

1.0 Introduction and Purpose

1.1 Introduction: What is a Stream Management Plan for the Broadstreet Hollow?

Stream management is an emerging discipline that recognizes the importance of our local streams to our overall quality of life, and seeks to coordinate decision-making around common goals we collectively identify for the stream.

This stream management plan was created cooperatively by the Broadstreet Hollow streamside community, local leaders and agency representatives, and identifies the common, shared goals that many have for the Broadstreet Hollow stream and its adjacent floodplains, forests and wetlands. In addition to identifying our common goals, it identifies competing goals as well, and provides a “road map” for coordination among the many “stakeholders.” Stakeholders are those who rely on, work with, and/or live by the waters of the Broadstreet Hollow, including: Town and County Highway Departments responsible for managing the Broadstreet Hollow Road and its bridges and culverts, local landowners concerned about erosion, flooding and the beauty of the stream, utilities that manage rights of way along the stream, anglers who seek out the rich trout fishery, and even the City of New York, which ultimately shares its waters with its 9 million residents.

Below, the specific goals and objectives of the plan are described. Generally, this plan for the Broadstreet Hollow provides first some history of the Broadstreet Hollow stream and its communities, so closely mingled with the stream itself in this mountainous setting, and adds a description of the existing physical condition of the stream, from its headwaters to its mouth. Recommendations are tailored to specific sections of stream, and generalized to the entire stream and watershed, to benefit many stakeholders and create multiple opportunities for conservation, improvement and other management projects. The plan also provides a more detailed description of stream behavior and dynamics for those interested in understanding some useful foundational principles for greater success in stream management activities. And finally, it also provides a comprehensive resource of contact information for a variety of people and organizations involved in many aspects of stream management, and sources of technical and financial assistance for those seeking to implement various recommendations provided in the plan.

1.2 Purpose: Why Develop a Management Plan for the Broadstreet Hollow?

The Broadstreet Hollow stream is a small headwater stream originating in the Catskill Mountain Town of Lexington in Greene County, and flowing south through a narrow valley, through the Town of Shandaken in Ulster County, where it joins the Esopus Creek. Though the stream is small relative to other tributaries and streams in the Catskills – its drainage area (or “watershed”) is approximately 9.5 square miles, and the main stem along the road is less than 4 miles long - for the residents of the Broadstreet Hollow valley, the stream has an immense impact on quality of life, providing great value, as well as great challenges.

Interest in developing an organized management strategy for the Broadstreet Hollow emerged after the January 19, 1996 catastrophic flood event. Historically, the waters of this stream had run clear at all but high flows, with some ongoing problem areas noted by landowners. In the

eastern Catskill Mountains, stream beds and banks are generally underlain by clay-rich soils, and as a result streams generally run very brown, or “turbid,” after major rainstorms or snowmelt events that bring flood flows. Often, these same streams run clear at low flows. After the 1996 flood, the dramatic stream and infrastructure damages that resulted, and subsequent emergency repair work, it was apparent something had changed in Broadstreet Hollow. After this time, small instability and erosion problems became much worse, small eroding banks became large failures, and the stream began to run very turbid even at the lowest flows during the driest of summer months.

This condition was noticed by streamside landowners, anglers, resource agencies responsible for the stream’s quality, and by the NYC DEP, who has been asked by the USEPA to identify and reduce sources of “turbidity” in its water supply watershed. The NYC DEP had already recognized the Broadstreet Hollow as a significant contributor to *suspended sediment* and related *turbidity* in the Esopus Creek drainage basin during the mid 1990’s. Recognizing that certain common management practices in a mountainous setting combined with catastrophic flood conditions can result in increased stream erosion and turbidity, the DEP initiated a voluntary planning effort with the Ulster County SWCD, the Greene County SWCD and the US Army Corps of Engineers. These core agencies agreed to work together to fund and coordinate the development of this management plan, and a stream restoration demonstration construction project at one of the worst eroding areas (described in Management Unit 3, section 4.1.3).

These four agencies recognized the importance of local leadership for development of an effective management strategy for the Broadstreet Hollow. The UCSWCD and DEP led a partnership effort with local stakeholders living and working along the stream by convening a Project Advisory Committee (PAC) to develop, guide and implement the goals and objectives of the management plan.

This planning process has helped foster stronger partnerships among local, state, city and federal agencies, and landowners and various private organizations in the Broadstreet Hollow watershed. The plan is intended to facilitate cooperation and communication between various parties, building community relationships and support for stewardship of the stream as a vital natural resource.

1.3 Goals and Objectives for this Management Plan

There are four primary goals for the management plan:

- 1) Document risks and outline a plan to reduce damage to private property and public infrastructure - roads, bridges, residential improvements and utility lines - from floodwaters and stream erosion (Section 1.4.1, Flooding and Erosion Threats);
- 2) Summarize known information and outline a plan to protect and improve water quality (Section 1.4.2, Water Quality);
- 3) Document current conditions and outline a plan to protect and enhance the integrity of stream and floodplain ecosystems, and of the unique communities of plants and animals that use the stream and floodplains as their home (Section 1.4.3, Ecological Health); and

- 4) Provide a strategy for coordination of management activities among the various stakeholders, to ensure no one of the above goals is achieved at the expense of another (Section 1.4.4, Coordination).

1.3.1 Flooding and Erosion Threats

The risks associated with floods and their powerful erosive forces can affect an individual landowner or an entire community. To reduce these risks, this plan proposes to achieve the following objectives:

- 1) Conduct a watershed-wide survey of landowners to assess the history of flood damages, concerns and interests in the stream;
- 2) Conduct a physical survey and analysis of the stream channel and floodplain, to better understand how the stream is likely to behave in future flood events, as indicated by the physical form, or morphology, of the stream;
- 3) Identify, monument (for ongoing monitoring) and survey sites of bank erosion, assess their relative stability, and make prioritized recommendations for their treatment;
- 4) Identify those locations where the road or bridges may be threatened by bank erosion, and make prioritized recommendations for their treatment;
- 5) Identify those locations where improved or residential areas may be threatened by bank erosion, and make prioritized recommendations for their treatment;
- 6) Identify those locations where glacial lake clay and/or bank location could exacerbate bank erosion problems leading to high water quality risks, and make prioritized recommendations for their treatment; and
- 7) Assess bridge or culvert crossings that may be at risk from erosion of stream banks or streambeds, or otherwise unstable or threatened, and make prioritized recommendations for their treatment.

1.3.2 Water Quality

Potential impairments to water quality can come from many sources, and they can affect both surface waters and ground water supplies for wells. To protect and improve ground and surface water supplies, this plan proposes to achieve the following objectives:

- 1) Determine the most significant sources of water quality impairment in Broadstreet Hollow from existing water quality monitoring data as available;
- 2) Identify the likely sources of suspended sediment from within the stream channel, and make prioritized recommendations for their treatment;

- 3) Identify the most likely sources of suspended sediment from upland areas, if any, and make prioritized recommendations for their mitigation;
- 4) Identify potential sources of contamination from landfills or dumping areas in the stream corridor, and make prioritized recommendations for their mitigation; and
- 5) Identify potential sources of contaminants from road runoff, and make prioritized recommendations for their mitigation.

1.3.3 Ecological Health

The health of the stream and floodplain ecosystems has come to be recognized as playing a key role in the quality of life in our community. We value healthy streams that support a diversity of fish and insect species, and healthy floodplains that support a variety of tree and shrub species, as well as wildlife that can only thrive along healthy streams are invaluable. To achieve the goal of optimizing stream and floodplain ecosystem integrity, this plan proposes the following objectives:

- 1) Characterize the status of stream ecosystem health in general terms for the Broadstreet Hollow as a whole, using existing fish and insect population data;
- 2) Survey local anglers' experience with the Broadstreet Hollow fishery, both in terms of its capacity and its informal management by angling groups;
- 3) Conduct a comparison study of several different stream settings to determine the range of response of fish and invertebrate communities to different physical settings within the Broadstreet Hollow, and make recommendations, where deemed necessary, for improvement of physically impaired habitat;
- 4) Monitor the response of fish community structure to stream stability restoration practices implemented during the course of the development and implementation of the management plan;
- 5) Characterize current floodplain and riparian forest management practices in Broadstreet Hollow, and make prioritized recommendations for changes that can improve ecosystem integrity; and
- 6) Conduct field surveys of selected riparian vegetation; make prioritized recommendations for further study and management of the riparian zone.

1.3.4 Coordination

Streams are currently "managed" by many different individuals, agencies and organizations. Each of these groups has its own "take" on the stream, and each has unique goals and management practices. Sometimes the goals and practices of one group can be at cross-purposes with others, but through better communication and coordination, and by coming to agreement on a common strategy, these potential conflicts can be minimized or avoided altogether. To promote

the goal of effective coordination among the many stakeholders, this plan proposed the following objectives:

- 1) Establish a Project Advisory Committee consisting of representatives of all significant stakeholder groups to coordinate the development and implementation of the plan;
- 2) Conduct a survey of Broadstreet Hollow residents to determine their concerns, interests and current stewardship practices;
- 3) Encourage and support the formation and activities of a streamside Landowners Association in the Broadstreet Hollow to represent landowner interests, especially to the Project Advisory Committee during plan development;
- 4) Survey highway superintendents on their concerns, interests and current management practices and priorities;
- 5) Survey local and town stakeholder agencies and departments for information needs to promote land use consistent with the long-term, collective goals of the Broadstreet Hollow community, and make recommendations for strategies to acquire that information;
- 6) Determine the needs of various stakeholder groups for technical assistance, information and education, and make recommendations for the development of programs to meet those needs;
- 7) Document baseline conditions of the Broadstreet Hollow and floodplain that can be used as benchmarks to gauge progress toward the collective goals of the Broadstreet Hollow community and others with an interest in keeping the stream and its neighbors both healthy and happy.

1.4 Guide to this Stream Management Plan

Plan Organization:

The Broadstreet Hollow Stream Management Plan has been arranged into two Volumes, subdivided into broad categories of general watershed description, specific stakeholder information, watershed and stream-specific recommendations, and supporting data and other useful resource documents. In Volume I, background, history and descriptions of the stream and watershed system are provided to set the context for the physical boundaries of stream management in Broadstreet Hollow, and the Catskills in general. The current framework for stream management, locally, regionally and statewide, is presented to set the context of existing institutional relationships and boundaries for stream management in the Broadstreet Hollow, and to provide detailed information on the interests, jurisdiction and management strategies of the many project stakeholders.

In Volume II, sections outline very detailed descriptions and specific recommendations for approximately 3.5 miles of stream, from NYS DEC property at the top of the Broadstreet Hollow watershed, down to the mouth of the stream where it meets the Esopus Creek. This section provides a useful reference for the extent of current problems at a localized stream reach scale, with specific recommendations for action and references to other sections of the plan for further information or resources. The main stream has been organized into *Management Units* (MUs), subdivided using physical stream characteristics, property boundaries, location of bridges and road infrastructure, and valley characteristics, all gathered through a detailed stream assessment survey conducted in 2001. These MU descriptions outline stream conditions (its bed and banks), general streamside (riparian) vegetation condition, and proximity and arrangement of roads, bridges and culverts. Conditions and recommendations are organized by management objectives: Flooding and Erosion Hazards, Water Quality, and Stream Ecology. Descriptions provide guidance and suggestions for specific projects or assessments in these categories, and any ongoing monitoring that can provide further detail to define specific problems. Summary tables provide a condensed version of each expanded description, and companion maps show the location of specific features described in the text.

Stream Management Plan Recommendation sections in Volume II contain summary recommendations, watershed wide and by Management Unit, with specific guidance on techniques, information and funding sources, and partnerships or other strategies for implementing recommendations or reprioritizing projects. Information regarding stream-related activities, agency contacts and grant funding information are also summarized in lists and tables for reference. This section also contains a set of suggested strategies for keeping plan information up to date, important to ensuring the plan remains a viable and useful resource for long term multiple objective stream management.

Volume I provides Appendices and specific reference sections, cited elsewhere in the plan.

Plan Application and Implementation:

The Broadstreet Hollow Stream Management Plan can serve as a basic guide for use in general decision making in the watershed. The plan provides detailed documentation of current stream conditions, private property issues and an assessment of existing infrastructure, which can be helpful to local highway departments and planning boards. This plan can serve as a useful tool for planning and permitting purposes, as well as being a reference source for landowners and agencies.

The Stream Management Plan also offers site-by-site recommendations for prioritizing future work and maintenance activities along the stream. The assessment data in the plan can aid progress and projects when the USDA-Natural Resources Conservation Service, US Army Corps of Engineers (USACOE), the Federal and State Emergency Management Agencies (FEMA and SEMO) and the NYS Department of Environmental Conservation (DEC) are assisting in flood emergencies.

Information and recommendations pertaining to stream bank erosion and stability management are noted on a site-specific basis. This can help landowners decide if an eroding bank would be stabilized by planting vegetation alone, or advise highway departments of where enhanced vegetation plantings can help reduce the long term maintenance of infrastructure projects.

A detailed, watershed wide assessment of Broadstreet Hollow fish populations and habitat quality was not undertaken as part of this effort. However, anglers can infer much about the quality of habitat from individual management units where sampling has been conducted over a period of years in conjunction with the stream stability restoration demonstration project (see Volume II, Section 1.0: MU3 (the project site), MU2 (the stable blueprint for design) and MU17 (the unstable control reach) – data also described in Volume I, Section 3.5, Fisheries and Wildlife). Anglers and riparian landowners will be interested to see the results of fish and macroinvertebrate sampling as a gauge for stream health.

The Broadstreet Hollow is a largely intact and healthy stream system, however, some trends, existing and future problems were identified. The recommendations proposed can serve as a guide for long-term stewardship. The success of this Plan will ensure the beauty and pristine water that flows through this valley, for the use and enjoyment of this and future generations.