needed varies not only from species to species, but between the different ages, or life stages, of a particular species, from eggs just spawned to juveniles to adults.

New York State Department of Environmental Conservation (DEC) classifies the surface waters in New York according to their designated uses in accordance with the Clean Water Act. The following list summarizes those classifications applicable to the Neversink River.

1. The classifications A, AA, A-S and AA-S indicate a best usage for a source of drinking water, swimming and other recreation, and fishing.
2. Classification B indicates a best usage for swimming and other recreation, and fishing.
3. Classification C indicates a best usage for fishing.
4. Classification D indicates a best usage of fishing, but these waters will not support fish propagation.

Waters with classifications AA, A, B and C may be designated as trout waters (T) or suitable for trout spawning (TS). These designations are important in regards to the standards of quality and purity established for all classifications. See the DEC Rules & Regulations and the Water Quality Standards and Classifications page on the NYSDEC web site for information about standards of quality and purity.

In general, trout habitat is of a high quality in the Neversink River. The flow regime above the reservoir is unregulated, the water quality is generally high (with a few exceptions, most notably low pH as a result of acid rain; see Section 3.1, *Water Quality*), the food chain is healthy, and the evidence is that competition between the three trout species is moderated by some *partitioning* of available habitat among the species. The mainstem in MBMU3 has been given a "A(T)" class designation with best use as a source of drinking water, for use swimming and fishing, and indicating the presence of trout. Trout spawning likely occurs in this management unit but has not yet been documented in the DEC classification.

Channel and floodplain management can modify the physical structure of the stream in some locations, resulting in the filling of pools, the loss of stream side cover and the homogenization of structure and hydraulics. As physical structure is compromised, inter-species competition is increased. Fish habitat in this management unit appears to be relatively homogeneous.

It is recommended that a population and habitat study be conducted on the Neversink River, with particular attention paid to temperature, salinity, riffle/pool ratios and quality and in-stream and canopy cover.

Water Quality

The primary potential water quality concerns in the Neversink as a whole are the contaminants contributed by atmospheric deposition (nitrogen, sulfur, mercury), those coming from human uses (nutrients and pathogens from septic systems), chlorides (salt) and petroleum by-products from road runoff, and suspended sediment from bank and bed erosion. Little can be done by stream managers to mitigate atmospheric deposition of contaminants, but good management of streams and floodplains can effectively reduce the potential for water quality impairments from other sources.

Storm water runoff can have a considerable impact on water quality. When it rains, water falls on roadways and flows untreated directly into the Neversink River. The cumulative impact of oil, grease, sediment, salt, litter and other unseen pollutants found in road runoff can significantly degrade water quality. The usage frequency and patterns of the private road adjacent to the river on the right bank are unclear. However, it is possible that the proximity of this road to the channel provides some risk of storm water runoff reaching the river during storm events.

Sediment from stream bank and channel erosion pose a potential threat to water quality in the Neversink River. Clay and sediment inputs into a stream may increase *turbidity* and act as a carrier for other pollutants and pathogens. There are no bank erosion sites in MBMU3 that represent a significant source of fine sediment.

Nutrient loading from failing septic systems is another potential source of water pollution. Leaking septic systems can contaminate water making it unhealthy for swimming or wading. Two structures are located in relatively close proximity to the stream channel in this management unit. These homeowners should inspect their septic systems annually to make sure they are functioning properly. Each household should be on a regular septic service schedule to prevent over-accumulation of solids in their system. Servicing frequency varies per household and is determined by the following factors: 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 out more often.

The New York City Watershed Memorandum of Agreement (MOA) allocated 13.6 million dollars for residential septic system repair and replacement in the West-of-Hudson Watershed through 2002, and the program was refunded in 2007. Systems eligible included those that are less than 1,000-gallon capacity serving one-or-two family residences, or home and business combinations, less than 200 feet from a watercourse. Permanent residents are eligible for 100% reimbursement of eligible costs; second homeowners are eligible for 60% reimbursement. For more information, call the Catskill Watershed Corporation at 845-586-1400, or see **http://www.cwconline.org/programs/septic/septic_article_2a.pdf**.