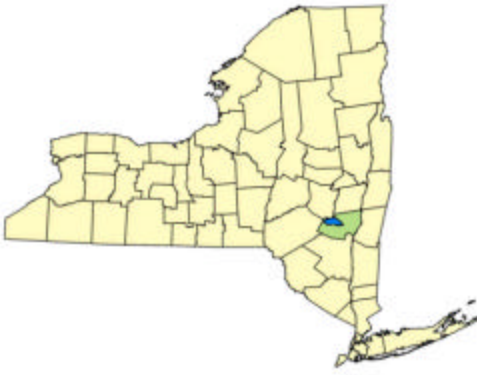


THE BATAVIA KILL STREAM MANAGEMENT PLAN

EXECUTIVE SUMMARY



The Batavia Kill Stream Management Plan (SMP) is a guide for local residents, municipalities, interested organizations and agencies to protect and improve the Batavia Kill Watershed. A NYC Department of Environmental Protection (NYCDEP) study identifying the Batavia Kill as contributing high levels of turbidity into the NYC drinking water system spurred the development of this Plan. Highly turbid water, caused by suspended sediment, may look muddy and interferes with the disinfection process for drinking water supplies. It may also act as a carrier for other pollutants, and spoils fish habitat. Stream walk-overs and assessments suggest streambank and bed erosion is a major

source of this turbidity. Streambank erosion also means property loss to landowners, expensive road maintenances for highway crews, as well as water quality and fisheries degradation. Addressing and preventing erosion is a central goal of the Plan.

- **Residents should use this Plan by working with Greene County Soil & Water Conservation District (GCSWCD) and our partners to adopt or implement management recommendations on their property.** Streamside landowners are encouraged to use the Plan to educate themselves on stream process and how to avoid potential problems by selecting management options that will protect their property and the stream.
- **This SMP provides municipalities with a reference guide on stream process and potential impacts of management practices.** Municipal, County, and State Highway Departments should use this plan to identify potential causes of stream problems and to consider potential effects of mitigation. Watershed towns can support this SMP through formal adoption and implementation of programs which support stream health.
- **Agencies may use general recommendations set forth in this Plan and seek out funding opportunities to implement these programs.** This Plan provides baseline conditions of the Batavia Kill, revealing problem areas in need of restoration as well as stable areas in need of protection. These baseline conditions will enable stakeholders to assess the success of stream management efforts.

Project Background

The Batavia Kill has been a primary focus of stream managers since devastating floods in the 50's and 60's resulted in the construction of a series of flood control structures in the watershed. In the mid-1990's, NYCDEP identified the Batavia Kill as the leader in high turbidity conditions throughout NYC water supply sub-basins. Faced with the need to improve water quality or build a \$8 billion filtration plant, a watershed protection program was created. Consequently, NYCDEP's Stream Management Program and GCSWCD initiated a pilot project to achieve improved fisheries and water quality at the same time as protecting property and infrastructure (multi-objective management). The project includes developing a Plan for managing and improving the overall health of the Batavia Kill, evaluating the stream's erosion rates and flooding behavior, and demonstrating the use of Natural Channel Design methods.



Section II: Introduction and Objectives

The Batavia Kill Stream Management Plan represents a coordinated effort among numerous stakeholders in the Batavia Kill watershed to define a comprehensive, management strategy that protects and improves the Batavia Kill. The SMP offers practical guidance for streamside landowners and stream managers.

Section III: Introduction to Stream Management

This section provides an explanation of stream dynamics and the emerging science of fluvial geomorphology - study of the formation of landforms by flowing water. Knowledge of factors which impact stream systems is essential for effective implementation of management strategies. This section includes information on: stream hydrologic regimes, fluvial process (stream form), hydraulic geometry relationships, stream classification, fluvial process, stream channel evolution models, traditional management activities, stream restoration methods, and natural channel design concepts.

Section IV: Batavia Kill Watershed Description

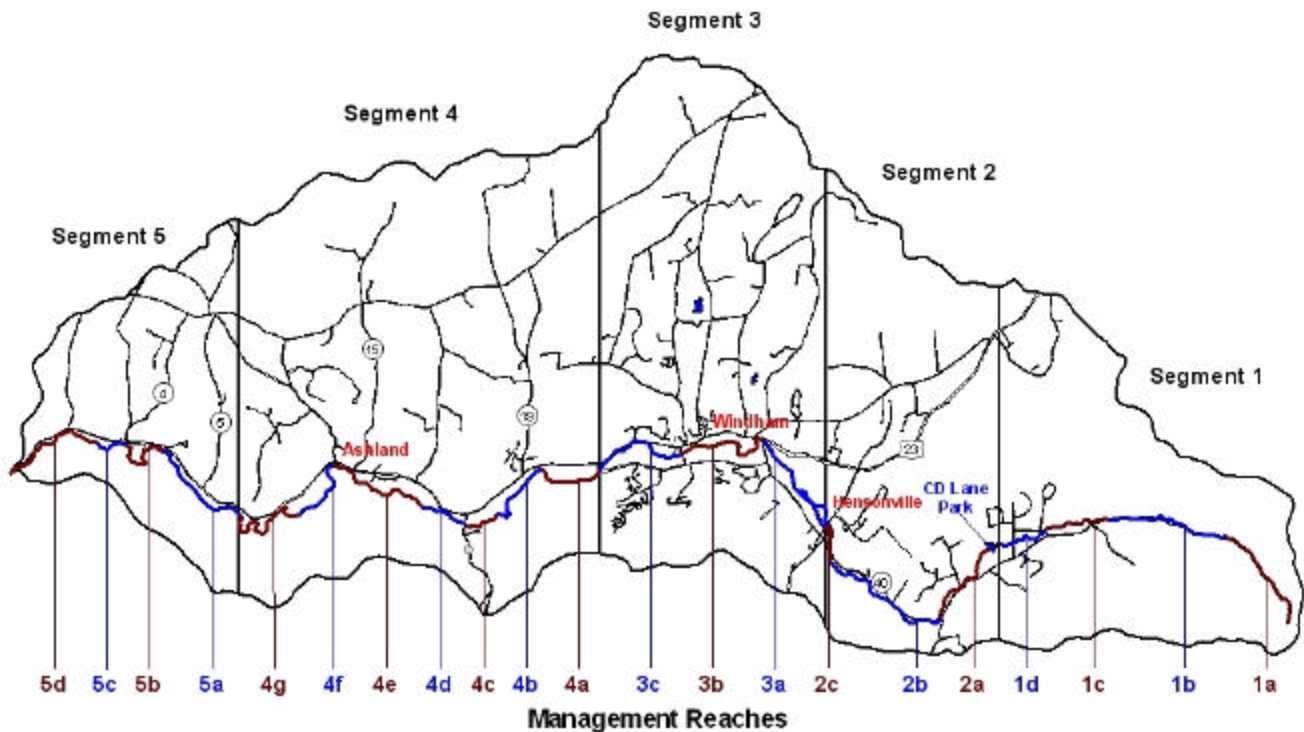
This section provides background information on the Batavia Kill watershed including: regional setting, watershed history, physiography, geology and topography, water resources, wetlands and floodplains, aquatic and terrestrial wildlife, riparian (streamside) vegetation, landuse, population and demographics, infrastructure, flood control structures, institutional resources, and watershed protection programs.

Section V: Batavia Kill Inventory and Assessment

Includes a summary of water quality assessments that have been undertaken over the years in the Batavia Kill and a description of the watershed assessment that was conducted specifically to develop this plan. Initial watershed assessments characterized the physical attributes of the watershed, documented existing hydrologic characteristics, and refined their relationship to turbidity and total suspended sediment. Watershed level assessments consisted of valley morphology, stream order, and multiple hydrological assessments including peak flow, historic flood trends, flood frequency, seasonal flow trends, and bankfull flow. Additionally an inventory of the hydraulic infrastructure including bridges, culverts, and the three flood retention structures was performed.

Section VI: Batavia Kill Reach Summary & Recommendations

In order to effectively communicate general stream characteristics and stability statistics, the Batavia Kill mainstem was divided into five distinct management segments, (1) headwaters to C.D. Lane Park, (2) C.D. Lane Park to CR 65 Hensonville, (3) CR 65 Hensonville to CR 12 South St., (4) CR 12 South St. to Vogatz Property, and (5) Vogatz Property to confluence with Schoharie Creek. To present a more in-depth assessment of current physical condition and recommendations for the stream corridor, each segment was further subdivided into smaller stream reaches. These reaches were delineated using field data collected from 1997 through 2000, including stream classification, cross-section pins, and channel process.



Each stream reach description provides a useful reference detailing the extent of current problems, with specific recommendations for action and references to other sections of the plan where further information can be found. These reach descriptions provide information about; stream channel morphology or shape (i.e., slope, width and depth), general streamside vegetation condition, water quality, infrastructure, flooding issues, habitat and further assessment recommendations. Companion maps show the location of specific features described in the text. Summary tables represent the level of restoration needed to improve or protect stability and lists specific management recommendations.

Users of this SMP should refer to the management reach in which they live, or for which they are responsible for conducting management activities, and work with GCSWCD and our partners to implement recommendations.

Section VII Batavia Kill Restoration Demonstration Projects

In the summer of 1999, the Batavia Kill Project Team initiated the first of several stream restoration demonstration projects to evaluate the effectiveness of using Natural Channel Design (NCD) methodologies on the Batavia Kill. NCD utilizes detailed measurements of existing stable stream reaches which have demonstrated the ability to handle stream flows and the sediment supply produced by their watershed. These stable stream segments, referred to as reference reaches, are used as “blueprints” for restoration, guiding appropriate size and shape of new stream features.



On the Batavia Kill, three sites demonstrating NCD have been completed and other sites have been identified for restoration in future projects. GCSWCD used in-house designers in conjunction with outside consultants to undertake extensive restoration of the streams morphological form. In 1999, 1,600 ft. of stream on Maier Farm and a 3,600 ft. stream reach behind the Brandywine restaurant in Ashland was restored. An additional project was completed in 2002 with the restoration of 5,600 ft. of stream above C.D. Lane Park. The stream’s dimension, pattern and profile were restored to a form more characteristic of stable sections of

the Batavia Kill (as shown below in red), with structures such as rock vanes, cross vanes, and W-weirs, constructed along the stream reach (as shown in photos below). These rock structures are used to reduce shear stress - the force exerted by flowing water on the streambanks.



In addition to stream channel construction, the restoration projects emphasize establishment of deep-rooted, native woody and herbaceous vegetation on the streambanks and floodplains. Roots bind soils in streambanks and resist the force of erosive stormflows. Tree trunks and plant stems slow water flow across the ground, capturing soil, pollutants and excess nutrients. And leaves and branches cool the water by providing shade and increase the food supply with fallen debris. Therefore, vegetation not only enhances the long-term stability of the projects, but also improves habitat for land and water creatures.



Section VIII General Recommendations

The Batavia Kill Stream Management Plan sets forth an extensive list of recommendations, providing a framework for watershed stakeholders to develop a long term management strategy to protect and improve the Batavia Kill. Listed below are selected examples.

Flood Prevention - support development, adoption, and use of new floodplain mapping and regulations; development of a long range management plan for the Batavia Kill flood control structures; and flood damage prevention outreach.

Education and Outreach - development of a detailed education and outreach strategy proposing a variety of stakeholder workshops; school based education programs, monthly newspaper articles, mobile displays, a website focusing on stream management, and installation of interpretive signage at selected stream restoration sites.

Riparian Zone Management - development of landowner incentive programs to encourage participation in riparian buffer protection programs; provide technical assistance to stakeholders; evaluation of existing municipal land use regulations; and research the impact of invasive species on riparian buffers and test management strategies.

Stream Management Activities - promote multi-agency coordination; secure funding for additional restoration projects; and development of detailed, science-based stream management guidelines for those entities responsible for stream activities in the Batavia Kill Watershed.

Water Quality - development and implementation of community-based Stormwater Management Plans; support of GCSWCD critical area seeding program; maximize participation in CWC Stormwater Retrofits Grant Program and Septic System Repair Program; facilitate participation in the Watershed Agricultural Program; and implementation of stream restoration projects which will reduce turbidity locally.

Public Enjoyment - increase public access fishing sites and develop opportunities for multi-use trails along the stream. This would include existing public facilities as well as possible new sites.

Fisheries Habitat - implement fisheries habitat improvement projects as may be identified by Trout Unlimited; evaluate the need for a detailed fisheries habitat assessment; and evaluate fisheries benefits associated with stream restoration projects.

Programmatic Resources - development of task force for review of stream disturbance permit applications; development of guidelines which integrates stream form and function for use during periods of flood response; and evaluation of municipalities existing land use regulations and adoption of stream corridor protection provisions.



An effective riparian buffer zone (above) will have a variety of deep rooted woody trees and shrubs as well as herbaceous plants growing in various zones of the stream corridor, while a riparian buffer zone in poor condition (below) often does not contain the deeper rooted woody plants that are essential for bank stability.



The GCSWCD is working with Windham Mountain to retrofit older development features such as this parking lot to address stormwater quality. Note the extensive rill erosion and loss of sediments.

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