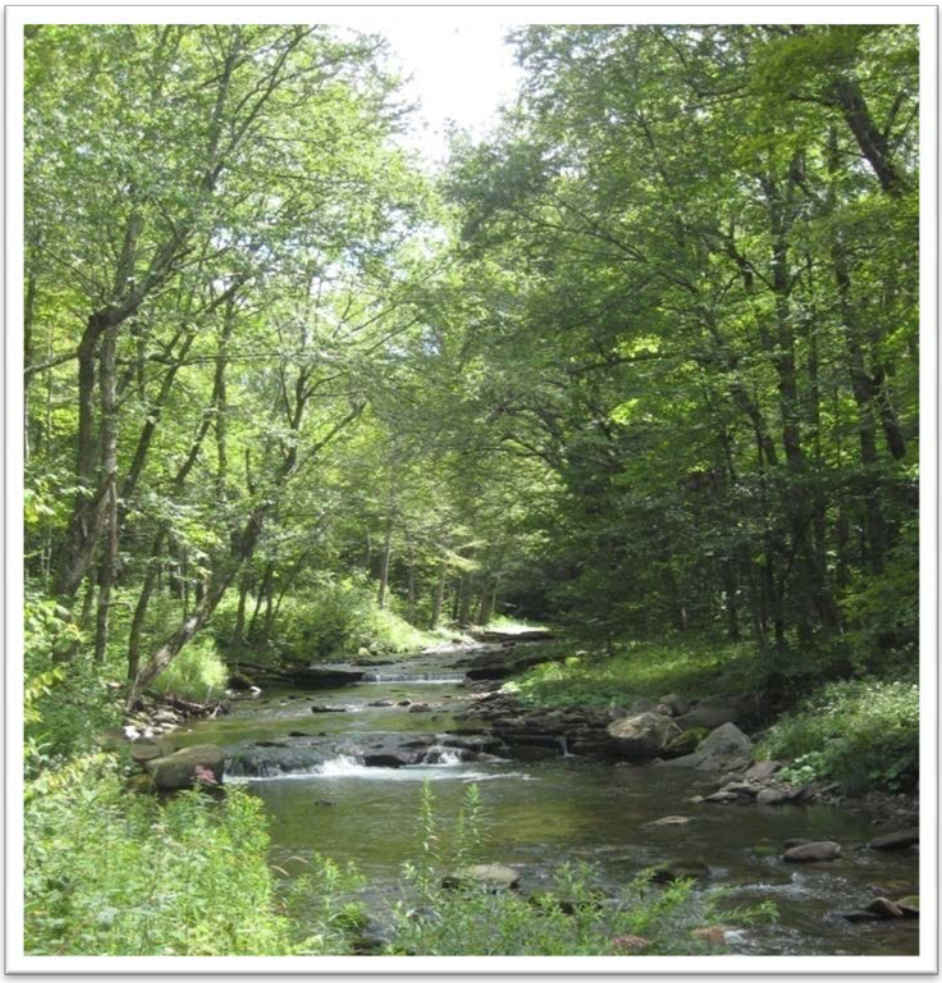
# A Riparian Buffer Program

# Program Development Initiative Report

**May 1, 2013**



Prepared for:

**The Town of Hunter**
**Consistent with**
**Special Condition 29 of the**
**2010 Water Supply Permit**
**to Support a**
**3 Year Pilot Program**

CATSKILLCENTER
conservation creates opportunity


Prepared By:

Nicole Vente -Stream Specialist
&
Alan White – Executive Director

**The Catskill Center**

**Riparian Buffer Program**

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## Table of Contents

## Executive Summary

Special Condition 29 of the 2010 Water Supply Permit (issued by the New York State Department of Environmental Conservation) describes a proposed Riparian Buffer Program ("RBP") that shall be funded by New York City Department of Environmental Protection ("NYCDEP") and is intended to provide permanent land protection to riparian buffers in order to promote water quality in New York City's West-of-Hudson Watershed. This Program Development Initiative Report (PDI Report) serves as a feasibility analysis for the RBP, and includes recommended program methods and procedures, policy recommendations, and landowner incentives for the Program's implementation.

The PDI Report finds that a Riparian Buffer Acquisition Program can likely be designed to satisfy water quality protection objectives in concert with municipal recreation goals, landowner satisfaction, and – critically – the many external rules imposed upon the subject program. Review of several riparian buffer programs from around the country suggests that significant water quality protection can be achieved by acquiring real property interests on riparian lands. Findings and recommendations discussed to foster program success include:

- To accommodate the variety of DEP and landowner objectives, the RBP should be structured as a new land acquisition tool that complements existing DEP land acquisition efforts.
- The scope of the pilot phase of the RBP should be focused within the Schoharie Basin of the New York City Watershed.
- To use a science-based design methodology for individual projects and project areas:
    - using Geographic Information System ("GIS") data, floodplain mapping, and stream geomorphology data sets;
    - incorporating flood hazard mitigation data; and
    - focusing on protecting 100-year floodplains, with the goal of augmenting the protection of watercourses from degradation.
- Program solicitation and priorities should be developed so as to integrate with:
    - Stream Management Plans and Annual Action Plans
    - Local Flood Hazard Mitigation analysis, County All Hazard Mitigation Plans, Catskill Stream Buffer Initiative (CSBI), FEMA Flood Hazard Insurance Maps, and local Open Space Plans and Comprehensive Plans; and
    - USDA's Conservation Reserve Enhancement Program (CREP).
- Negotiating escrow agreements could assist with building contiguous chains of protected buffers because landowners may be more willing to sell once they see their neighbors are willing to commit.
- RBP should explore whether stewardship performed by local land trusts is cost-effective for DEP.

- Ideally, public access on lands acquired would complement local recreational and economic objectives.
- An interim evaluation should be undertaken 18 months into the pilot followed by a comprehensive full-program evaluation at the completion of the three-year pilot program to consider programmatic changes and determine program viability beyond a pilot program.
- It is the recommendation of this report that a pilot phase be pursued to further develop and test procedures, and to evaluate and provide feedback on the continuation of this watershed protection tool.

The Catskill Center for Conservation & Development submits this report to the Town of Hunter with recognition that the RBP is a vital tool that should be integrated with other watershed protection and land acquisition programs.

## Section 2 - Introduction & Objectives

### 2.1 - Introduction

The Town of Hunter, with funding from the Catskill Watershed Corporation's (DEP-funded) Local Technical Assistance Program, has engaged The Catskill Center for Conservation & Development ("CCCD") to draft a Riparian Buffer Program Development Initiative Report ("PDI Report") that will be acceptable to the stakeholder group identified in the Special Conditions section 29b of the New York State Department of Environmental Conservation ("NYSDEC") Environmental Conservation Law (ECL) Water Supply Permit WSA#11,352 ("WSP"). As stated in section 29b: "The goals, acquisition criteria, procedures (including implementing agency), and evaluation criteria for the RBP will be developed into a Report (PDI Report) with full City participation through an intergovernmental cooperative effort (RBP Program Development Initiative [PDI) between the City, Coalition of Watershed Towns (CWT), [the Town of Hunter and Greene Land Trust] and the Catskill Center for Conservation and Development (CCCD) (lead implementing organization) funded by a grant from the Catskill Watershed Corporation (CWC) Local Technical Assistance Program ("LTAP Grant") or, if for any reason the lead implementing organization fails to develop the PDI Report, the City, in either event with the input of a consultative working group including but not limited to NYCDEP, NYSDEC, NYSDOH, CWC, CWT, Delaware County, Greene County, Schoharie County, NRDC, Riverkeeper and NYPIRG."

#### 2.1.1 - Study Phase

A Study Phase was conducted from November 2011 to May 2013 in which The Catskill Center for Conservation & Development (lead implementing organization) met with the members of the consultative Working Group identified in Special Condition 29b of the WSP to discuss programmatic objectives, obstacles, and solutions for a Pilot Riparian Buffer Acquisition Program within the Schoharie

Basin of the NYC watershed. Information was amassed from similar programs across the country and reviewed. Programmatic feasibility was analyzed and this PDI Report was submitted. This report is a contract deliverable and is meant to serve as a basis for DEP to develop the RBP and hire a land trust to implement it. The RBP as developed and described within this PDI Report is a tool that will allow NYCDEP to focus a portion of its land acquisition funding toward protection of the particularly sensitive and dynamic terrain that surrounds watercourses on parcels that are generally not available to, or not likely to be protected by, the existing Land Acquisition Programs. This means targeting properties that would not otherwise be available to existing programs, such as those that are smaller than the minimum size pursued by LAP and those within designated hamlets.

A review process of this PDI Report by the Working Group began in January, 2013. Comments from the Working Group were documented by The Catskill Center for Conservation & Development and integrated as deemed appropriate. The Final PDI Report was submitted to the working group by May 1, 2013. According to the WSP: "The City shall submit to NYSDEC a written recommendation regarding the implementation of the Program no less than 3 months before the implementation deadline" of November 1, 2014.

### 2.1.2 - Goals of the Riparian Buffer Program

Stakeholder objectives for the RBP were catalogued during meetings with the Town of Hunter, the Coalition for Watershed Towns, The New York City Department of Environmental Protection ("DEP"), The New York State Department of Environmental Conservation ("DEC"), County Soil & Water Conservation Districts, The Catskill Watershed Corporation ("CWC"), municipalities, land trusts, environmental organizations, and other watershed stakeholders. A common theme among almost all the involved organizations was that DEP should invest in an additional tool that would focus land acquisition efforts on land most directly related to watercourses. Another theme was to create a conservation tool that would enhance water quality protection without competing with existing DEP land acquisition programs. As a result of these meetings, a list of water quality and other program objectives was generated:

Central Water Quality Objectives:

- To permanently protect streams and adjacent buffer land by fee simple acquisition wherever possible and conservation easement acquisition if deemed desirable on properties that are not likely to qualify for other existing acquisition programs.
- To prevent future development within 100 year floodplains.
- To add permanent legal mechanisms – beyond those that already exist through regulations to protect streams and their buffers from the impacts of development, impervious surfaces, soil disturbance, and erosion due to human activities.
- To protect, promote and allow restoration of native tree cover along stream banks and within buffers for purposes of strengthening banks and increasing the stability of stream channels, capturing soil and nutrients from runoff, and temperature regulation of in-stream water.

- To protect the floodplain from avulsions (sudden separation of land from one property and its attachment to another, especially by flooding or a change in the course of a river) during large storms by protecting/reestablishing deep rooted forested vegetation.

Secondary objectives, in priority order:

- To protect and enhance ecosystem services for local and downstream communities.
- To provide passive recreational opportunities by linking protected areas to public access points.
- To increase landowner knowledge of stream protection options by networking landowners with local Stream Programs and other available resources.
- To determine if and how RBP could serve to permanently protect lands with expiring CREP leases.

### 2.1.3 - Geographic Scope

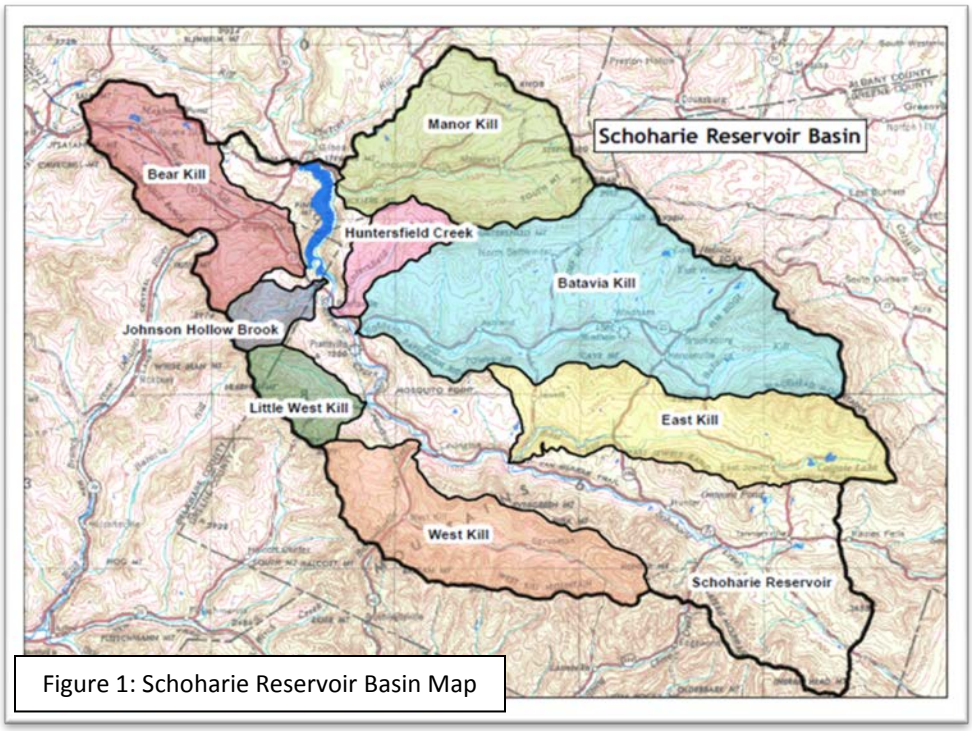

Figure 1: Schoharie Reservoir Basin Map

As this study was commissioned by the Town of Hunter on behalf of the CWT, the study phase was based within the Schoharie Reservoir Basin (Figure 1). The Schoharie Reservoir Basin drains primarily Greene County, but contains smaller portions of Delaware and Schoharie Counties. Threats to water quality in the Schoharie Reservoir Basin are well documented in a series of sub-basin specific Stream Management Plans produced by the Greene County Soil & Water Conservation District ("GCSWCD") in partnership with the DEP.

Many municipalities within the Schoharie Basin have allowed development along dynamic mountain streams, often within floodplain areas. Locating of structures within the floodplain is almost always incompatible with proper floodplain function – and can endanger residents on site and downstream. Many people want to live by streams but they often increase streambed degradation and stream bank erosion by undertaking stream management activities to protect their property from flooding.[1] Increased degradation requires increased stream management activities to protect property from

[1] GCSWCD, et. al. *East Kill Management Plan.* Greene County Soil & Water Conservation District & the New York City Department of Environmental Protection. April 2007. Catskillstreams.org

flooding, creating a cyclical problem. Stakeholders involved with the Stream Management Plans for the Schoharie Basin cited the single biggest concern as controlling the stream within its banks.[2] Natural stream channels size themselves to conduct the 1-2 year return flows; flows larger than the 2-year flood necessarily must use their floodplain.[3] As landowners develop the floodplain and attempt to contain these larger flows within the active channel, banks become destabilized and a loss of riparian vegetation often occurs. The increased velocities that result can ultimately cause the stream to incise, or lower its bed elevation, which has destabilizing impacts throughout the entire stream system, both upstream and downstream. This process lowers the water table which negatively impacts riparian vegetation. A Riparian Buffer Program within the Schoharie Basin can help provide permanent protection to floodplains, slowing the process of erosion and streambed incision, and allowing them to better generate important ecosystem services, as detailed later in this report.

### 2.1.4 - Pilot Phase

According to the WSP: "The City shall cause to be completed the Riparian Buffer Program Development Initiative (PDI Report) Report by May 1, 2013 and a copy provided to NYSDEC." Also, "The City shall allocate initially Five Million Dollars ($5,000,000) of the LAP funds for a program for acquiring Riparian Buffers – in easement or fee as part of a Riparian Buffers Program (RBP) which shall be implemented by November 1, 2014, and run for no less than 3 years thereafter".

According to Special Condition 29f of the WSP: "An evaluation report of the effectiveness of the RBP meeting the requirements of this permit and Filtration Avoidance Determination as well as the goals and evaluation criteria to emerge from the PDI, including recommendations on any proposed changes, if necessary, to improve the program, shall be submitted by NYCDEP to NYSDEC within 6 months before the end of the initial 3 year program." NYSDEC will then "evaluate this program and, after consultation with NYSDOH, NYCDEP, as well as other agencies and local governments, make a written determination on whether or not it should be continued and/or expanded beyond the Schoharie Reservoir Basin. Such written determination shall include addressing NYCDEP recommendations".

### 2.1.5 – Pilot Program Evaluation and Measurement Criteria

It is the recommendation of this report that an interim evaluation should be undertaken 18 months into the pilot followed by a comprehensive full-program evaluation at the completion of the three-year pilot program. It will be the responsibility of the primary contractor to provide necessary information to DEP in order to conduct these evaluations. The evaluations should be written by DEP and submitted to DEC, DOH, and EPA for review.

[2] GCSWCD, et. al. *Schoharie Creek Management Plan.* Greene County Soil & Water Conservation District & the New York City Department of Environmental Protection. April 2007. Section 2.6.7 catskillstreams.org
[3] catskillstreams.org/Stream_Management_Plans.html

The main objective of evaluating the pilot program at the 18-month benchmark is to identify programmatic changes to consider for the remainder of the pilot program including:

- review of the appraisal data to date to evaluate the feasibility of creating a market-book approach;
- solicitation process and response rate.

The main objectives of evaluating the completed pilot program include:

- determining whether the RBP described herein is or is not worth continuing or expanding after the Pilot Phase;
- and if deemed necessary, determining what factors are required to strengthen RBP from a pilot program to a broader watershed program.

The completed program review should include analyses that allow stakeholders – particularly DEP and its regulators – to determine whether the effort is worth the investment of resources. Evaluation criteria should identify how the RBP functions to:

1. ensure a significant number of deals fill gaps in existing land protection programs;
2. best compliment (and not compete with/replicate) existing programs;
3. protect a high proportion of land with sensitive features; and
4. maintain cost efficiency.

1.) Gaps identified in the existing land protection programs (for agricultural land) include:

- Lands not actively farmed
- Land without a whole farm plan
- Parcels under 50 acres in size

Gaps identified in the existing land protection programs (for non-agricultural land) include:

- Any CE under 75 acres in size
- Any Fee under 10 acres in size
- Any CE or Fee in designated village/hamlet areas

2.) The RBP can complement the efforts of existing watershed programs by prioritizing the following parcels:

- Parcels identified by stream management plans
- Parcels that protect existing investments (stream management/restoration/CSBI projects)
- Parcels identified by SMP as critical areas/hazard areas/areas of special concern
- Parcels adjacent to permanently protected land
- Parcels identified by municipalities as recreation goals.

3.) The RBP should aim to conduct projects where a significant percentage of the land acquired contains the following features:

- watercourses

- riparian buffers
- wetlands
- floodplains

4.) The RBP should strive to be cost effective with the following considerations:
    - Program cost and overhead cost should be less than or equal to current programs (WAC, LAP)
    - Analysis of capital cost versus long term carrying cost per acre as compared to current programs
    - Project costs per linear foot of stream indentified as High Stream Management Concern, compared to existing programs

## Section 3 - Functions/Values of Riparian Buffers Protection

### 3.1 – Forested Riparian Buffer

The term *riparian area* has many definitions. The USDA Forest Service defines a riparian area as: the aquatic ecosystem and the portions of the adjacent terrestrial ecosystem that directly affects or is affected by the aquatic environment (figure 2). This includes streams, rivers, lakes, and bays and their adjacent side channels, flood plain, and wetlands. In specific cases, the riparian area may also include a portion of the hillslope that directly serves as streamside habitat for wildlife.[4] Riparian areas serve to buffer sensitive yet dynamic aquatic terrain from environmental or man-made occurrence upland.

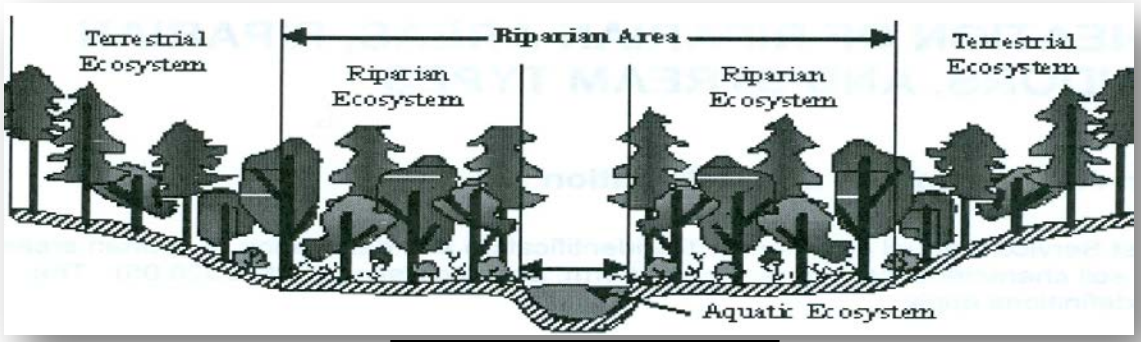


Figure 2: USDA Forest Service

Riparian zones typically comprise a small percentage of the landscape, often less than 1 percent, yet they perform an inordinate number of ecological functions when compared to most upland habitats.[5] These functional areas are often called *riparian buffers*.

[4] USDA Forest Service. 1988. Management of riparian resources within forested landscapes. Riparian Mangement Guide, Williamette National Forest, Pacific Northwest Region, Portland OR.

[5] Fischer, Richard. A and Fischenich, Craig, A. *Design Recommendations for Riparian Corridors and Vegetated Buffer Strips*. U.S. Army Corps of Engineers Ecosystem Management and Restoration Research Program. April 2000.

Figure 3:NRCS

The most effective type of riparian buffer for the purposes of enhancing stream bank stability and reducing risk of bank failure is *riparian forest* (figure 3). A *riparian forest buffer* can be defined as an area of trees, usually accompanied by shrubs and other vegetation, that is adjacent to a body of water and which is managed to maintain the integrity of stream channels and shorelines, to reduce the impact of upland sources of pollution by trapping, filtering and converting sediments, nutrients, and other chemicals, and to supply food, cover, and thermal protection to fish and other wildlife.[6] Riparian forest buffers may vary in size, shape, mix of vegetation, and management objectives; however, they maintain native trees over the long term as a dominant part of their plant communities. Studies have found that forested buffers are highly effective in preventing bank failures but less effective in capturing sediments and nutrients from runoff when compared with grass buffers.[7] Some buffer design schemes call for grassed buffers or level spreaders in upland areas to prevent runoff from forming concentrated flow into riparian areas.[8] However a recent study has shown that a single tree can reduce stormwater runoff by 13,000 gallons per year.[9] Riparian Forest Buffers positively influence the overall health of the environment by filtering sediment, nutrients, and pollution; attenuating downstream flooding by slowing water flow; regulating light and temperature; and stabilizing stream banks and streambeds against erosion. In doing so, they protect adjacent property from environmental damage and may increase property values.[10] They also provide habitat and corridors for terrestrial and aquatic wildlife, recreation areas for residents, and a green screen for privacy.[11] Therefore, it is the recommendation of this report that buffer areas (protected by fee or easement) be allowed to return to native forest cover.

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[6] Palone, S., Roxane, and Todd, H., Albert. *Chesapeake Bay Riparian Handbook: A Guide for Establishing and Maintaining Riparian Forest Buffers*. USDA. 1997

[7] Fischer, Richard. A and Fischenich, Craig, A. *Design Recommendations for Riparian Corridors and Vegetated Buffer Strips*. U.S. Army Corps of Engineers Ecosystem Management and Restoration Research Program. April 2000.

[8] Qui, Z.; Hall, C.; Hale, K.; *Evaluation of Cost-Effectiveness of Conservation Buffer Placement Strategies in a River Basin*; Journal of Soil and Water Conservation, Vol 64, No. 5, September/October 2009.

[9] Plumb, Mike. 2008. Sustainable raindrops: cleaning New York Harbor by greening the urban landscape. Riverkeeper Report. 40 p. http://www.riverkeeper.org/wp-content/uploads/2009/06/Sustainable-Raindrops-Report-1-8-08.pdf. (26 April 2012).

[10] Schueler, T.R. *Site Planning for Urban Stream Protection*. Center for Watershed Protection, Ellicot City, MD 1995

[11] *Strategies for Establishing, Maintaining, and Protecting Lakeshore and Streamside Riparian Buffer Areas*. Upstate Forever.

### 3.2 - Water Quality and Hydrologic Function

The riparian forests buffering our dynamic mountain streams perform many vital functions including, but not limited to:

- Protecting stream banks and floodplains from the erosive force of water by allowing colonization by diverse native woody vegetation,
- Provides floodplain roughness which slows down streamflow velocities as water moves across the floodplain,
- Regulating water temperature changes by providing shade to waterways,
- Providing room for water courses to establish geomorphic stability,
- Maintaining stable stream morphology by allowing natural channel alterations,
- Slowing the rate of runoff from adjacent impervious surfaces,
- Capturing excess nutrients carried from adjacent lands,
- Providing connectivity for wildlife movement across the landscape,
- Providing recreational opportunity by linking protected strips to public access points.

Vegetation intercepts rainfall and slows runoff. A reduction and delay in runoff decreases the occurrence of destructive flash floods, lowers the height of flood waters, and extends the duration of the runoff event. Diverse plant types (trees, shrubs, grasses, herbs), diverse plant ages (young and old), and disturbance-adapted, moisture-loving plants (accustomed to flooding & ice floes) will ensure healthy and functional riparian buffers. Grasses alone are insufficient to maintain bank stability in steeply sloping streams such as in much of the Schoharie Basin. As water courses through the floodplain plants serve as natural filters, trapping sediments, and capturing pollutants.[12] Figure 4 illustrates a riparian forest buffer on the left side of the image, and a grass buffer on the right side of the image within the Schoharie Basin.

Figure 4: GCSWCD

[12] American Rivers. 2003. The value of floods and floodplains. Available of web: http://www.amrivers.org/index.php?module=HyperContent&func=display&cid=1823.

In some studies, it has been reported that effective riparian buffers may reduce as much as 50% of nutrients entering the stream.[13] The ability for riparian buffers to remove pollutants from runoff is influenced by buffer width as well as the density and types of plants present, as grassed buffer perform better than forested buffers at capturing nutrients and sediments. In some cases pollutants such as sediments may experience reductions up to 90%.[14] The role of vegetated riparian buffers in water quality protection and the promotion of stream stability cannot be overstated. Losing 10% of forest cover to impervious surface can double runoff and increase flood frequency as much as 28%.[15,16] In order to maintain healthy, stable streams, we need to maintain a stable stream morphology and vigorous streamside, or riparian vegetation. Stable streams are less likely to experience bank erosion, reduction in water quality and habitat quality.[17]

A floodplain is streamside land that becomes periodically inundated by floodwaters. By absorbing floodwaters, they reduce flood height as well as the velocity of floodwaters, especially when forested. When floodwater is absorbed sediments and pollutants are captured. Often landowners choose to build structures within, or simply modify the active floodplains on their property. The Riparian Buffer Program can function to reduce damage/loss of personal property/public infrastructure by limiting development in these flood prone areas.

It is noted in the Stream Management Plans for the Schoharie Reservoir Basin that overall riparian condition would benefit from enhanced protection and management in many sections of the stream corridor. While some riparian vegetation is present throughout most of the basin, often the size and structure of the buffer (buffer width, plant density, plant size distribution and diversity of plant species) is inadequate to ensure long term protection of each stream. Each Stream Management Plan within the Schoharie Reservoir Basin has developed a series of recommendations regarding riparian buffers. These recommendations address preservation/protection of buffers, establishment or enhancement of buffers and control of invasive species. According to the Stream Management Plans for the Schoharie Reservoir Basin, the GCSWCD strongly recommends that priority be given to efforts that will protect existing functional riparian buffer zones. While quality and continuity of the riparian area within the Schoharie Basin is currently far from ideal, any additional loss of intact riparian vegetation and its buffer function must be avoided. The protection of riparian buffers already benefits from the NYC Watershed Rules and Regulations because they closely monitor development activities within 100 feet of a watercourse and provide an opportunity for discussion with the landowner or

[13] Fischer, Richard. A and Fischenich, Craig, A. *Design Recommendations for Riparian Corridors and Vegetated Buffer Strips*. U.S. Army Corps of Engineers Ecosystem Management and Restoration Research Program. April 2000.
[14] GCSWCD, Et al. *The Batavia Kill Stream Management Plan*. Greene County Soil & Water Conservation District.. Cairo, NY. January 2003
[15] Arnold, C.L. and J. Gibbons 1996, Impervious surface coverage: The emergence of a key environmental indicator. *J.Am. Plan. Assoc.* 62(2):243-258.
[16] Bradshaw, C.J.A., N.S. Sodhi, K.S.H Peh, and B.W. Brook. 2007. Global evidence that deforestation amplifies flood risk and severity in the developing world. *Global Change Bio.* 13:1-17
[17] Neversink River Stream Management Plan. New York City Department of Environmental Protection.

developer on the importance of protecting riparian areas. While large scale rules and regulations exist, the GCSWCD has observed a number of activities that occur on a smaller scale, and generally do not fall under existing regulations. Further, the watershed rules and regulations do not strictly prohibit the removal of riparian vegetation, so they cannot be relied upon alone to do the job of protecting existing vegetated buffers.[18]

### 3.3 - Economic & Other Benefits

Protection of forested riparian buffer provides more than high water quality within the West-of-Hudson Watershed. A network of contiguous protected land along streams retains aesthetic values for landowners and visitors, creates opportunity for promotion of local stream-based tourism, and could provide increased access to recreational trails. A national study found that riparian buffers were thought to have a positive or neutral impact on adjacent property values in 32 of 39 communities surveyed.[19]

#### 3.3.1 - Floodplain Management

Proper watershed management can assist in protecting infrastructure, reduce flood damage and help to develop a stream stewardship ethic. Taken together, all of these benefits can increase the quality of life of watershed residents, while providing high quality drinking water to the residents of New York City into the future. [20]

The destruction of personal property and infrastructure during a flood can greatly impact water quality. The increase in stream disturbance following a flood event as landowners and municipalities attempt to repair damage caused by flooding may contribute additional water quality impacts and destabilizing effects or impacts long after the flood waters have subsided. Historical "planning" or intervention for flooding has emphasized attempts to constrain or

Image: NYSDEC

[18] GCSWCD. Et al. *The Batavia Kill Stream Management Plan*. Greene County Soil & Water Conservation District.. Cairo, NY. January 2003
[19] Schueler, T.R. *Site Planning for Urban Stream Protection*. Center for Watershed Protection, Ellicot City, MD 1995
[20] GCSWCD, Et al. *Schoharie Creek Management Plan*. Greene County Soil & Water Conservation District. April 2007.

control stream channels. These "control" approaches typically result in ongoing maintenance costs that draw valuable community resources away from other projects.[21] Streams are often channelized or armored into highway-like systems. The erosive power created from these management processes requires substantial investment of money and resources and may be counterproductive to stream stability. Property investments that rely on incised channels remaining stable are doomed to fail. Clay sediments under armored areas may be cut away causing an entire reach to fail. There is a commitment to a certain amount of river management in order to protect established communities and infrastructure. In order to provide that commitment areas must be identified to dissipate that energy elsewhere. The RBP can act as a tool to preserve and restore naturally functioning floodplains and release landowners and municipalities from the vicious cycle of control, rebuild, and maintain.

Frequently, "flood control" measures involve dredging (i.e., removal of bedload sediments –gravel and cobble—deposited by the stream during or following large flood events) with the objective of lowering flood elevations through developed areas. The establishment, through floodplain acquisition/easement, of natural bedload depositional areas in key locations throughout the river network can significantly reduce the likelihood of bed aggradation and the higher flood stages associated with it in areas where it poses more risk to property and infrastructure. These "bedload preserver" zones would also store large woody debris, which likewise can pose a risk to roads and bridges.

### 3.3.2 - Stream Access for Recreation

Contiguous strips of undisturbed forest buffer are ideal to maximize watershed ecosystem function, hold streambanks and floodplains together and reduce flooding potential. Protection and restoration of this contiguous network of riparian lands, and the associated water quality and flood protection, is the primary goal of this program. However, with proper reviews and approvals, these protected lands may also provide opportunities for stream-based recreation and tourism throughout the watershed, as long as the recreational infrastructure does not significantly degrade the bank stabilizing function of the forested buffer. Recreation is not a main goal of the RBP, but certainly a secondary benefit where possible to incorporate. Functional riparian areas that protect and enhance the fishery could benefit the economy and aesthetic values of the region.[22] The Catskill Forest Preserve Public Access Plan calls for improving access to fishing sites, linking trail systems, and pursuing trail linkages between communities and to New York City watershed lands. [23]

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[21] GCSWCD, et al. *The Manor Kill Stream Management Plan*. Greene County Soil & Water Conservation District, NYCDEP Stream Management Program, Schoharie County Soil & Water Conservation District, Schoharie County Planning & Development. Cairo, NY. January 2009

[22] GCSWCD, et. al. *Schoharie Creek Management Plan.* Greene County Soil & Water Conservation District & The New York City Department of Environmental Protection. April 2007. Section 2.6.7

[23] *The Catskill Forest Preserve Access Plan*. NYSDEC & NYSDOT. August 1999. New York.

Research conducted within the Schoharie Reservoir Basin uncovered a network of existing parks and preserves that could be greatly improved with riparian linkages between trails. Currently, the Greene County Trail Based Recreation Plan (GCTRP) is being compiled by Elan Planning, Design & Landscaping in partnership with Alta Planning & Design to amass data and provide GIS mapping of the trail based protected spaces (parks, preserves, fishing easements) within Greene County. Non-motorized passive recreation such as walking, hiking, fishing, and mountain biking can be compatible land uses with water quality protection within the forest buffer. A GIS map of these recreational assets is scheduled to become available by June of 2014. Using GIS layers of existing recreational assets will allow the Riparian Buffer Program to highlight key projects that will accomplish water quality protection objectives as well as link trails or provide access to featured streams.


Image: Jen Greiser

The Riparian Buffer Program is supported by a group of municipalities that have an interest in promoting "Greenways" for public recreational access. Providing permanent protection to riparian buffers will not only protect water quality, but can also provide open space for year-round passive recreation. In terms of the RBP, passive recreation is defined as non-motorized access such as walking, hiking, fishing access, and biking. Permeable walking/biking paths may be constructed through partnerships with the City, municipalities, and local non-profit groups on City owned lands as well as with consent of land owners on conservation easement properties. Water quality must remain the primary function of the buffer, but with proper design passive recreation can be a compatible use that can promote tourism and local economies. Trails should be carefully designed and located so as not to compromise the stability of stream banks and channels during flood events. Proper trail design e.g. excluding long sections of parallel trail within the 10 year floodplain should be of the utmost importance within the RBP. At the request of several stakeholders, we recommend that DEP consider (1) limited motor vehicle use within the model CE provided that such use is consistent with water quality protection objectives, including whether such access should be restricted only to allowed uses within the CE, (2) whether to allow snowmobiles in specified areas and under specified conditions (such as connecting the trail within the CE with publicly-available snowmobile trails outside the CE), and (3) whether such provisions should apply to every CE or be decided case-by-case.

The Town of Hunter has expressed interest in promoting a linear park that would link the Village of Hunter with the Village of Tannersville using the riparian corridor. As part of the GCTRP, trail extensions are also proposed for many areas throughout the Schoharie Reservoir Basin within areas that are riparian in nature.[24] The Town of Prattsville has mapped desired trails within the floodplain that link points of interest within the town. Currently, the New York State Department of Environmental Conservation administers Public Fishing Easements throughout the Schoharie Reservoir Basin. An additional desire of the Greene County Trail Based Recreation Plan is to link trails associated with natural resources to those of historical and cultural resources. Many historic and culturally significant properties were settled along dynamic Catskill Mountain streams. The Riparian Buffer Program can work to link protected properties (or those expected to be protected). Municipalities may provide a key role in garnering landowner support for riparian buffer protection that provides recreational access. Commercial properties may be a vital target for linking recreational trails. Local businesses can be positively affected by increased tourism. For example, a local restaurant may experience increased business with a trail stretching through their property. In addition, local businesses may not experience the same infringement of privacy that a landowner of a small residential parcel might experience with the addition of a recreational trail on their property.

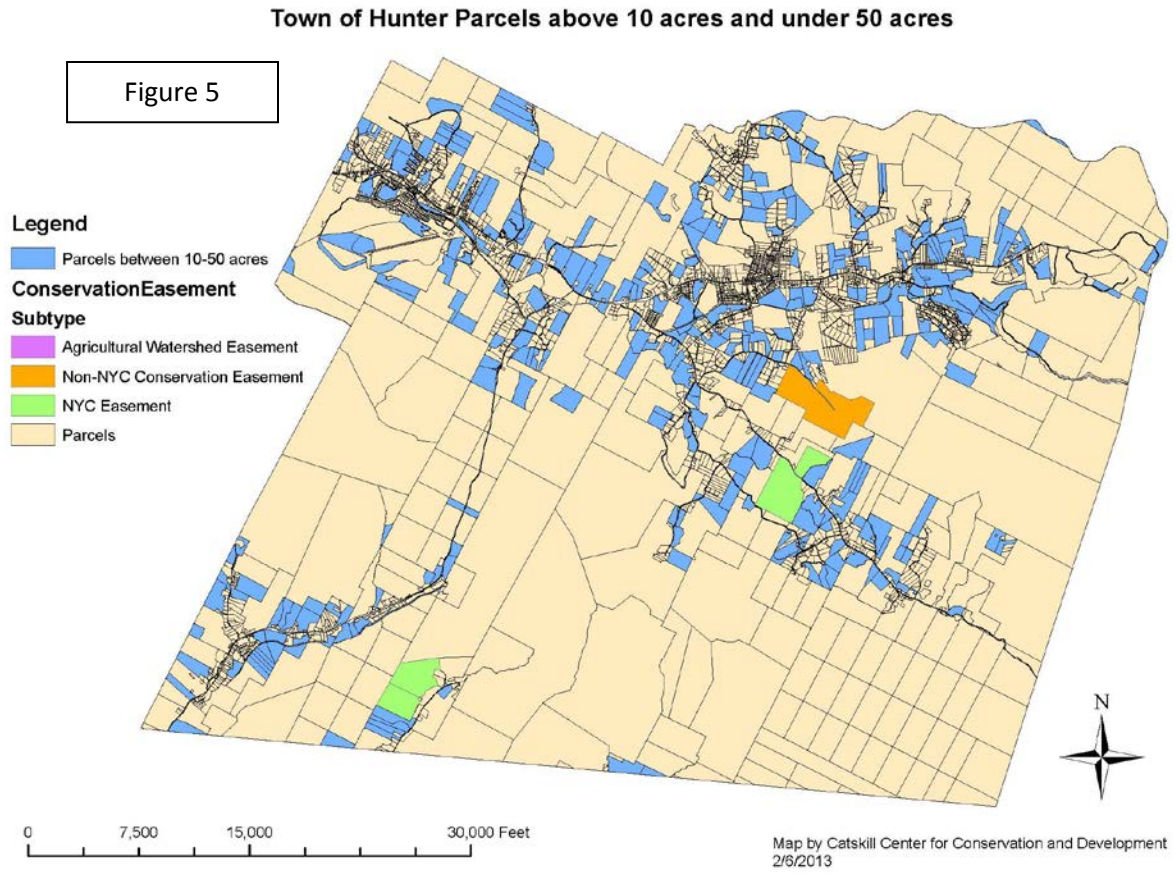
[24] Greene County Trail Based Recreation Plan. Alta & Elan Planning.

## Section 4 – Acquisition Criteria

### 4.1 Pilot Program Acreage Focus

It is the recommendation of this report to focus pilot program funds on streamside parcels between 10 and 50 acres in size, with the exception of vacant parcels less than 10 acres explained in the next section of this report. Based on the test appraisal data detailed later on in this report and the costs associated with site assessment for each parcel, cost-effectiveness directs the focus of the pilot program toward parcels between 10 and 50 acres in size. A GIS map analysis of the number of streamside parcels between 10 and 50 acres in the Town of Hunter produced 122 results, highlighted in blue (Figure 5). These maps were produced for all other towns in the Schoharie Basin with the following results; Ashland: 62, Conesville: 29, Gilboa: 42, Jewett: 112, Lexington: 104, Prattsville: 61, and Windham: 115. These maps can be found within the appendix of this report. Using this data we totaled the number of streamside parcels between 10 and 50 acres within the Schoharie Basin at ~525. Only portions of these towns/villages located within the NYC West-of-Hudson Watershed will be eligible for this program. It is the recommendation of this report that maps be scrutinized for accuracy, and an overlay of designated hamlet areas be generated as a first step of the pilot program and all parcels identified by the acreage focused mapping be solicited by letter.

Figure 5



### 4.1.1 Vacant Parcels Under 10 Acres.

DEP-funded acquisition of real property interests on single parcels – or multiple parcels together – that total less than ten acres in size is prohibited by the 1997 MOA and the 2010 WSP within the watershed (unless a town has formally waived this restriction). However, the WSP provides that RBP is exempt from this minimum size requirement. The WSP dictates that towns with designated hamlet areas will be required to opt in to the RBP in order to be eligible. Acquiring the entirety of vacant, streamside parcels under 10 acres in size, compared with acquiring ten-acre (or smaller) portions of parcels, would reduce acquisition costs by eliminating staff time in the design component as well as tasks related to design, surveys and approvals of subdivisions. Likewise, acquiring small easements on the entirety of a tax lot or lots is much more efficient in terms of both up-front staff time and long-term stewardship costs than acquisition of easements on portions of tax lots, since it obviates certain monitoring difficulties inherent in the latter designs.

Small, vacant parcels, when adjacent to high order streams, may contain a high proportion of active or historic floodplain. In these cases, development may present greater risks to water quality. Project configurations – whether for acquisition in fee simple or easement - should ensure that floodplains retain water quality function and serve to protect existing development downstream. As a secondary benefit, protecting these parcels can allow them to act as corridors to build networks of forested riparian buffer trails if the local community is interested. Figure 6 displays vacant streamside parcels under 10 acres within the Town of Hunter. It is the recommendation of this report that the Pilot Phase of this program should include working with the Town of Hunter to compare the location of these small vacant streamside parcels with existing maps of recreational assets that exist or are desired within the town. Key parcels could be identified in order to link existing trails, natural resources, or historical/cultural assets. Outside of designated hamlets, the pilot phase of the RBP will limit participation to parcels under 50 acres in size, in order to reduce direct competition with NYCDEP's current Land Acquisition Program (within designated hamlets where the town "opts in" to the pilot, the RBP can pursue properties of any size because there is no conflict). These parcels should be mapped and solicited as a first step of the pilot program.

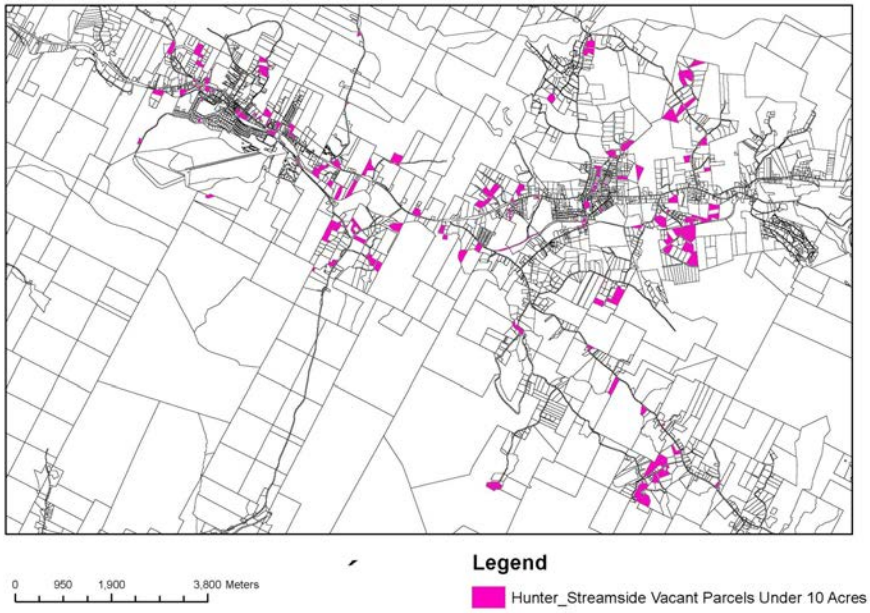



Figure 6: Vacant Streamside Parcels under 10 acres
Town of Hunter

### 4.2 Prioritization Using Stream Characteristics

Following solicitation by letter, a series of sub-basin workshops/outreach events should be led by the primary contractor in partnership with DEP, Soil & Water Conservation Districts, local stream management programs, and municipalities to familiarize landowners with RBP and garner participation. The 18-month evaluation of RBP will analyze this landowner response rate after letters are received and outreach events take place.

It is unclear what percentage of landowner response can be expected from the first round of solicitation. Projects should move into design phase and appraisal stage at a first-come first-served basis in the order that interest was received from solicited landowners. In the event that landowner response overwhelms staff capacity or program funds the following ranking system to determine priorities for project design, and selection of qualifying parcels to appraise should be used. There are many stream-related and anthropogenic factors to weigh when determining which tax lots or areas within tax lots would be most beneficial to protecting water quality. If it becomes appropriate to use this ranking tool stream management programs and Soil & Water Conservation Districts should plan to work cooperatively with the primary contractor to have a ready-to-use tool in 3-6 months.


Figure 7: Route 42 along the West Kill
© google maps

In order to rank particular parcels or reaches this report recommends creating GIS maps that identify “reaches of high stream management concern”. These include 1) high-integrity reference reaches, 2) reaches with intact and connected floodplains whose location in the stream network makes them valuable as floodwater and bedload storage areas, 3) reaches at risk from flood hazards, 4) sediment source areas, 5) reaches with development potential, and 6) reaches near mouths of tributaries. Any parcel identified under

this designation will receive a certain number of points, detailed in figures 9 and 10 below. It is the recommendation of this report that if a project ranking system becomes necessary, the pilot program primary contractor work with DEP-SMP as well as GCSWCD to map the Schoharie Basin and identify areas of "high stream management concern".

Many of the areas of "high stream management concern" listed above have already been identified in the Schoharie Basin Stream Management Plans (Phase V: Watershed Reference Conditions) and are listed as "*reference reaches*", floodplains with storage potential, erosion hazard zones, and sediment source areas. A reference reach is characterized by low erosion rates, effective riparian buffers, and good habitat conditions, and typically exhibit a high degree of stability.

High priority reaches include those whose floodplains are operating as "pressure relief valves" within the system during flood events, storing both floodwaters and bedload. Permanent protection of these ***critical floodplains*** at key locations will dramatically increase the stability of the stream network downstream. The ability of floodwater to access functional floodplains in undeveloped areas reduces the risk of inundation in developed areas downstream, and mitigates the threats of contamination from activities there. Properties that include critical floodplains should receive high priority for solicitation and acquisition within the pilot program. Examples of these critical floodplains have been identified within the Schoharie Basin by Greene County Soil & Water Conservation District and include but are not limited to the following areas: Rte 42 along the West Kill (Figure 7), midsection of the Manor Kill, and Thompson House 296 & 23 along the Batavia Kill.

Reaches in ***flood hazard zones*** should also be considered high priority areas for solicitation and acquisition during the pilot program. Flood hazard zones include both a) low-lying developed sites, susceptible to inundation and which represent a source of water quality contaminants from homes and businesses during floods, and b) undeveloped sites whose location in the stream corridor puts them at high risk of erosion. During flood events, these areas often experience property damage, bank destabilization, and pollutant loading. The ability to limit human development in these areas may significantly reduce water quality impacts during flood events. Incorporating a flood hazard mitigation component to the toolbox of the program may help eliminate threats to water quality from riparian development and infrastructure failure during flood events. There are isolated success stories from buyout and flood prevention programs in past years such as in the Town of Walton and in the Town of Middletown. Riparian Buffer Program funding can potentially assist in long-term redesign of flood prone areas that are not identified by a disaster declaration, but may require long term protection.

Reaches that run through or directly adjacent to known glacial deposits with high concentrations of fine sediment are disproportionately responsible for creating turbid conditions during higher flows. Acquisition of these ***sediment source reaches*** is a priority to prevent land and channel management practices that exacerbate entrainment of these fine sediments.

Buffers are most effective when they are contiguous, so guidelines for buffer widths recommend that long, continuous buffer strips should usually be favored, although fragmented strips of greater width may be acceptable. [23] The effort to secure continuous buffers would be directed both at individual projects and multiple projects (i.e., so as not to create gaps in protected buffer either within a project or between projects). "Nick points" (gaps in vegetation along the bank that can channelize runoff into the river and effectively negate the effect of surrounding buffers[24]) should be considered a priority for project development within the pilot program. A system of prioritization should be developed during the first year of the pilot program that will aid the RBP in acquiring continuous buffer strips along water courses. Continuous buffers will not only help achieve water quality protection goals, but will also enhance multiple recreation goals. Therefore, municipalities may be able to help identify a "willing seller network" among landowners to encourage contiguous participation in the program. Acquiring deeds in escrow can provide the time needed to secure properties from hesitant or hold-out landowners (or to avoid purchases that are not useful without key parcels). The escrow concept allows deeds to be held until/unless critical neighboring properties are also acquired, at which point the deeds are recorded. Such escrow acquisition may be aided through community presentations and implementation of additional incentives.

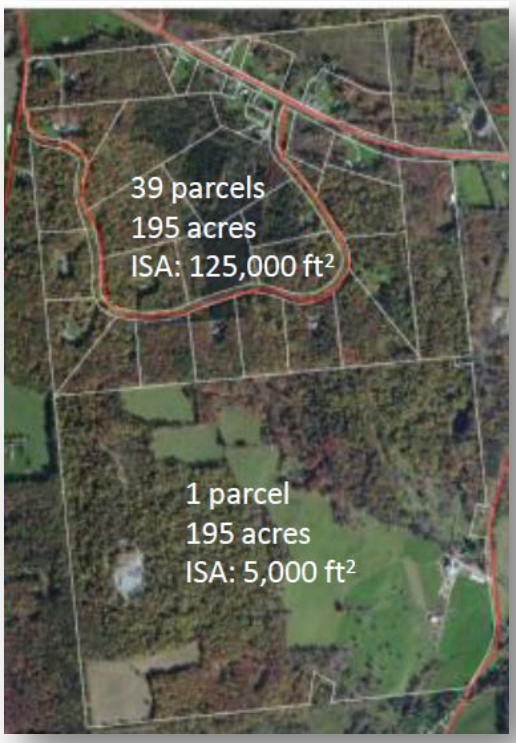



Figure 8: Subdivision Implications

Riparian buffer areas that may not be classified as high stream management concern within the existing stream management plan, yet retain some water quality function and are at risk for future development, should be considered a priority for project development within the pilot program.

Larger parcels (with streams) that may be further subdivided and developed according to local regulations may pose detriment to water quality and are defined as "areas with development risk". In the Catskill/Delaware Watersheds, each new subdivided parcel adds an average of 3,200 square feet of impervious surface area within 20 years[25] (figure 8). In order to minimize water quality risks associated with impervious surface parcels with development risk should be considered higher priority than "sub-size" parcels that are not allowed to

[23] Fischer, R.A. and Fischenich, J.C. 2000. Design recommendations for riparian corridors and vegetated buffer strips. U.S. Army Engineer Research and Development Center, Environmental Laboratory. Vicksburg, MS.
[24] Hawes, Ellen. And Smith, Markelle. *Riparian Buffer Zones: Functions and Recommended Widths.* Eightmile River Wild and Scenic Study Committee. 2005.
[25] Anderson, N.M., R.H. Germain, and M.H. Hall. 2012. An assessment of forest cover and impervious surface area on family forests in the New York City Watershed. *North J. Appl. For.* 29(2): 67-73

be further subdivided and/or developed under local regulations. Conditions exist in which these sub-code parcels may still pose significant risk to preserving water quality despite development restrictions. Commercial properties that have existing unused capacity or that might be particularly vulnerable to a 'nick' are examples of two situations that must be considered. Therefore, it is the recommendation of this report that parcels between 10 and 50 acres that are easily sub-dividable should be considered as higher priority as a general rule, with exceptions for smaller properties that may pose significant risks to water quality. Acquisition of smaller properties to form a contiguous corridor can be difficult, especially through residential settings with many small parcels, but might generate important benefits.

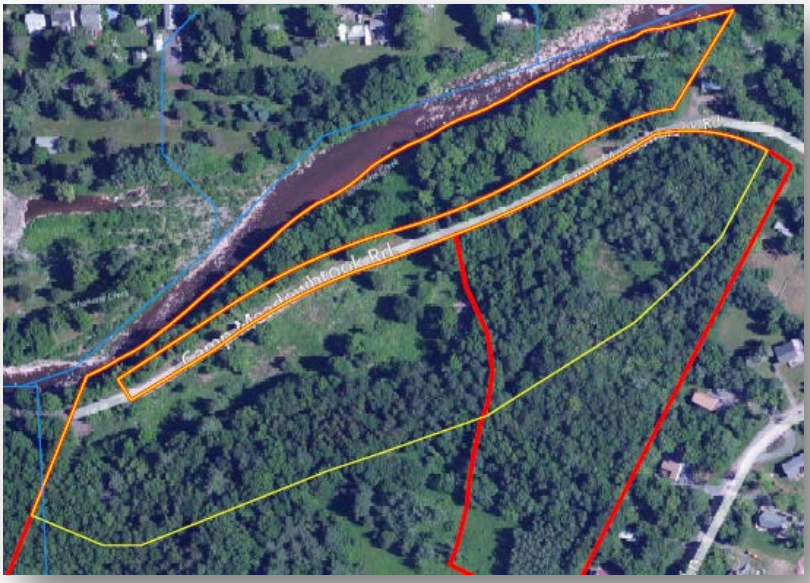


Figure 9: Roadside Buffer

Roadside ditches or gutters tend to prevent sheet flow; since most roads are crowned, they effectively act as secondary watercourses (Figure 9). Roads may also act as point sources of pollution. Poorly planned road drainage may destabilize steep hillsides and become a major source of fine sediment in many catchments. Therefore, thin riparian buffers with roadways or piped outfalls from roadside ditches cutting through, may provide less water quality benefit. These areas should not be considered a priority for acquisition within the pilot program unless acquisition makes sense within the context of a larger project, and/or could be coupled with stewardship efforts that ensure buffer integrity and function. Adequately vegetating these buffers through restoration projects may allow them to collect, detain, and infiltrate road drainage. Failure to restore and permanently protect these areas may result in repetitive costly damage to roadways and infrastructure for landowners and municipalities.

Due to the vagaries of existing tax parcel boundaries and patterns, the buffer design process proposed herein may yield projects containing "riparian buffer" but not contain portions of, or are not adjacent to watercourses.

### 4.3 Project Ranking System

This proposed system to rank properties was developed using stream characteristics and a point-value system in the event that response rates overwhelm the program staff or program funds available (see Figure 10). Although just an example, implementing a system such as this (to be further refined by DEP and the primary contractor), will allow properties to be ranked against each other. Once landowner interest is expressed, a project must be designed. The design will depend on reaching agreement between objectives as viewed by the landowner and the program. Once a design has been agreed to, a system is needed to appraise a project based on the design. Projects that move through the design process will then be ranked for appraisal. A ranking system for projects to go into appraisal is illustrated in Figure 11.

FIRST SOLICIATION, PILOT PROGRAM

| POINTS | Buffer Acreage | POINTS | 100-Yr Floodplain | POINTS | SMP FOCUS | POINTS | Mapped Watercourse |
|---|---|---|---|---|---|---|---|
| | *(Acres)* | | (% Acreage of Parcel) | | (Linear Feet, Both Banks) | | (Linear Feet, Both Banks) |
| 10 | 50+ | 10 | 75-100% | 10 | >1000 | 10 | >1000 |
| 9 | 35-49 | 9 | 50-74% | 9 | 900-999 | 9 | 900-999 |
| 8 | 31-34 | 8 | 35-49% | 8 | 800-899 | 8 | 800-899 |
| 7 | 26-30 | 7 | 21-34% | 7 | 700-799 | 7 | 700-799 |
| 6 | 21-25 | 6 | 15-20% | 6 | 600-699 | 6 | 600-699 |
| 5 | 15-20 | 5 | 10-14% | 5 | 500-599 | 5 | 500-599 |
| 4 | 10-14 | 4 | 6-9% | 4 | 400-499 | 4 | 400-499 |
| 3 | 6-9 | 3 | 4-5% | 3 | 300-399 | 3 | 300-399 |
| 2 | 4-5 | 2 | 3-4% | 2 | 200-299 | 2 | 200-299 |
| 1 | 2-3 | 1 | 2% | 1 | 100-199 | 1 | 100-199 |
| 0 | <2 | 0 | <2 | 0 | <100 | 0 | <100 |

Figure 10 – design ranking system

APPRAISAL ROUND 1

| POINTS | WILLING LO | POINTS | Configuration | POINTS | GREENWAY | POINTS | CONTIGUITY |
|---|---|---|---|---|---|---|---|
| | (Acres) | | | | | | |
| 10 | FEE | 10 | Includes >75% Water Features | 10 | As-Of-Right | 10 | Abuts, strong connection |
| | | 8 | Low Boundary-to-Area Ratio | | | | |
| | | 6 | No Outparcels | | | 6 | Abuts, weak connection |
| | | 4 | No Orphans | | | | |
| 3 | CE | | | 3 | Grantor Approved Req'd | | |
| | | 2 | No Right to Pass Through | | | 2 | Doesn't abut |
| 0 | Neither | | | 0 | None | | |

Figure 11 – appraisal ranking system

## 5 - Designing the Forested Riparian Buffer

### 5.1 - Buffer Design

Several scientific papers focusing on riparian buffer design were analyzed for the purpose of this report. The recommendations derived herein were cross-referenced with experts in the field in New York and Vermont. The data compiled throughout the research process supports a three-zone design model for designing the area needed to protect and maintain a forested riparian buffer. This three-zone system allows adequate flexibility between landowner objectives and water quality goals.[25] The design system (diagram available in the appendix of this report) is recommended in both *Strategies for Establishing, Maintaining, and Protecting Lakeshore and Streamside Riparian Buffer Areas*, a paper produced by the non-profit organization Upstate Forever, as well as *The Chesapeake Bay Riparian Handbook: A Guide for Establishing and Maintaining Riparian Forest Buffers,* produced by the USDA .

A breakdown of each of the forested riparian buffer zones, their recommended widths, and water quality attributes are listed below with portions cited from *Strategies for Establishing, Maintaining, and Protecting Lakeshore and Streamside Riparian Buffer Areas* and *The Chesapeake Bay Riparian Handbook: A Guide for Establishing and Maintaining Riparian Forest Buffers* (USDA). These zones will be defined (for each eligible property within a target area whose owner expresses interest), and then used to create a project design that best meets the goals of the RBP. The zones can be described as follows:

***Zone 1*** *(the* ***Streamside Zone****)*

Zone 1 is located in the near stream portion of the buffer, stretching upland from the edge of the stream. It can be measured from the normal water line or at the upper edge of the active channel.[26] It's primary purpose is to stabilize the stream bank and provide habitat for aquatic organisms. The roots of trees in Zone 1 are particularly important in that they are the first line of defense to hold soil from the erosive forces of flooding water, and also keep sediment and nutrients bound and out of the stream. Roots and fallen logs in this zone tend to slow the flow of water. The leaf canopy of the trees provides shade that helps to control water temperature. Maximum summer temperatures in a deforested stream may be 10-20 degrees warmer than in a forested stream, which is significant because temperature changes of only 4-10 degrees usually alter the life history characteristics of macroinvertebrates that form an important part of the food web. While Zone 1 will improve habitat along streams, its greatest impact will be along smaller streams where the canopy completely covers the water surface, providing maximum control over light and temperature conditions. Trees in Zone 1 will aid in filtering surface runoff and, in some landscapes, can help remove nutrients carried in the groundwater. [27] A minimum

[25] Palone, S., Roxane, and Todd, H., Albert. *Chesapeake Bay Riparian Handbook: A Guide for Establishing and Maintaining Riparian Forest Buffers*. USDA. 1997

[26] Natural Resources Conservation Service Conservation Practice Standard. Riparian Forest Buffer (Acre) Code 391. NRCS-Minnesota.

[27] Palone, S., Roxane, and Todd, H., Albert. *Chesapeake Bay Riparian Handbook: A Guide for Establishing and Maintaining Riparian Forest Buffers*. USDA. 1997

width for Zone 1 (the streamside zone) is 25 feet but may be extended to include any adjacent wetlands or critical habitats.

***Zone 2*** *(the* ***Middle Zone****)*

Zone 2 (The Middle Zone) is located immediately upslope from Zone 1 (the streamside zone). It's primary function is to remove, transform, or store nutrients, sediments and other pollutants flowing over the surface and through the groundwater. In areas where shallow groundwater flows through the root zones of the trees, large amounts of nitrate can be removed before the water enters a stream. This results primarily from plant uptake and denitrification in soils. Nitrate removal in these areas can be high- on the order of 90 percent. In areas where the groundwater flows much deeper, much of this benefit will be lost as most of the water bypasses the root zone and enters the stream directly through the sediment. Regardless of whether shallow groundwater flows through the root zones, all Zone 2 forest buffers will remove surface-borne pollutants. Debris from the trees slows and traps sediments in the runoff, giving the nutrients they carry time to infiltrate into the ground where they may be stored or removed through natural processes. Studies have found that Zone 2 can remove 50-80 percent of the sediment in runoff from upland fields. Whether they are pulled from shallow groundwater or infiltrate into the soils from surface runoff, nutrients are removed in Zone 2 through a variety of mechanisms. The most obvious process is plant uptake, as all plants must absorb nutrients to grow. In addition, forests provide large amounts of decaying organic material necessary to fuel the microbial processes in Zone 2 soils that remove nutrients. [28] The recommended minimum width for Zone 2 is 100 feet or the entire width of the 100-year flood plain, whichever is greater. Additional extensions are recommended at 4 feet additional width for every percent increase in adjacent land slope above 5%. An additional extension may include any adjacent land with a soil types high in clay.[29]

***Zone 3*** *(the* ***Outer Zone****)*

Located immediately upslope of Zone 2 (the middle zone), Zone 3 contains grass filter strips or other control measures which help slow runoff, filter sediment and its associated chemicals, and allow water to infiltrate into the ground. Grass filter strips help to protect the wooded areas and set the stage so the forest buffer can perform at its maximum potential. Effective sediment trapping in Zone 2 requires that runoff entering that portion of the buffer be in the form of sheet flow. Zone 3, therefore, acts to spread out the flow and prevent runoff from adjacent land uses from eroding channels into the buffer. Several studies show that grass filter strips are highly effective at reducing sediment runoff, with removal rates of 50 percent or more. Also, the filter strips are highly effective at removing sediment-bound nutrients such as phosphorus, but less effective at removing dissolved nutrients. Over time, the removal efficiency decreases as grass is smothered by deposited sediment. Generally, the narrower the filter strip, the shorter its effective life.

[28] Palone, S., Roxane, and Todd, H., Albert. *Chesapeake Bay Riparian Handbook: A Guide for Establishing and Maintaining Riparian Forest Buffers*. USDA. 1997

[29] Hawes, Ellen. And Smith, Markelle. *Riparian Buffer Zones: Functions and Recommended Widths.* Eightmile River Wild and Scenic Study Committee. 2005.

## 5.2 – Riparian Buffer Design: application and mapping

It is the recommendation of this report to use the design system highlighted above as the ideal base for each project whenever possible. However, for compelling projects where a small portion of the buffer is not included in the tax lot, or is too close to improvements, the RBP should reserve the right on a case-by-case basis to include small sections of buffer that do not meet the 150 foot minimum supported in the literature. The three-zone design system will be mapped onto each reach of stream and each specific tax parcel using Geographic Information Systems (GIS) software.

Tax parcel configurations, stream layers within each basin, FEMA designated floodplains, and slope calculations allow for site specific design of defensible riparian buffer projectss. To create this buffer map each of the three zones was measured, relevant extensions were included based on our design criteria and all zones were combined to form one hatched area within the tax parcel (figure 12). Once the method to determine buffer width has been applied to specific parcels, 'grounding' is needed in order to straighten boundaries and move them onto fences, rock walls, or other such features as available for ease of survey, delineation and long-term stewardship. The 'grounding' of boundaries results in a completed design for use in appraising the easement or fee acquisition area. When entire parcels are acquired in fee simple or under CE, buffer design component is not necessary (although maps are still required). A comparison of several completed buffer designs, used in the test-appraisal process can be found in the section below.

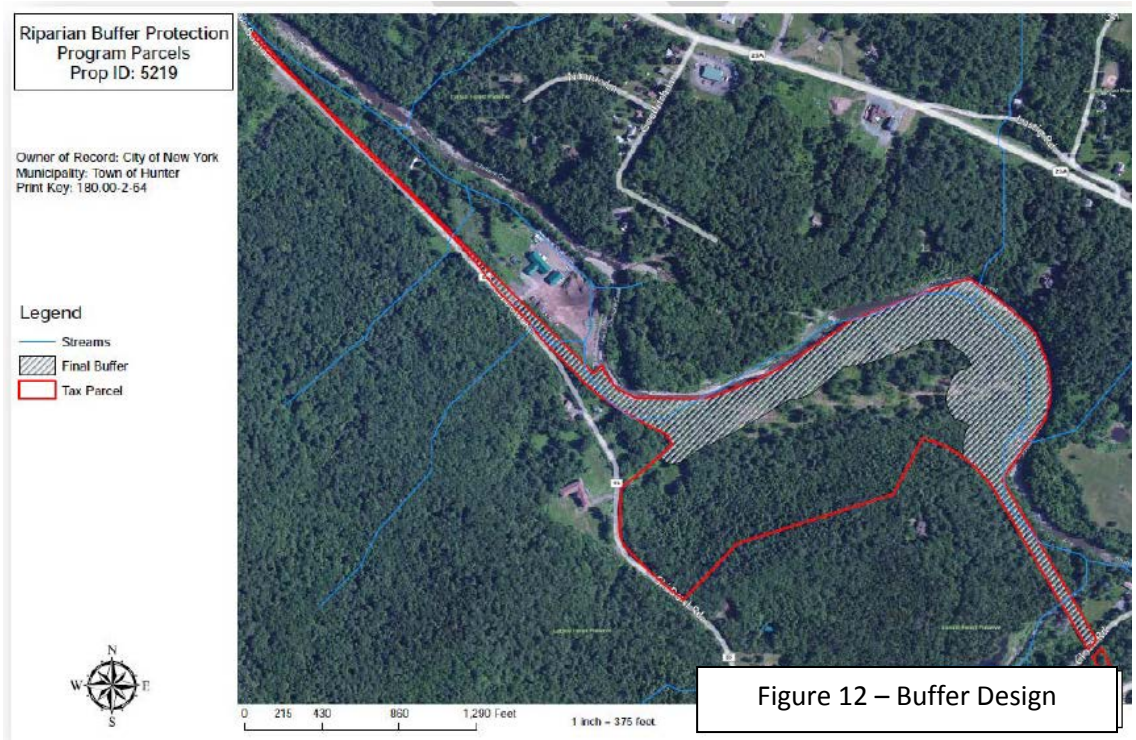



Figure 12 – Buffer Design

### 5.2.1 – Test Parcel Design

A number of parcels were selected to test the design process explained above. Each parcel has already been acquired through NYCDEP's current method of land acquisition. Each tax parcel was imported to GIS and 3-zone design system was applied to each. Figure 12 illustrates a completed buffer design on test parcel #5219. In the case of test parcel #5219, the 3-zone design resulted in a jagged buffer boundary, which would present survey and monitoring obstacles. Figure 13 illustrates the final configuration that was created following 'grounding' of the boundaries from the original buffer design.

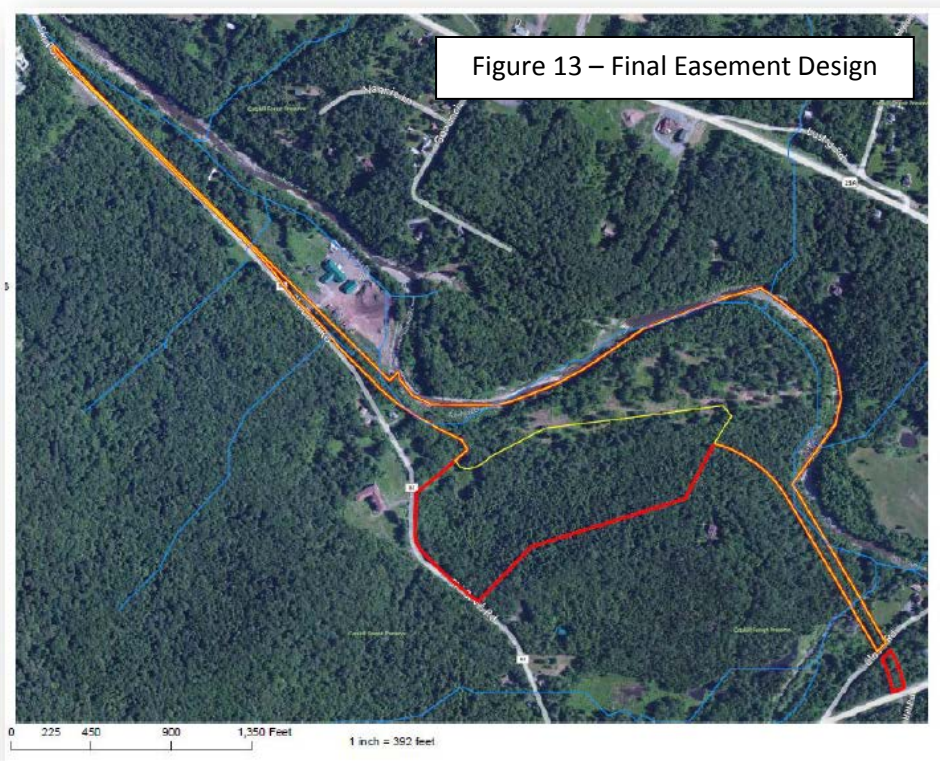



Figure 13 – Final Easement Design

Another test parcel was done using Prop ID #2738. In this test case, the tax parcel was divided into eastern and western portions by a public road. The 3-zone design yielded jagged edges and two orphaned segments that would have been 'landlocked'. In the case of a CE, right of ways would have to be necessary through the easement area in order to provide access to land-locked areas not under easement. In the case of fee, the orphaned segments would most likely be included in the design, since most towns will not approve subdivisions of property that lacks access. The buffer design for Prop ID# 2738 can be found in Figure 14.The final easement design forProp ID #2738 can be found in Figure 15. The 'grounding' process here included the smallest orphan within the easement boundary, while squaring off property boundaires. The large land-locked area created in the south-eastern portion of the property would be accessed through a right-of-way that is written into the conservation easement language.

### 5.3 - Stream Order Considerations

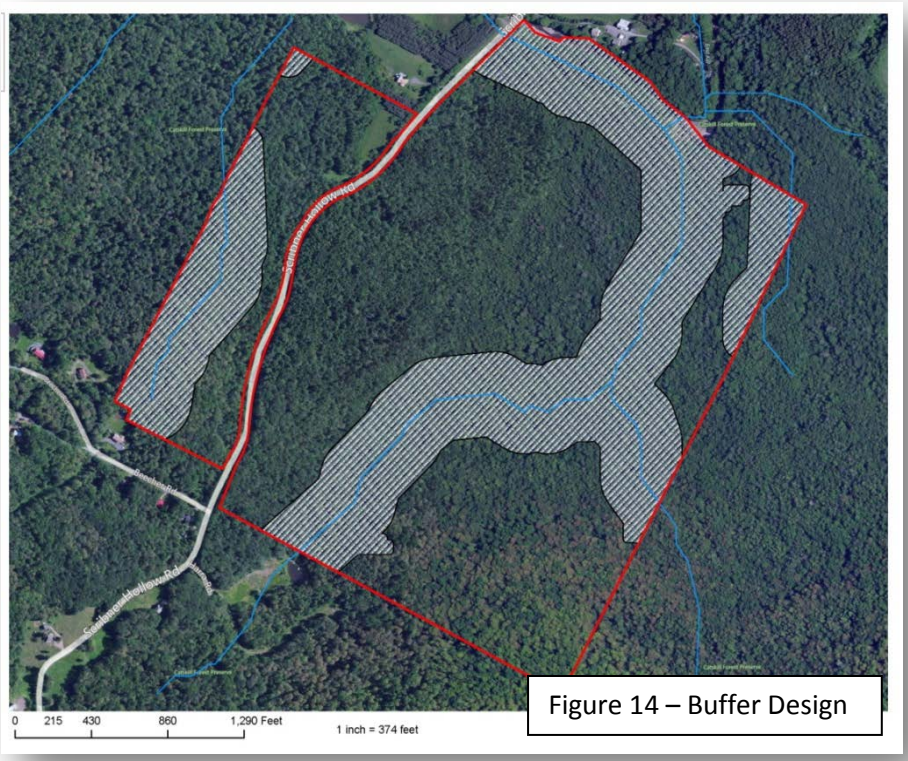


Figure 14 – Buffer Design

On low order streams (1st, 2nd, and 3rd), even a narrow buffer can have greater positive influence on water quality than wider buffers on portions of larger order streams already carrying polluted water. Even the best buffer strips along larger rivers and streams cannot significantly improve water that has been degraded by improper buffer practices upstream.[30] Riparian buffers have a greater relative impact on water quality factors such as temperature regulation and nutrient removal on lower stream orders than on higher stream orders. However, riparian buffers have a higher relative impact on flood mitigation on higher order streams (4th, 5th and 6th). Regardless of the size of stream or the hydrologic setting, water moving across the surface or through the root zone of a Riparian Forest Buffer should show reduction in either nitrate (groundwater) or sediment and sediment-borne chemical loads reaching the stream. As streams increase in size, the integrated effects of adjacent riparian ecosystems should decrease relative to the overall water quality of the stream. On lower order streams there is the greatest potential for interactions between water and riparian areas. On second-order streams (and above) the function of Riparian Forest Buffers is based on the relative sizes of the two potential pollutant loads – upstream sources and adjacent land uses. On a watershed basis, the higher the proportion of total stream flow originating from relatively short flow-paths to small streams, the larger the potential impacts of Riparian Forest Buffers.[31]

[30] Fischer, R.A. and Fischenich, J.C. 2000. Design recommendations for riparian corridors and vegetated buffer strips. U.S. Army Engineer Research and Development Center, Environmental Laboratory. Vicksburg, MS.
[31] Palone, S., Roxane, and Todd, H., Albert. *Chesapeake Bay Riparian Handbook: A Guide for Establishing and Maintaining Riparian Forest Buffers*. USDA. 1997

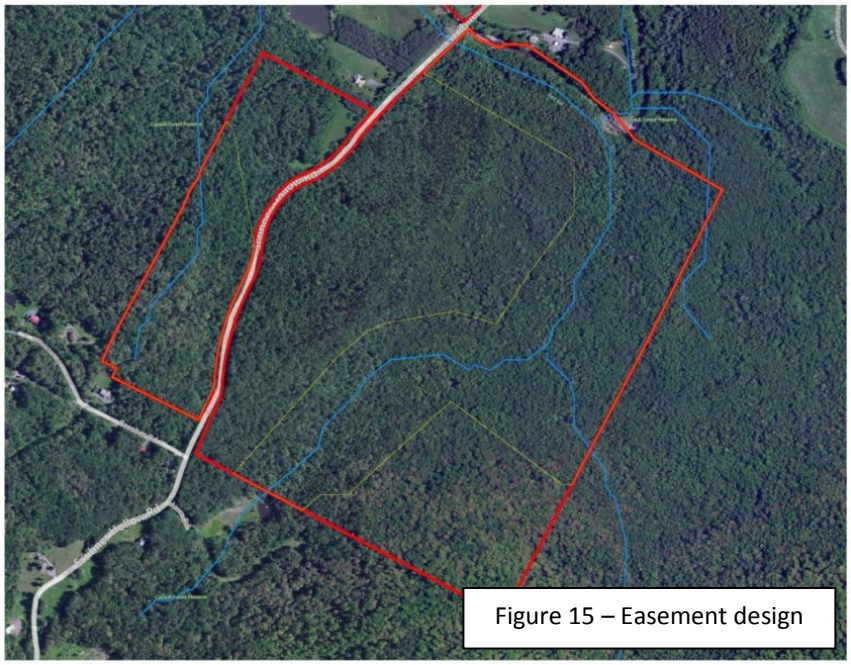


Figure 15 – Easement design

Forested riparian buffers along higher order streams often act as a floodplain, by accepting high velocity stream flows during flood events. Allowing floodwaters to escape the stream channel can considerably reduce velocity during storm events. When velocity is reduced the carrying capacity for sediments and large woody debris is also reduced, allowing them to drop out of the water column and collect on the floodplain. Access to a functional floodplain in higher order streams is an important way to protect infrastructure such as culverts and bridges, as well as personal property downstream. In order to promote high water quality, protection of functional vegetated buffers on low order streams as well as floodplains on high-order streams should be an equal target for solicitation.

**5.4 Factors that Reduce Effectiveness**

The riparian buffer strip will be most effective when used as a component of a total resource management system including nutrient management, pest management, and erosion, runoff and sediment control practices.[32] This report recognizes that the RBP is simply one component of that system. Roads and trails that run parallel to streams can act as secondary watercourses, reducing the effectiveness of small buffer strips that may be established between the stream and road.

Degradation of riparian vegetation can drastically reduce ecosystem function. Human-generated disturbance to vegetation such as cutting, mowing, or surface disturbance, within the buffer should be minimized. One of the most significant sources of water quality degradation comes from stream and floodplain management activities. Landowners, often with good intentions, reconstruct channels and may destabilize entire reaches of stream. Disconnecting channels form their floodplain can result from improper stream bank manipulation.

The record flooding caused by tropical storms Irene and Lee resulted in damage of roads, bridges and homes. Numerous streams were filled with debris. In the recovery from these conditions, the

[32] Natural Resources Conservation Service Conservation Practice Standard. Riparian Forest Buffer (Acre) Code 391. NRCS-Minnesota.

requirement for NYS DEC stream-work permits was waived for several months, and following that numerous permits to conduct in-stream construction. Many operators however took very liberal actions while performing this work, often time exceeding permit conditions and site specific recommendations.

Reports of these abuses became increasingly common. After learning of these instances, DEC enacted a survey to document the scope and scale of these occurrences. DEC Staff were sent to 19 counties and visited 2,000 plus work sites to document and assess stream conditions. Of these, 412 (20%) were found to exhibit some form of improper work activity. These sites were documented with a site assessment form, georeferenced pictures and coordinate data. Sites where abuses occurred were most often characterized by over-dredging and channelization, as well as creation of 'side-cast' berms and the destruction of riparian habitat. Beyond acute impacts to biota and habitat, it is expected that these conditions will contribute to raising water temperatures, increased erosion and sedimentation, and an increase in morphological stream instability.[33]

A stream bank degraded by human disturbance

Often in these cases, the course material backbone of the stream is removed. This backbone is a series of permanent (immobile) features that protect the fine sediments below from scour. When the grade is changed and naturally occurring ripples and steps removed, the sediments exposed cannot resist the erosive forces of flood waters. Degradation of channel, bank, and buffer stability must be minimized in

[33] Thiel, Joshua. *Documenting Impacts of Storm Response Construction Activities upon Stream Ecosystems Following TS Irene & Lee.* Impacts of Tropical Storms Irene and Lee on the Hudson River. Conference Handbook. Hudson River Environmental Society & Cary Institute of Ecosystem Studies. September, 2012. p16.

order to ensure water quality protection. Land protection under the RBP may serve as an integral part of both watershed-scale, and reach specific planning and protection goals.

**5.5 - Research On Comparable Programs**

Case study examples were obtained from throughout the U.S. Programs were assessed for their goals and buffer design systems, and analyzed for their effectiveness in achieving those goals. Program operations were reviewed to consider solicitation strategies, property appraisal methods, and the structure of funding partnerships. Third-party reviews and reports were examined for recommendations on buffer design, prioritization of solicitation, applicability and limitations.

**Vermont Rivers Conservancy**, in partnership with the Vermont Natural Resources Department, administers the River Corridor Easement Program for the State of Vermont. CCCD researched this program extensively for inclusion in this PDI report. Literature was reviewed, personal meetings were conducted with VTC staff, and field trips were taken to project sites in VT.

*Major Program Goals:* To reduce erosion and pollutant runoff through promoting vegetated riparian buffers. The idea was to change the culture from "hard" engineered solutions that change stream morphology to "softer" solutions that involve letting the stream meander within a projected corridor by compensating landowners to forgo agricultural and developmental use of their land.

*Design:* Buffers are designed using GIS mapping and LIDAR data. Mapping is used to create buffers eight channel-widths wide inside the valley walls. The intent of design is to limit erosion and runoff associated with the surrounding agricultural landscape. Significant staff time and expertise is required to map each stream reach or parcel.

*Value:* No appraisals are used to calculate values because the "before" and "after" values do not appear significantly different enough to provide a financial incentive for a landowner. Instead, a CREP-like calculation is used (most of the properties involved are active agricultural properties). So there is a rent/acre calculation for the crop (corn, soybeans, etc.) and then that rate per acre is capitalized for a perpetual length of time to come up with a per acre calculation. Most projects so far have been valued between $1,000-$3,000 per acre, with low values around $900 per acre and higher values over $3,000 per acre when the landowner agrees to required public access. There is a specific before/after done for the public access valuation. A market survey was compiled by the USDA Natural Resources Conservation Service to support land valuation for vacant land parcels under 20 acres in Vermont. Land was prioritized by development potential with only the highest category being solicited (as of this writing).

*Funding Sources:* The funding for the program comes from Vermont's "Clean and Green" environmental program. The State of Vermont funds the program though a contract with Vermont Rivers Conservancy, paying them a per-project overhead fee with a "not to exceed" limit. Another

payment is made to the land trust upon entering into purchase agreement to cover purchase and all soft costs, followed by a $5,000 per/project stewardship payment at closing.

**New York State Department of Transportation:**

*Major Program Goals:* Land is acquired through eminent domain in order to construct maintain, or repair transportation infrastructure.

*Design:* Designs vary based on project needs.

*Value:* A market survey report appeared similar to the 'sales book' or 'market book' approach. Here, one boilerplate real estate neighborhood market summary is used for calculating values, with each property receiving an individual report with attachments. In doing so, a catalog of the market trends for residential, commercial, agricultural, and timber lands is created using previous comparables for that market stretch. Unique features of each property are added to boilerplate language of the sales book for that market stretch to adjust value.

**NYSDEC Fishing Easement Program**: was researched using literature, personal interviews with staff, and GIS mapping.

*Major Program Goals:* To provide public recreational fishing access on specific trout streams within New York State.

*Design:* Easements are 33 ft wide, extending outward from each stream bank. Easements can be single bank or both banks of a stream and may also include access trails from a public road and public parking areas.

*Value:* To value the fishing easements, a formulaic approach is used based on market trends, stream classification for fishing, and a purchase price schedule based on length of stream. Residual damage to land unencumbered by easement areas can be calculated in value determinations. The fishing easements allow for a single use: public recreational fishing access and do not necessarily preclude the Grantor from some development of the property. A valuation schedule for Public Fishing Rights footpaths is found in the Appendix of this report.

**U.S. Army Corps of Engineers Ecosystem Management and Restoration Research Program**

*Major Program Goals:* This report documented the various ecosystem services that could be expected from vegetated buffers of differing widths.

*Design:* A report titled "Design Recommendations for Riparian Corridors and Vegetated Buffer Strips" is

available, which highlights the 3-zone design system. In order to achieve the water quality objectives of the program, a buffer width of 17-99 feet is recommended according to the US Army Corp of Engineers. Protected riparian areas may be able to influence water quality by filtering along moderate slopes. However, steeper slopes require widths reaching 99 feet in order to provide water quality protection. In terms of providing stream bank stabilization a vegetated buffer width of 33 feet to 66 feet in more actively eroding soils is required. To achieve flood attenuation function, the buffer zone is recommended to measure between 66 and 493 feet.

## Section 6 – Appraisal

### 6.1 – Fair Market Value

The RBP can real property interests outright (land in "fee simple") or as "CEs". Fee simple acquisition of potentially developable riparian buffers should be a major priority of the RBP pilot program, because exclusive fee ownership provides the highest level of protection for sensitive resources. CEs, because they are much more complicated to design and to then steward in perpetuity, and because grantors can create substantial violations of CE terms in a matter of hours, are less desirable than fee acquisitions. The 1997 Watershed Memorandum of Agreement (MOA) dictates that the City may acquire land or easements only through willing sellers at fair market value as determined by independent appraisals obtained at the direction of the City and performed by independent, certified New York State appraisers. Standard appraisal methods determine the highest and best use as "the reasonably probable and legal use of vacant land…, that is physically possible, appropriately supported, and financially feasible and that results in the highest value." Some of the parcels targeted by this program, which may be small and riparian in nature, may not be suitable for development due to building constraints, zoning requirements, and existing State and local regulations.

Research was conducted on comparable land protection programs throughout the United States. These case studies revealed that not uncommonly, in order to create a program that is attractive to landowners, a formulaic approach to land valuation that is influenced by fair market valuation has been used elsewhere. A lack of development potential within riparian buffers can make some look less valuable than otherwise found in a traditional highest-and-best-use ("HBU") appraisal, yet these dynamic lands perform many vital ecosystem functions. The appraisal concept of HBU involves determination of what is legally permissible, physically possible, financially feasible, and maximally productive to reach fair market value. While these criteria reflect market forces that drive real property sales, they do not generally reflect ecological services – i.e. the value of a property to the larger community in terms of flood control, water quality, or ecosystem health ("public interest value"). This report does not endeavor to determine how or whether such valuations can be obtained, nor whether they would result in higher or lower values than those developed using standard comparable sales from the market. It is beyond the scope of this report to create a new system for valuing real property that would satisfy the various requirements set forth in the 1997 MOA, the 2010 WSP, New York City rules and regulations, and other applicable guidelines. During or after the pilot phase of the RBP, it may be possible to develop a formulaic method in order to increase the efficiency of the appraisal process – although congruence with MOA and WSP language will have to be explored.

An evaluation of the pilot phase (see Section 2) will determine whether additional incentives and funding sources may be necessary to increase program participation, and whether such would be possible in the context of the many program constraints.

It may be useful to review compensation schemes used by similar programs elsewhere. The following summaries provide background on how other payment-for-land programs compensate landowners (but the reader should be cautioned that there is no way to know whether any of the values listed below would be applicable to the subject RBP):

Case Study # 1 – NYSDOT Market Book Approach

- More cost effective than appraising every property since (1) the cost of individual reports is eliminated and (2) staff time is not required to order and review such reports. Updates of the market book are needed periodically however.
- Would require that an appraisal is informed by the market but would not require individual appraisals.
- Clearly displays some challenges to MOA language pertaining to fair market value requirements.

Case Study # 2 – NYSDEC Fishing Easement Approach

- Provides some calibration for ecosystem type – value categorized based on health of trout streams. A fee schedule for DEC fishing easements can be found in the Appendix (M) of this report.

Case Study # 3 – CREP Easements Approach

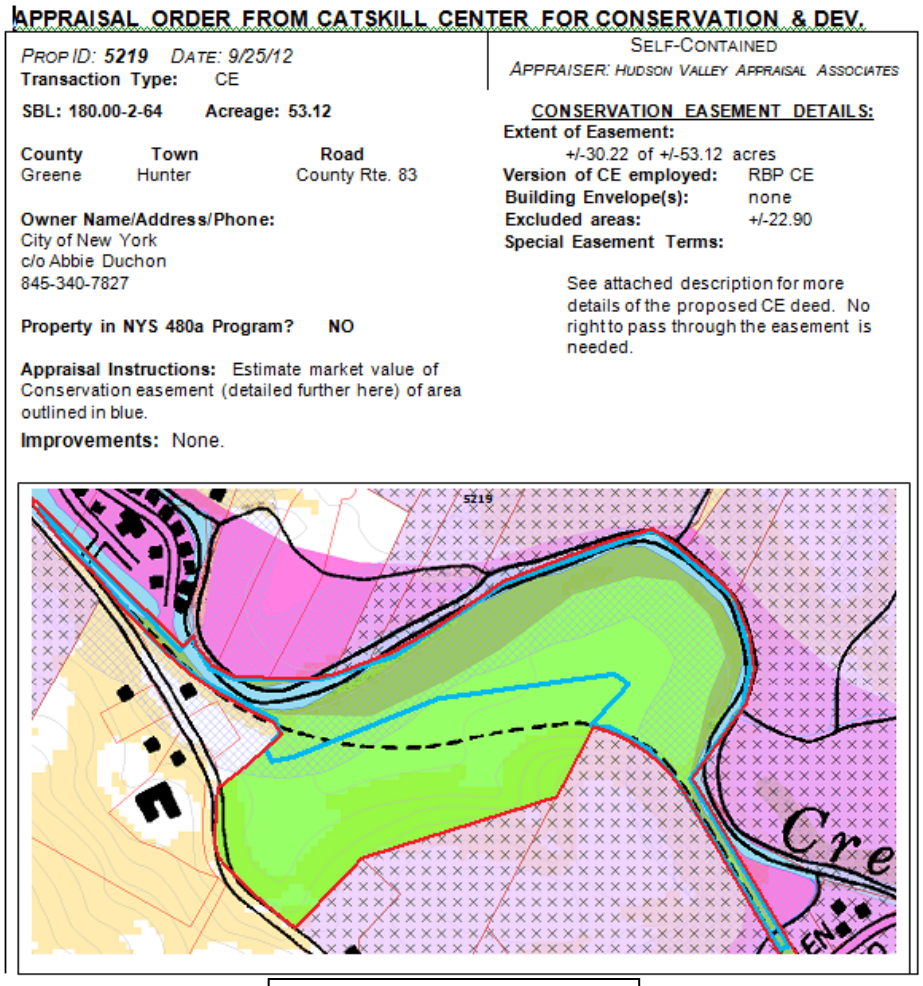
- The Conservation Reserve Enhancement Program ("CREP") is a federally-funded program that seeks to protect streams by paying farmers a per-acre fee to forego agricultural activities within a 35-foot buffer strip along streams, provided certain management practices such as fencing or tree plantings are implemented.
- A formulaic valuation method that categorizes land types to calculate agricultural production values. Enhancements are added to include bonus payments and full cost-sharing for best management practices to increase the economic incentive for participation. CREP easements are term-limited to 10 or 15 years; they are not permanent.
- Incorporation of additional incentives on top of the original program fees were used to grow program participation.
- A major limitation to the success of this program is that contracts expire after 10 or 15 years of participation unless renewed with funding and landowner interest.

### 6.2 – Test Parcel Valuation

Three “test-case” parcels were chosen to test design and appraisal methodologies for both fee simple and CE projects. To avoid the complexities of using private property at this stage, properties previously acquired by NYC DEP were used. Two appraisal firms were used in order to look at variations in appraisal methodologies and approaches.

#### 6.2.1 – NYCDEP LAP #5219

The configuration of buffer design as applied to test parcel #5219 can be found in Figure 16. The extent of the hypothetical CE in this case is +/- 30.22 acres of the original +/- 53.12 acre parcel, leaving 22.9 acres unencumbered with direct road access on one tax lot in the Town of Hunter. This property has frontage on two roads and included an old rail bed. The rail bed was considered to function as a permanent landmark to ease delineation and stewardship issues, and also to serve public access which would otherwise be lacking. The market value of the fee simple in the 30.22 acre designated riparian buffer easement area was $233,449.50. This translates to $7,725 per acre. In order to calculate conservation easement value a ‘before’ value was determined to be $6,887 per acre on the entire property. Then, an ‘after’ value on the entire property was determined as if the proposed easement was in place. The ‘after’ value was determined to be $2,397 per acre. The after value of $167,593 was subtracted from the ‘before’ value of $389,900 in order to obtain the conservation easement value of $222,307. This 30 acre CE represented 95% of the fee simple value of the same. The appraisers formed this opinion based


APPRAISAL ORDER FROM CATSKILL CENTER FOR CONSERVATION & DEV.

PROP ID: 5219 DATE: 9/25/12
Transaction Type: CE

SBL: 180.00-2-64 Acreage: 53.12

County Town Road
Greene Hunter County Rte. 83

Owner Name/Address/Phone:
City of New York
c/o Abbie Duchon
845-340-7827

Property in NYS 480a Program? NO

Appraisal Instructions: Estimate market value of Conservation easement (detailed further here) of area outlined in blue.

Improvements: None.

SELF-CONTAINED
APPRAISER: HUDSON VALLEY APPRAISAL ASSOCIATES

CONSERVATION EASEMENT DETAILS:

Extent of Easement:
+/-30.22 of +/-53.12 acres
Version of CE employed: RBP CE
Building Envelope(s): none
Excluded areas: +/-22.90
Special Easement Terms:

See attached description for more details of the proposed CE deed. No right to pass through the easement is needed.



Figure 16: Test Appraisal

on the fact that the most developable portion of the property was encumbered in the CE design, with the unencumbered portion being unfit for development. The area encumbered by the CE also had a view of Hunter Mountain, therefore increasing the value of the property significantly.

### 6.2.2 – NYCDEP LAP #1694

This design yielded a +/- 34.00 acre CE area within a +/-41.50-acre parcel (Figure 17) on one tax lot in the Town of Hunter. This property has several access issues: first, the property overall is only accessible via right of way ("ROW") over private land. Configuration of the CE resulted in an area on the subject parcel that would be unencumbered by the CE, requiring a provision for the Grantor to access that area through the CE and involving a stream crossing. A second ROW exists, which burdens the unencumbered portion of the property. The complexities evident on this property would raise questions about whether it would be worthwhile pursuing the project in the first place, but if pursued those issues would affect both design considerations and appraised value. The proposed CE on 34.38 of the 46.38 acres leaves 12 acres unencumbered. A before value was generated for the entire property at $1,400 per acre. An after value of $1,250 per acre was determined after a CE was placed on the 34.38 acres. This represents an overall loss in value of $150 per acre. The after value of $57,975 was subtracted from the before value of $64,932 to obtain a $6,957 value for the CE. This translates to a cost of $202 per acre on this CE. Significant access issues on this parcel resulted in the appraisers to find the highest and best use of the property to be for recreation, despite any remaining development potential.

### 6.2.3- NYC DEP LAP #7410 and #5228

An estimate of market value of both fee simple and an easement was comissioned for a +/-10.1 acre area within a +/-~31.7 acre

**APPRAISAL ORDER FROM CATSKILL CENTER FOR CONSERVATION & DEV.**

*PROP ID:* ***1694*** *DATE: 12/11/12*
**Transaction Type:** RIPARIAN BUFFER CE
**SBL:182.00-5-4.2** **Acreage: 41.50**

| County | Town | Road |
|---|---|---|
| Greene | Hunter | off County Rte. 23A |

**Owner Name/Address/Phone:**
City of New York
c/o Abbie Duchon
845-340-7827

**Property in NYS 480a Program? NO**

**Appraisal Instructions:** Estimate market value of the CE (detailed further here and attached) of area shown in yellow wash.
**Improvements:** None.

SELF-CONTAINED
*APPRAISER: HUDSON VALLEY APPRAISAL ASSOCIATES*

**CONSERVATION EASEMENT DETAILS:**
**Extent of Easement:**
+/-34 of +/-41.50 acres
**Version of CE employed:** RBP CE (see separate description)
**Building Envelope(s):** none
**Excluded areas:** +/-12
**Special Easement Terms:**
This property is accessed via a 50-ft-wide ROW; the CE will allow access from the ROW through the CE area (including a stream crossing if needed) to the unencumbered portion of the subject property. The subject is also burdened by a ROW (through the center of the parcel) that benefits a neighbor to the south.

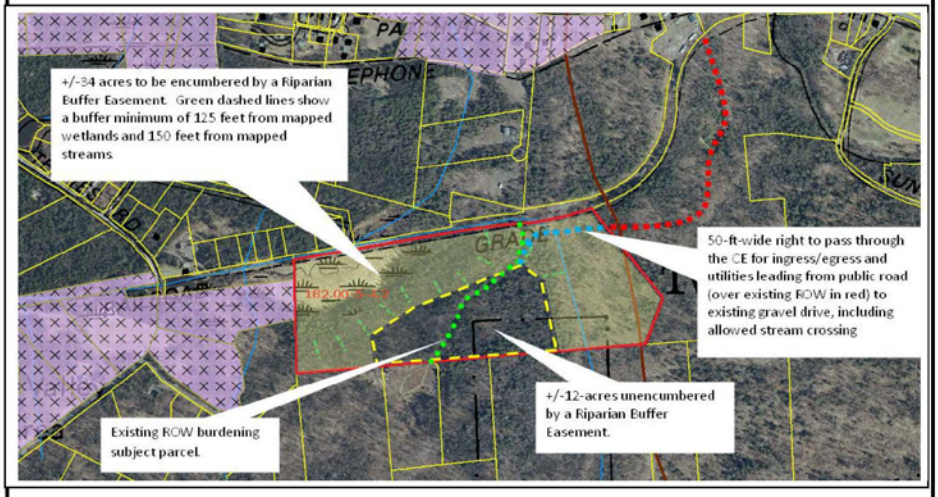



Figure 17: Test Appraisal

property (Figure 18). The parcel contains two tax lots in the Town of Hunter with some frontage on the Batavia Kill and on two public roads. A public road extends, parallel to the Batavia Kill into the larger tax parcel as well as an exisiting driveway into the center of the larger tax parcel. A before value was determined to be $17,000 per acre for the property as a whole. An after value was determined to be $15,000 per acre for the property after a conservation easement has been placed on the 10.1 acres. This represented a $2,000 loss in value for the property per acre. The after value of $473,550 was subtracted from the before value of $536,690 to generate a conservation easement value of $63,140. This rounds to a per acre cost within the conservation easement of $6,000 per acre. The appraisal firm found the highest and best use of the property to be development, causing a much higher per acre value than the last case study described (#1694). The appraiser also determined the cost of mandatory public access as terms of the conservation easement with a value of $47,355.

**APPRAISAL ORDER FROM NYC DEP LAND ACQUISITION PROGRAM**

*PROP ID: #5228 AND #7410 DATE: 11/2/12*
**Transaction Type: Riparian Buffer CE**

□ SELF-CONTAINED
*APPRAISER:* _____

**SBL:** 163.00-3-8.1 (7.2 acres of 24.72 acres)
**SBL:** 164.00-1-2 (2.9 acres of 6.86 acres)

| County | Town | Road |
|---|---|---|
| Greene | Hunter | Camp Meadowbrook Road |

**Owner Name/Address/Phone:**
NYC DEP
71 Smith Avenue
Kingston, NY
c/o Abbie Duchon 845 340-7827

**Property known to be in NYS 480a Program?**
□ No

**Appraisal Instructions:** Estimate market value of:
A Conservation Easement on 10.1 acres of the ~31.7-acre property as shown in yellow below. Please confirm that the planned appraisal methodology is expected to offer the standard "before" and "after" values. The attached document explains the nature of the conservation easement restrictions (although the CE itself has yet to be drafted).

Please also see the attached map showing the configuration of the conservation easement within the subject property.

Figure 18: Test Appraisal

### 6.3- Easement Terms

Conservation Easement language will be drafted by the City. The language of the RBP CE will be modeled on the existing City CE but will be modified to include additional restrictions to minimize buffer disturbance while access will be maintained with establishment of right-of-ways. The following terms and restrictions are recommended for inclusion in the model CE:

- Stream work would be limited to those practices specifically undertaken for emergency protection of life and property without prior notice, or to improve water quality and only with advance written notice to and approval from Grantee, except that landowner may retain rights to remove water from a stream so long as it does not violate the terms or purpose of the CE.
- Rights reserved for flood hazard mitigation and stream restoration projects including floodplain enhancement/restoration, in-channel stabilization, streambank stabilization, contractor access,

construction staging areas/material storage associated with these projects, with approval by Grantee.

- Forestry and agricultural activities would be prohibited except for *de minimus* amounts for household use, unless specifically allowed in easement language. Case by case consideration for limited agricultural uses on prime agricultural soils will be subject to Grantee Approval.
- Construction of impervious surfaces is prohibited.
- Construction of non-impervious trails less than 4 feet wide may be allowed only with advance written notice to and approval from Grantee.
- Subdivision from a larger parcel would be prohibited except to allow for conveyance of the land (that is encumbered by the CE) in fee simple to the Grantee or organization approved by Grantee.

**6.4- Public Access on Land Under Conservation Easement**

It may be desirable for local communities to secure public access for greenway or public trail purposes on certain properties under CE. In such cases, it may be difficult to convince landowners to convey such rights. According to our initial appraisal data, the costs for purchasing such public access rights may be non-trivial. DEP has indicated that costs for purchasing – and stewarding – such public access rights may not be funded by DEP(LAP). It is recommended that the applicable model CE include the following provisions:

- Public access should be for passive recreation limited to: hiking, biking, fishing, cross country skiing.
- Parcels where public access would provide key linkages should receive priority as fee acquisitions.
- Public access for hunting and associated hunting activities should remain under Grantor control.
- Motorized vehicles should be prohibited except for construction and administrative uses subject to Grantee approval and for flood management needs by the municipality. Linkages for snowmobile usage will be considered on a case-by-case basis subject to Grantee approval.
- Construction of non-impervious trails less than 4 feet wide can be undertaken by Grantee or allowed with Grantee approval.
- If the CE does not offer direct frontage on a public road for feasible public access, a pedestrian ROW should be included to connect the public road to the recreational area.

**6.5 Stewardship of Easements**

While the WSP expects a land trust to 'implement' the RBP, the entity that would hold land encumbered by CE and steward in perpetuity is not dictated and has yet to be determined. If a land trust becomes grantee of a CE, the City should consider whether contracting with local land trusts to provide stewardship services on CEs would be efficient. Where the land trust becomes the grantee, the City should maintain third party enforcement rights and consider providing assistance for legal

defense. The (often) high costs of monitoring, enforcing, and litigating over CE violations are primary reasons why land trusts and agencies avoid small CEs.
The challenge of enforcing easement restrictions that prohibit removal of vegetation can be reduced by establishing a violation schedule that sets a threshold for *de minimis* activities, but imposes fines for significant violations and allows the stewardship entity to install mitigation plantings with little or no reliance on landowner cooperation. Nonetheless, monitoring of such restrictions would remain a costly line item.

### 6.6 Appraisal Methodology

When appraising small riparian properties, the cost of the appraisal report may be greater than the fair market value of the subject fee simple property. Valuation of partial interest or areas of entire tax lots are inherently complex, and the intricate design of CEs may require significant adjustments to produce a logical and defensible value.

Severance value, which is the value attributed to economic loss to the unencumbered portion of the property due to the CE encumbrance, may be invoked for various reasons including parcel configuration, developability, and impact to access. Because the City usually acquires CEs that encumber all, or virtually all, of a subject tax lot, severance values have almost never been considered by DEP appraisers. In the case of a "taking" (under condemnation or eminent domain), the Uniform Standards of Professional Appraisal Practice (USPAP) provide that subject to the appraiser's determination, severance may be invoked – but DEP programs (including RBP) do not invoke condemnation.

## Section 7 – Ownership and Stewardship

### 7.1 Conservation Easements

According to the WSP, the RBP is expected to be operated by a willing land trust, and that if no land trust is willing to manage the RBP, the City shall itself run the program. If a land trust is indeed found, it should be willing to acquire and hold the CEs. In such case, the City would fund the land trust to acquire and hold the CEs, and to provide funding for stewardship. Partnerships similar to that existing between the Watershed Agricultural Council ("WAC") and the City in regard to Farm and Forest Conservation Easements may be the best model for acquisition and stewardship of CEs. As in that example, the City would still hold a third-party reversionary interest and right to enforce the RBP CE terms.

Similar to the WAC model, the primary RBP program contractor would be expected to be responsible for creating a stewardship committee subject to open meetings law, consisting of board members and others as appointed pursuant to agreement between the contract organization and the City. This

committee would be responsible for setting stewardship policy and settling all stewardship-related Grantor requests, conflicts, and requests for amendments.

Perpetual stewardship of CEs in the RBP, as envisioned, presents a significant challenge because by definition the average project would be considerably smaller than most other CEs, and the boundaries much longer (per unit size) and less uniform. In addition, the goal of the CE is to prohibit virtually all of the site-disturbance activities that landowners often choose to undertake along streams. Even though small properties were purposefully avoided in the three test appraisal projects, the average size (25 acres) represents a significantly smaller size than is presently considered for CE eligibility by most land trusts and DEP due to the proportionately higher cost per acre for acquisition and stewardship. Another essential strategy for mitigating stewardship costs is to ensure that the CE grantor retains an adequately-sized yard around their residence where routine landowner activities are not regulated, but this is harder to accomplish on small properties.

### 7.2 On Fee Acquisitions

In the case of fee acquisition, DEP would be expected to become the owner. If DEP sees cost efficiencies, opportunity may exist to out-source stewardship tasks to a local organization. Land Use Permits ("LUPs") are an existing vehicle through which DEP allows private and public entities to use DEP land for compatible activities; LUPs may be sought by community organizations to create public access opportunities (trails, trail connectors, etc.) on parcels acquired by DEP through RBP. However, not all riparian areas will be able to support recreational access while maintaining water quality function. Therefore, recreational access project approval should be considered on a case-by-case basis in order to ensure protection of water quality and the long term protection of sensitive areas.

# Section 8– Pilot Program Operation

This PDI Report recommends that the City be the holder in fee of acquisition lands and, as elsewhere in the City's LAP initiative, be responsible for property taxes, stewardship, and enforcement for (and conveying conservation easements to the NYS DEC on) those parcels. In some cases the properties will be of size and location that are consistent with DEP's ongoing portfolio of acquisitions, while in other cases there will be very small and isolated properties. The latter type present challenges similar to those found in the 1996 Flood Buyout Program, where partnership – or even ownership – opportunities with local municipalities could be explored. Where fee simple acquisitions border State Lands, the holder in fee could be the State of New York, which would likewise need to take on the responsibilities listed above. By taking advantage of such ownership assemblages, acquisition by NYS DEC could reduce the City's cost of long-term protection and stewardship while also achieving water quality goals, as the land would be forever protected by the New York State Constitution. Public access issues would also be resolved and stewardship costs could be greatly reduced in this scenario. The State of New York should provide these lands with the appropriate classification in order to allow stream management projects to continue if necessary in perpetuity.

### 8.1 – Staffing & Administration

The City will serve as funder of the 3-year RBP pilot program and will also serve as technical review body and holder of fee interests. It is the recommendation of this report that a primary contractor be sought to work on behalf of the City to facilitate the Pilot Program within the Schoharie Basin. The City may wish to assign a DEP liaison to work closely with the primary contractor in day to day program operation. The duties of the primary contractor should include facilitating completion of design, solicitation, offers, subdivision, and local consultation. Additional duties may include subcontracting with land trusts, if deemed desirable, to hold or steward easements, conduct outreach, and/or local vendors to complete program site-services. The primary contractor should have or be willing to set up office space within the Schoharie Basin to conduct the pilot program.

According to the WSP: "The RBP will be implemented in conjunction with one or more Stream Management Plans developed under the City's Stream Management Program, and will be carried out in partnership with one or more land trusts which shall be bound by contract to the City to implement and comply with the provisions of this permit." It is expected that if an interested land trust can be engaged, the City would seek to enter into a program contract similar in scope to the existing contract between the City and WAC. The land trust would provide certain program services and hold title to CEs while the City would provide funding for staff capacity and overhead, land acquisitions and any required subcontracting. In the case of fee acquisitions where the City is to hold title, closing work would be performed by existing City staff. The City might also assist with some pre-closing site services for CEs depending on available staff resources. It should be recognized that the City has contracting

requirements that may create significant challenges to what initially appears to be a straightforward recommendation.

Consistent with the WSP, the land trust(s) would be responsible for coordinating with NYCDEP on tasks that may include but not be limited to:

- Landowner outreach and contact
- Establishing eligibility and criteria
- Coordinating with NYCDEP to minimize overlapping program solicitations or conflicting/competing efforts
- Ordering appraisals and making purchase offers
- Acquiring eligible real property interests
- Managing the local consultation process
- Identifying and implementing management practices linked to the goals of riparian buffer protection
- Stewarding, administering, monitoring, and enforcing the terms of riparian buffer easements or fee acquisitions
- Allowing for public access on land acquired in fee simple or CEs as applicable

**8.1.1 – RBP Program Contract**

It is expected that the City and one or more land trusts will engage good faith efforts to design a program that would be operated by the land trust(s) as framed by a program contract with DEP, as outlined in Special Condition 29 of the 2010 WSP. If the arrangement proves untenable, the City shall implement the RBP itself. A contract between the City and the primary contractor for the pilot program should be negotiated that provides capacity to complete project tasks and engage subcontracts for site services and stewardship (figures 19 & 20). As funder and tax-payer in perpetuity, the City should have approval authority over all decisions that create long-term or perpetual real property rights and obligations. In order to meet the November 2014 implementation deadline, a contract between the primary contractor and the City should be completed and signed by both parties by that date. This timeframe would allow the primary contractor adequate time to appoint staff and establish appropriate headquarters.

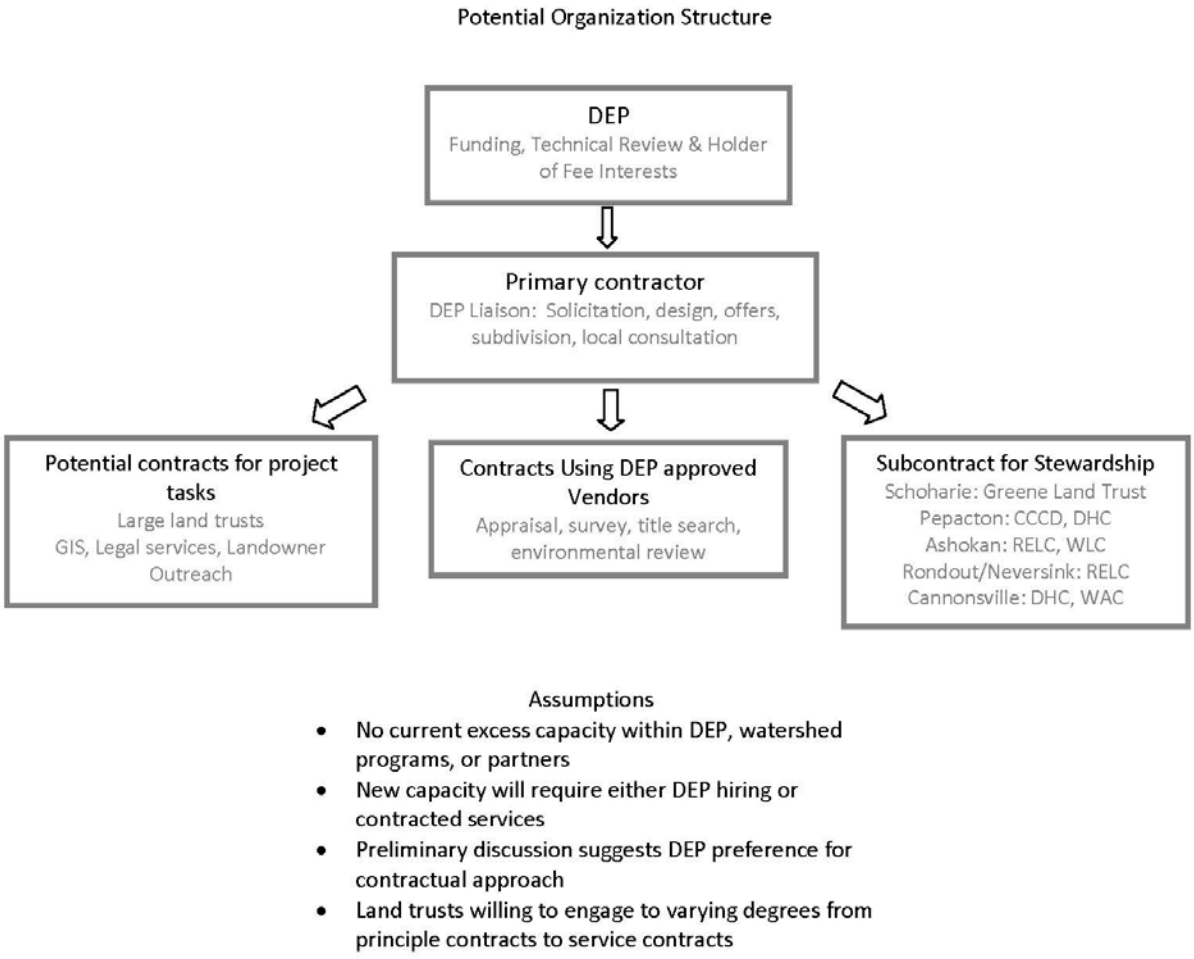



Figure 19: Potential Organization Structure

### 8.1.2 – RBP Advisory Committee

This report attempts to recognize the wide range of complex issues and diverse set of goals involved in development of a pilot program. Therefore it is the recommendation of this report that before and during implementation of the RBP, DEP convene an Advisory Committee to triage challenges that may arise and undertake dispute resolution. The Advisory Committee may consist of the primary contractor, NYCDEP, NYSDOH, NYSDEC, CWT, and EPA.

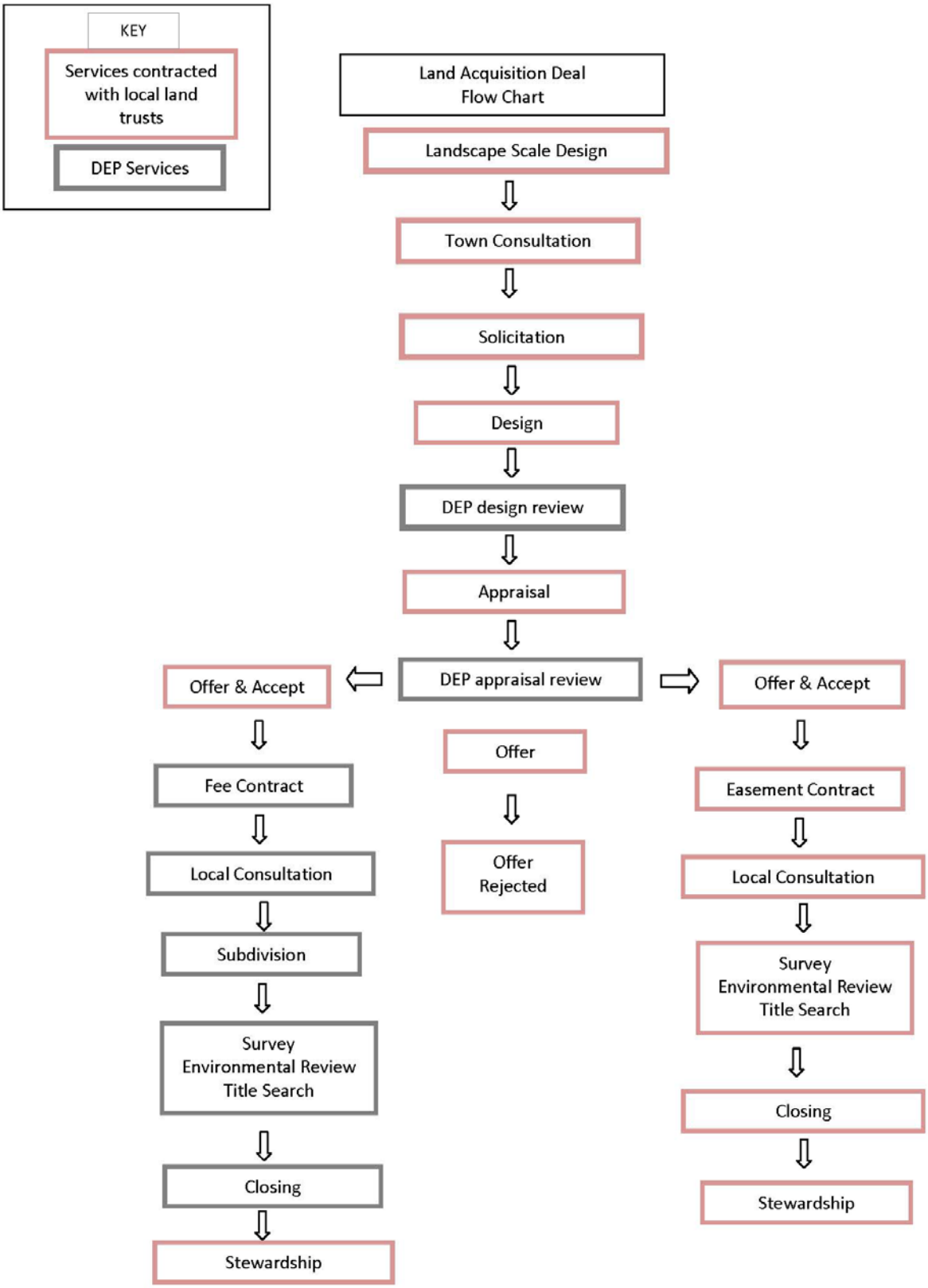



Figure 20: Contract Flow Chart

### 8.1.3 – Pilot Program Timeline

This report aims to provide structure to outline operation of the RBP while allowing flexibility to change and meet objectives as the program evolves. A three-year pilot program is slated to begin in November of 2014. Therefore, an outline for 3 years was generated.

Year 1 Objectives

- Create RBP Advisory Committee
- Compile GIS data for Schoharie Basin & complete the project design process and solicitation priorities.
- Consult with DEP-SMP and Greene County Soil & Water Conservation District to identify key reaches based on water quality protection, if ranking system becomes necessary.
- Consult with local municipalities to identify key parcels for recreational goals
- Consult with DEP to finalize round 1 solicitation goals.
- Work with municipalities, Greene County Soil & Water, and local land trusts to hold public forum to introduce program/begin solicitation
- Appraise at least 20 projects
- Execute purchase contracts on at least 10 projects

Year 2 Objectives

- Appraise at least 30 projects
- Execute purchase contracts on at least 20 projects

Year 3 Objectives

- Appraise at least 40 projects
- Execute purchase contracts on at least 30 projects

### 8.1.4 – RBP Outreach & Promotion

Promotion of the pilot program and participation outreach must be conducted as a partnership between the primary contractor, local municipalities, Greene County Soil & Water Conservation District, NYCDEP-LAP, and NYCDEP-SMP.

A series of public forums introducing the program should be conducted by the partners listed above. Public forums may be held as part of local basin-wide events such as Schoharie Watershed Month, Hunter Fest, etc.

### 8.2 – Parcel Solicitation

Parcel solicitation will be the responsibility of the primary contractor with assistance from DEP (Land Acquisition and Stream programs) and input from Soil and Water Conservation Districts, towns (regarding trail and public access projects), and possibly WAC with regard to agricultural issues that may arise.

### 8.3 – Buffer Design

Buffer design will be conducted as described above by the primary contractor in consultation with and with approval by DEP LAP and SMP.

### 8.4 – Site Services

Given the complexities of the existing MOA and WSP rules that govern LAP (to which the RBP is also subject), the technical expertise required by vendors to deliver products up to mandated standards, and the decades-long experience and efficiencies developed between DEP and a number of its vendors (which evolve over time), it is recommended that the land trust which manages the RBP should take full advantage of DEP's vendors and procedures as further detailed below. The following site services (Section 8.4.1-8.4.9) will be required in order to close any real property interest acquired under the RBP.

### 8.4.1 – Appraisal

"Ground truthing" the design process will need to be conducted on each property before the final appraisal order is submitted for each parcel. The opportunity for redesign may be necessary prior to ordering an appraisal in order to resolve issues (regarding access, etc.).

Assuming there is a proper mechanism to do so, the RBP primary contractor should use existing prequalified DEP appraisers, with input, review and approval by DEP. DEP presumably retains its current ability under the MOA to petition DOH to contest cases where water quality benefit and appraisal values appear disproportional. At some point after a sufficient number of appraisals have been secured, it may be possible to analyze values and resource efficiencies (staffing and funding) to determine whether a modification of the appraisal process should be considered.

### 8.4.2 – Legal Process

The City should consider providing legal services necessary to review and close contracts.

### 8.4.3 – Subdivision

Participating landowners will work with municipal zoning boards to get formal subdivision approval where necessary prior to conveyance.

### 8.4.4 – Survey

The technical standards required by DEP for professional surveys are very high and have been refined over the years; surveys under the RBP should thus be conducted using prequalified DEP vendors.

### 8.4.5 - Local Consultation

The MOA and WSP require a process of Local Consultation ("LC"), in which several parties (the town, EPA, DEC, and Sporting Advisory Committees) are notified of pending acquisitions once the City is under contract to purchase. Once LC documents are submitted, the town has 120 days to provide comments, after which the City has 30 days to respond. The process allows local review for the following purposes:

1.) To ensure the city is adhering to MOA and WSP rules regarding properties allowed to be acquired – for example, minimum size, natural features criteria, etc;
2.) To provide notice that a subdivision is being planned (for such cases);
3.) To indicate whether the property may have been otherwise involved in plans to support local education, health, or safety needs of the community;
4.) To review and respond to City proposals for public access to land acquired in fee simple.

In all cases where the City is acquiring a real property interest, the City should be the entity to draft and submit documents under LC. In cases the City is paying for the acquisition but another entity will be the owner, the City should be consulted by that organization on LC before the organization submits documents under LC, and copies of all related documents generated pre-closing should be sent to the City.

### 8.4.6 – Environmental Site Assessment ("ESA")

ESAs could be conducted by DEP-prequalified vendors, but this service product is relatively proscribed and could be performed by any qualified vendor that has experience with vacant lots. For all acquisitions using City funds, a Phase I report is required before no earlier than 6 months before closing, with a Phase II conducted where deemed necessary by the Phase I. Cleanup of any issues identified on the site are almost invariably the responsibility of the seller, done prior to closing, whether fee or CE.

### 8.4.7 – Title Insurance

Title insurance could be ordered by the prospective owner (usually DEP) through any title underwriter that is a member of TIRSA in good standing. That organization should also address any issues that might arise in order to ensure clean title before the closing.

### 8.4.8 – Closing Process

For fee or CE acquisitions that are acquired by DEP, it would be most efficient if only one purchase contract and transaction took place. In such fee cases, DEP would execute the contract (after the land trust and seller reached general agreement on configuration and purchase price) and follow its traditional closing processes. There is a question regarding how a new raft of ~10-30 annual closings might impact DEPs ability to close its normal portfolio of real estate deals. In the case of CEs that are not acquired by DEP, the primary contractor or local land trust would be expected to execute the contract and proceed to closing in consultation and coordination with DEP.

## 8.5 - Stewardship

DEP currently has significant stewardship responsibilities to serve real property interests that it acquires, and DEP would continue with stewardship services on those properties acquired under the RBP. We recommend that DEP examine whether it might be efficient to hire a land trust to undertake certain stewardship tasks under the RBP. For any properties or CEs acquired by a non-DEP entity using DEP funds, it is recommended that DEP be given a permanent seat on any body that determines land use and stewardship policies and enforcement actions.

## 8.6 – Legal Defense

Land trusts holding CEs on riparian buffers should explore with DEP the possibility of having the City fund, or otherwise accept, legal defense of CEs. This will require further discussion, since similar to WAC's easement program this puts the City in the position of being asked to pay for CEs (and related property taxes) that are then owned and monitored by a land trust, which land trust might inadvertently create additional liability for the City through inadequate or inappropriate monitoring or enforcement actions.

## 8.7 – Property Taxes

The City, as owner of any property acquired in fee simple under the RBP is expected to take on tax responsibilities in perpetuity in accordance with the MOA. The City is also expected to pay a pro-rated share of property taxes for conservation easements that are held by the City or that are held by a local land trust on behalf of the City. As funder and tax-payer in perpetuity, the City should have approval authority over all decisions that create long-term or perpetual real property rights and obligations.

### 8.8 – Pilot Program Evaluation

An interim evaluation should be undertaken by DEP 18 months into the pilot followed by a comprehensive full-program evaluation at the completion of the three-year pilot program. The primary contractor will be responsible to provide necessary information to DEP into order to conduct these evaluations. The evaluations should be written by DEP and submitted to DEC, DOH, and EPA for review. The main objective of evaluating the pilot program can be found in Section 2.1.5 of this report.

## Section 9 – Integrating the RBP

### 9.1 – NYCDEP Land Acquisition Program

The primary contractor will have a contractual relationship with DEP that frames all aspects of program funding and operation. The existing DEP LAP and the RBP should have the opportunity to refer potential participants in both directions. A landowner contacted by the RBP may prefer to sell their land outright, and may be referred to the existing DEP LAP. Likewise, LAP should refer properties as appropriate to the land trust. The City will derive acquisition costs for fee land, CE, and soft costs associated with funding the pilot program from the $5million allocated from LAP funds that was previously mentioned in Section 2.1.4 of this report.

### 9.2 – Flood Hazard Mitigation Analysis

The Impact of floods on private property, public infrastructure and the quality of life is one of the primary concerns of watershed residents, stakeholders, and regulators alike. Increased degradation of streams and riparian areas requires increased stream management activities and costs to protect property from flooding and erosion, creating a cyclical problem.

The RBP may provide a tool that can help to reduce and relieve this problem. The most effective tool replaces the “control, rebuild, maintain” cycle with the protection of natural features that help to ameliorate the impacts of flooding. Protecting the role of natural features such as floodplains and riparian buffers can thus help release Catskill Region residents from a vicious cycle of property damage. In a national study of ten programs that diverted development away from flood prone areas, researchers discovered that land next to protected floodplains had increased in value by an average of $10,427 per acre.[36]

Flood Hazard Mitigation Analysis linkages may best be accomplished by reviewing each analysis conducted to determine potential parcels to solicit for RBP participation. Local Soil & Water

[36] Burby, R. *Cities Under Water: A Comparative Evaluation of Ten Cities’ Efforts to Manage Floodplain Land Use*. Institute of Behavioral Science #6, Boulder CO 1988.

Conservation Districts conducting the analysis will be extremely valuable partners in helping to identify parcels for solicitation within the RBP. The RBP primary contractor should serve as a partner in study analysis discussion to determine which program will be more appropriate to solicit each particular parcel.

**9.3 – CREP**

Within the time frame of the RBP Pilot, a number of Conservation Reserve Enhancement Program ("CREP") easements will be up for renewal. Although traditional CREP easements are term-limited and do not necessarily fit the water quality requirements of RBP buffer design, they have proven to help mitigate significant water quality impacts on actively used agricultural properties. It is the recommendation of this report that properties with CREP easements (assuming they remain in good standing with functional Best Management Practices ("BMPs") in place) should be considered for inclusion within the RBP pilot program, in order to receive permanent protection. It would be expected that RBP design methodology would apply, thereby expanding protection beyond the original CREP areas. CREP areas may be incorporated as permanent easements or as fee acquisition strips, depending on the desire of participating landowners. In order to minimize competition with other land protection programs within the watershed, the RBP may seek to target gaps in other programs eligibility. Limitations such as farm income, whole farm plan status, farm size, and timing of extensions would not affect eligibility for RBP. It is the recommendation of this report that RBP accept referrals from FSA, districts, and WAC to avoid conflict while promoting multiple conservation tools that may maximize likelihood of protection success.

To convert CREP areas into permanently protected areas through the RBP, it is problematic that existing CREP easements may not be compatible with the recommended design for this PDI report unless additional land is added. This will likely reduce the amount of land that can be farmed, and may thus be in conflict with other values held by stakeholders. An unintended conflict with agriculture may exist as many of the Prime Agricultural Soils are situated on the 100-year floodplain. It is not the intention of the RBP to compete with existing watershed programs that protect agricultural land. This unintended consequence needs to be addressed and prevented, both from a policy and program perspective. The RBP plans to consider case-by-case easement language modifications for prime agricultural soils with Grantor Approval. In addition, WAC's easement program may consider a program for idle agricultural land, that may protect the option for agriculture in the future, but that do not meet current program standards. This issue is beyond the scope of work of this report, and pilot program. However, the RBP may consider land that does not qualify for other watershed land protection programs.

### 9.4 – Stream Restoration Projects / Stream Management Projects

Image: GCSWCD restoration project

According to Special Condition 29e of the WSP, "The RBP will be implemented in conjunction with one or more Stream Management Plans developed under the City's Stream Management Program, and will be carried out in partnership with one or more land trusts which shall be bound by contract to the City to implement and comply with the provisions of this permit." Local stream programs ability to provide technical assistance will be crucial to the success of the RBP. Technical assistance to landowners can be particularly important when programs are first introduced and/or when conservation practices are complex or unfamiliar.[37] The RBP is strictly a real-property acquisition initiative and is not designed as an outreach tool. However, the RBP can increase landowner knowledge about stream maintenance options by networking landowners with local Stream Programs and other available resources to benefit overall watershed management.

Successful riparian restoration and protection programs educate landowners about the exact nature of their stream challenges, demonstrate a riparian buffer's benefit to the local environment, illustrate the roles that landowners play in the conservation process, and provide effective, workable solutions.[38] Restoration projects emphasize establishment of deep-rooted, native woody and herbaceous vegetation on streambanks and floodplains.[39]

On numerous occasions, local stream managers have observed everyday activities carried out by private landowners that may damage their own riparian area and lead to bank and bed instability in the future. These landowners may not be aware of the potential impacts of their actions. In fact, the GCSWCD team evaluating the East Kill found that landowners often believe that such activities actually

[37] Klapproth, Julia C. and Johnson, James E.; *Understanding the Science Behind Riparian Forest Buffers: Factors Influencing Adoption*. Virginia Cooperative Extension, Virginia Tech University, February 2001
[38] Klapproth, Julia C. and Johnson, James E.; *Understanding the Science Behind Riparian Forest Buffers: Factors Influencing Adoption*. Virginia Cooperative Extension, Virginia Tech University, February 2001
[39] GCSWCD, Et al. *The Batavia Kill Stream Management Plan*. Greene County Soil & Water Conservation District.. Cairo, NY. January 2003

may benefit stream health. This accentuates the need for increased awareness of the role of permanent protection for a diverse woody assemblage of riparian vegetation in stream health.[40] It is the recommendation of this report that landowners participating in the RBP should receive higher priority for funding from Stream Management Programs. This is an example of an additional incentive that may improve buffer program participation. Stream Management Programs may be able to design BMP's for particular parcels that wish to include public recreational access as a long term utility. The Catskill Stream Buffer Initiative (CSBI) program may be able to refer landowners who are interested in providing permanent protection of stream restoration sites to the RBP. In turn, the RBP may urge participating landowners to seek out CSBI restoration projects on eased buffers.

### 9.5 - NYSDEC Fishing Easements

In order to incentivize the program for landowners, this report recommends that DEC contribute additional acquisition funds to landowners where public fishing access will be granted as terms of the easement. Group discussion is required on this topic.

### 9.6 – Alternative Incentive Funding

Economics is a high priority factor in implementing conservation programs. However, economic incentives alone often do not explain private lands conservation program participation. Monetary incentives alone are often too small to fundamentally change land use decisions and may only reward a landowner for activity s/he was likely to undertake regardless without the incentive.[41] Additional non-monetary incentives can be utilized to gain landowner participation. Practices that are profitable and simple to implement are more likely to be implemented.[42] Funding should be targeted to where it is most effective for conservation in order to direct more marketable compensation to participating landowners.[43]

Development of landowner incentive programs to encourage participation in riparian buffer protection programs was cited in the general recommendations sections of the Batavia Kill & Schoharie Creek Management Plans. It is the recommendation of this report that incentives offered to participate in RBP should go beyond financial. For instance, in the case of CEs, landowners may be more likely to

[40] GCSWCD, Et al. *The Batavia Kill Stream Management Plan*. Greene County Soil & Water Conservation District.. Cairo, NY. January 2003

[41] Kauneckis, Derek; *What Do We Know About Landowner Behavior and Why Does it Matter for Environmental Policy Design*; presented at Western Political Association meeting, March 8-10, 2007, Las Vegas, Nevada.

[42] Klapproth, Julia C. and Johnson, James E.; *Understanding the Science Behind Riparian Forest Buffers: Factors Influencing Adoption*. Virginia Cooperative Extension, Virginia Tech University, February 2001

[43] Klapproth, Julia C. and Johnson, James E.; *Understanding the Science Behind Riparian Forest Buffers: Factors Influencing Adoption*. Virginia Cooperative Extension, Virginia Tech University, February 2001

participate if they are offered greater access to consulting services through the local stream management programs. A landowner may also be more interested if their property receives higher priority for stream management or stream restoration projects.

For landowners only willing to sell a CE, the following incentives may be of interest:

- Access to stream consultants through their local stream management program;
- Priority for stream management projects to proactively protect stream banks; and/or
- Priority for stream program visits and site assessment after a flood event.

For landowners willing to sell land in Fee Simple, the following incentives may be of interest:

- Monetary incentives
- Flood Property-Swap or Flood Buyout programs; and/or
- Greenway-related recreational and tourism benefits (in the case of local businesses)
- Deed-in-escrow agreements to encourage neighbors to sell.

## Section 10 – Conclusions/Recommendations

### 10.1 – Next Steps

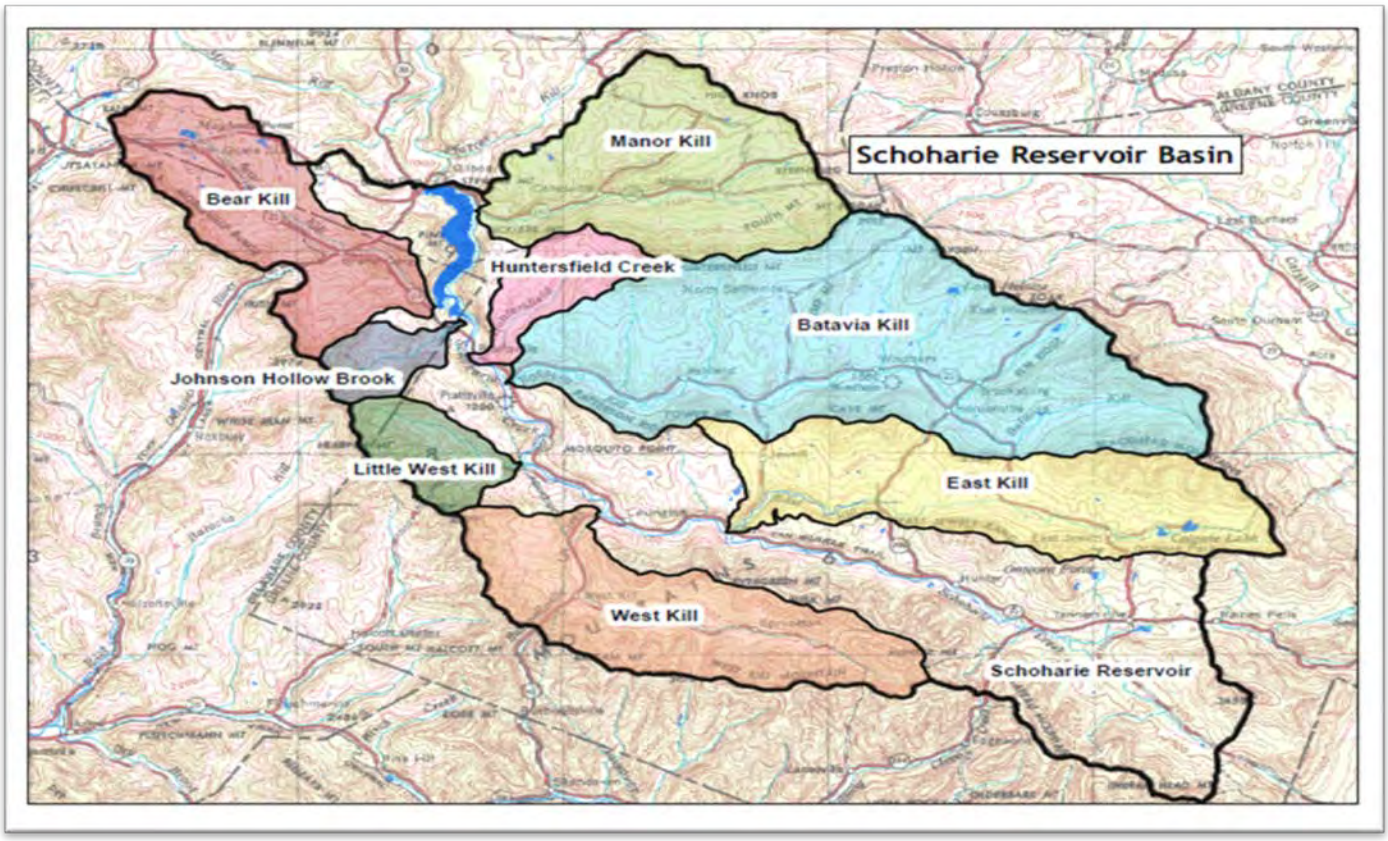
According to the WSP "The City shall submit to NYSDEC a written recommendation regarding the implementation of the Program no less than 3 months before the implementation deadline", which is November 1, 2014. These recommendations will be considered for approval by NYSDEC. NYSDEC will make a determination and modify the WSP as appropriate.

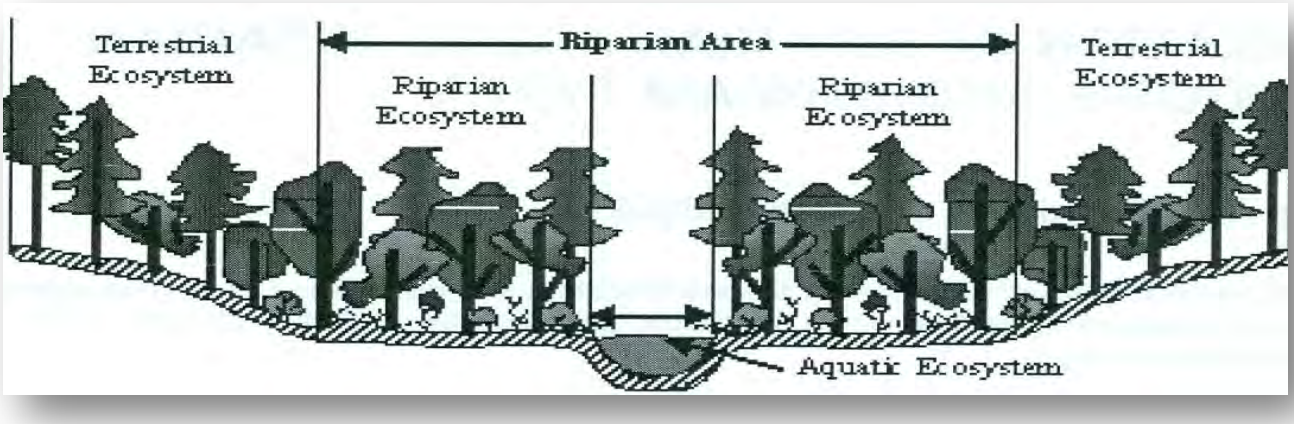
### 10.2 – Final Recommendations of this Report

1. To accommodate a variety of water-quality objectives that dovetail with landowner interests, a riparian buffer protection program should be structured as a new land acquisition tool that complements existing DEP land acquisition efforts.
2. The scope of the pilot program should be focused within the Schoharie Basin.
3. Buffer design should be based on Geographic Information System data, floodplain mapping, and ground-truthed stream geomorphology.
4. Buffer design and prioritization should incorporate flood hazard mitigation as allowed within the rules of the MOA and WSP. Integration of 100 year floodplains into the design can prevent increases in impervious surfaces and contaminants in active stream areas.
5. The RBP should provide additional landowner incentives to allow public access on eased land in order to compliment local recreational and economic objectives.
6. As this program expands in the watershed, RBP solicitation and priorities should be integrated with Local Flood Hazard Mitigation Analysis.

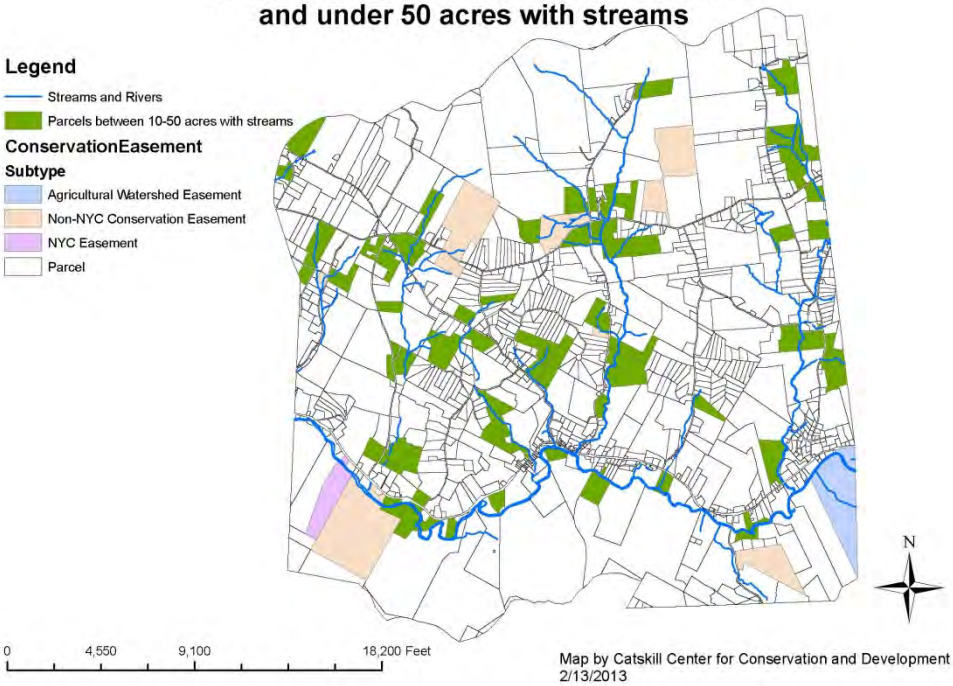
7. Permanent protection (in expanded form) of the buffers created under CREP should be explored within the RBP.
8. DEP may explore whether cost-effective stewardship monitoring can exist on small acquisitions or easements by contracting with local land trusts.
9. The RBP should coordinate with DEP's Stream Management Program(s), and landowners participating in the RBP should be encouraged to seek services from various Stream Management Programs. This is an example of an additional incentive that may improve landowner participation in the RBP.
10. The RBP should undergo evaluation halfway through the pilot and once again upon completion of the pilot phase to determine whether program will continue beyond pilot.

# APPENDIX


Schoharie Reservoir Basin
Manor Kill
Bear Kill
Huntersfield Creek
Batavia Kill
Johnson Hollow Brook
Little West Kill
East Kill
West Kill
Schoharie Reservoir

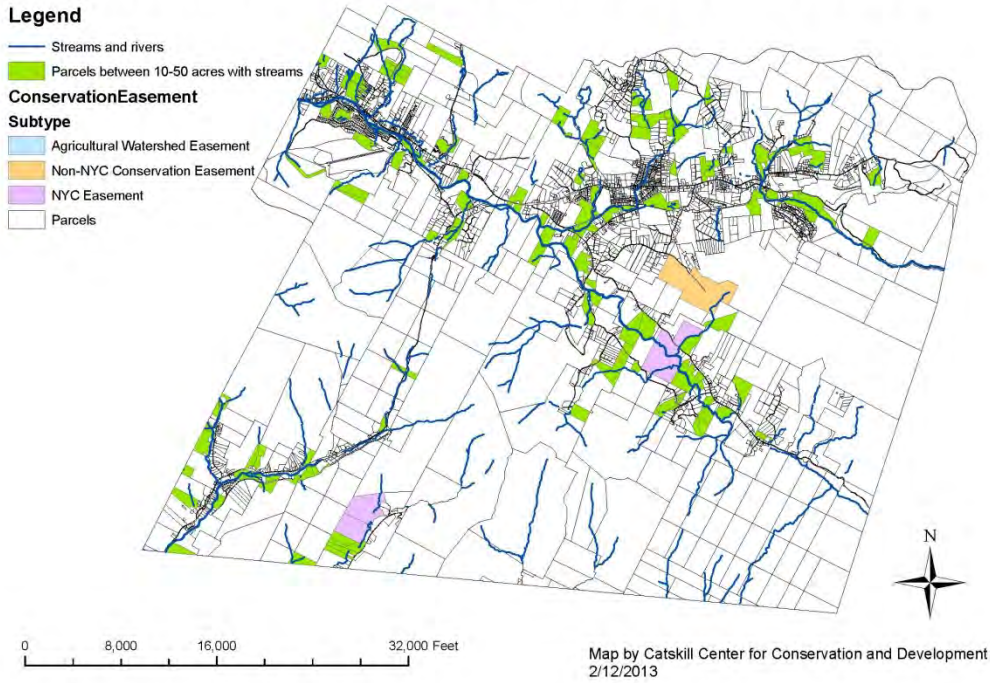

Terrestrial Ecosystem
Riparian Area
Riparian Ecosystem
Riparian Ecosystem
Terrestrial Ecosystem
Aquatic Ecosystem

## Town of Ashland Parcels above 10 acres and under 50 acres with streams



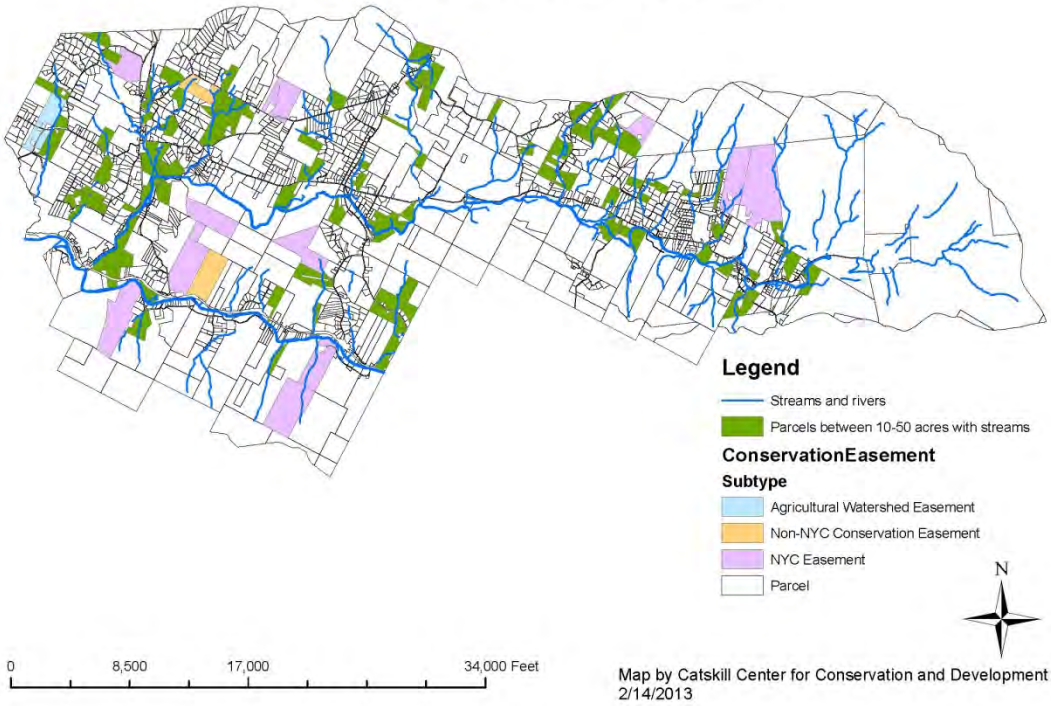

Map by Catskill Center for Conservation and Development
2/13/2013

## Town of Hunter Parcels above 10 acres and under 50 acres



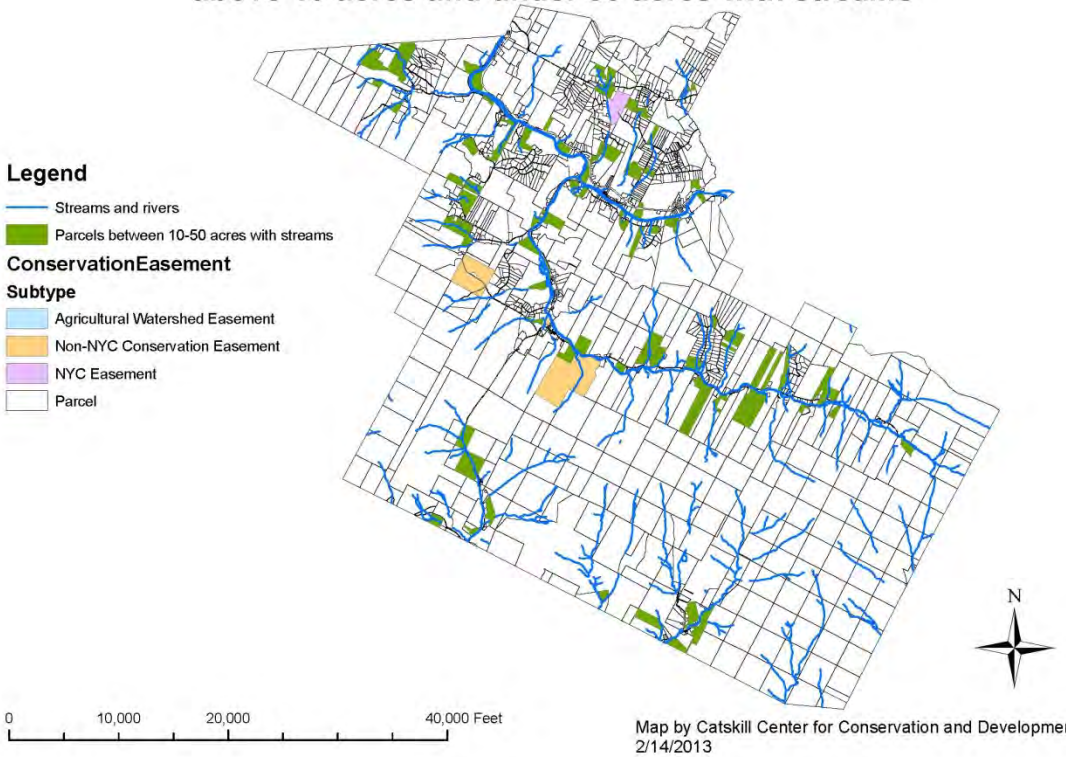

Map by Catskill Center for Conservation and Development
2/12/2013

## Town of Jewett Parcels above 10 acres and under 50 acres with streams



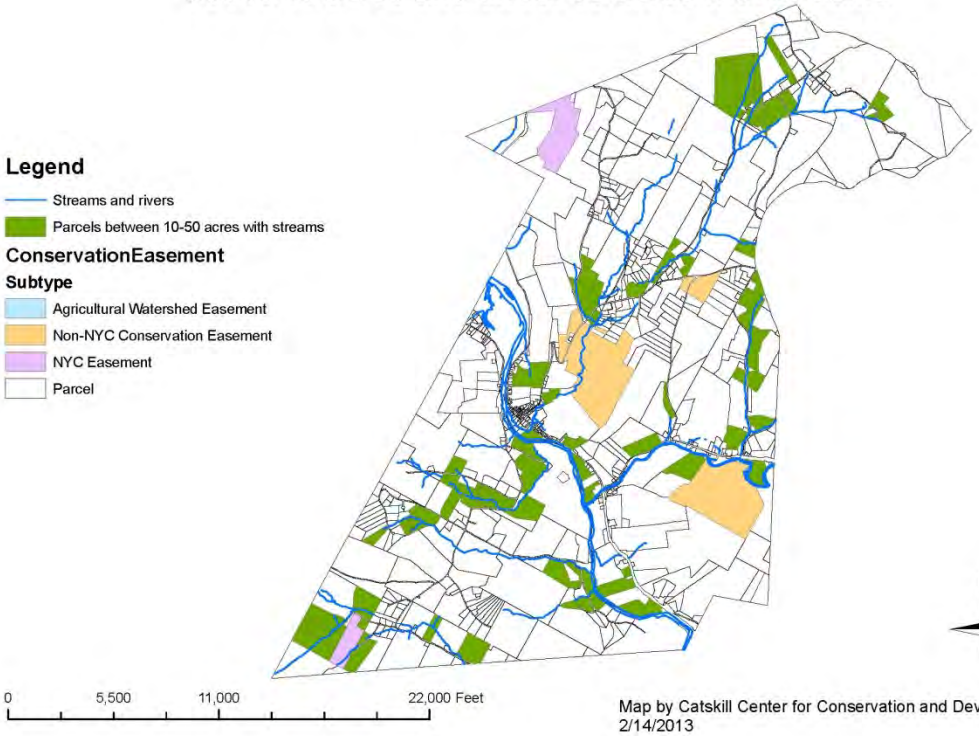

Map by Catskill Center for Conservation and Development
2/14/2013

## Town of Lexington Parcels above 10 acres and under 50 acres with streams



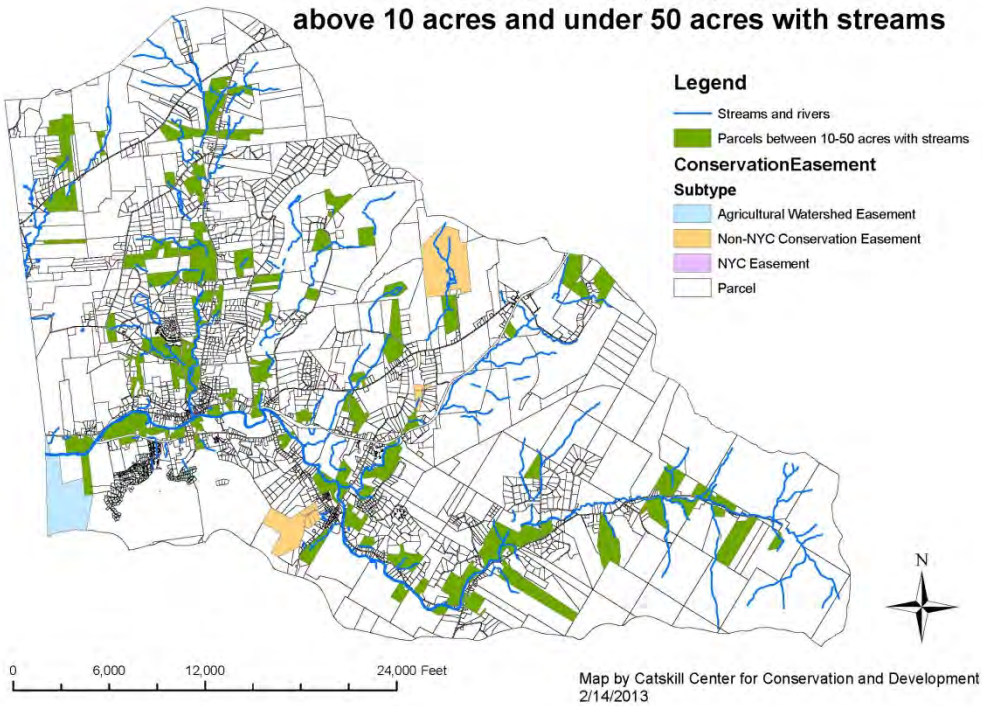

Map by Catskill Center for Conservation and Development
2/14/2013

## Town of Prattsville Parcels
## above 10 acres and under 50 acres with streams



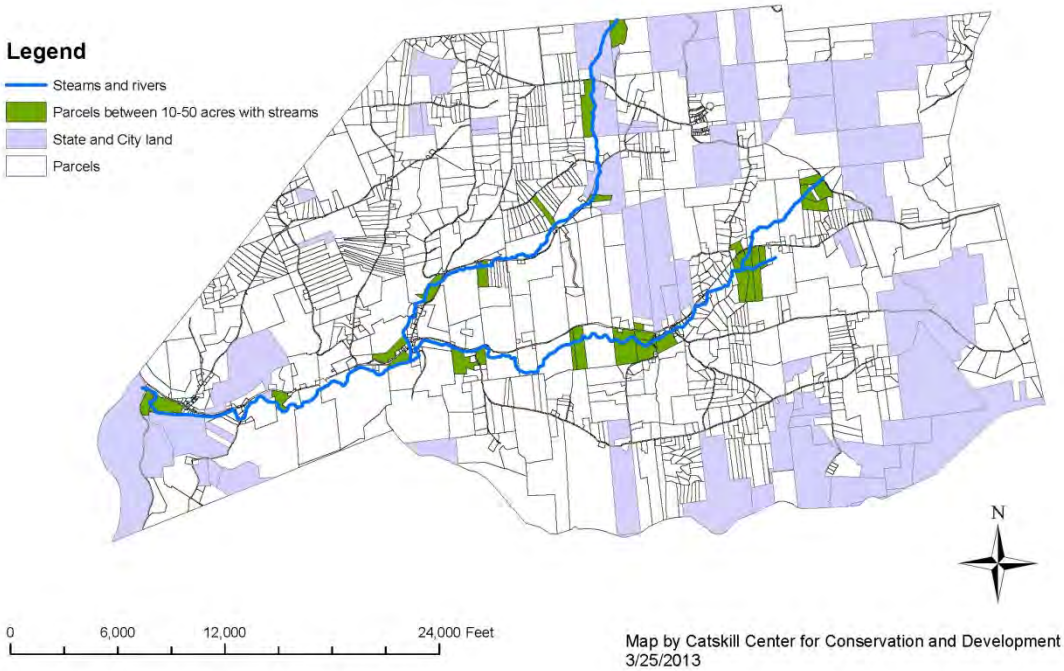

Map by Catskill Center for Conservation and Development
2/14/2013

## Town of Windham Parcels
## above 10 acres and under 50 acres with streams



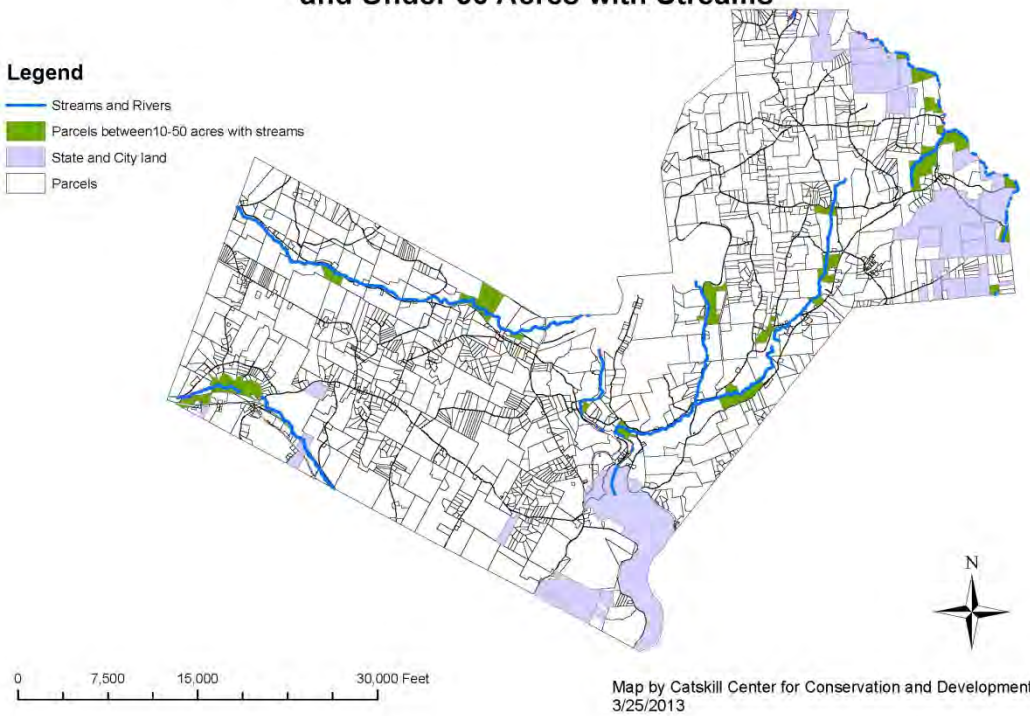

Map by Catskill Center for Conservation and Development
2/14/2013

## Town of Conesville Parcels Above 10 Acres and Under 50 Acres With Streams



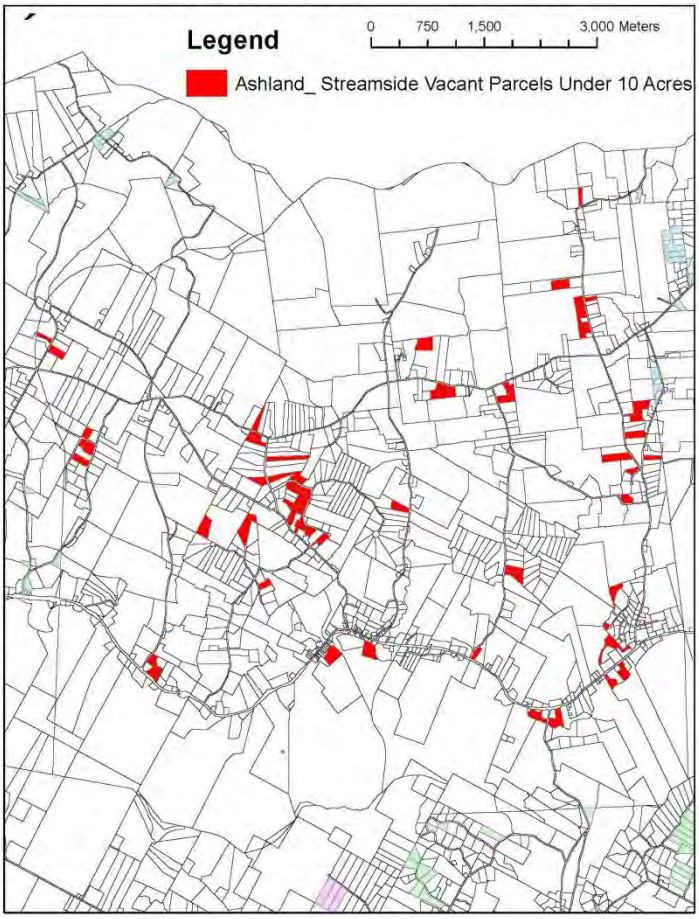

Map by Catskill Center for Conservation and Development
3/25/2013

## Town of Gilboa Parcels Above 10 Acres and Under 50 Acres with Streams

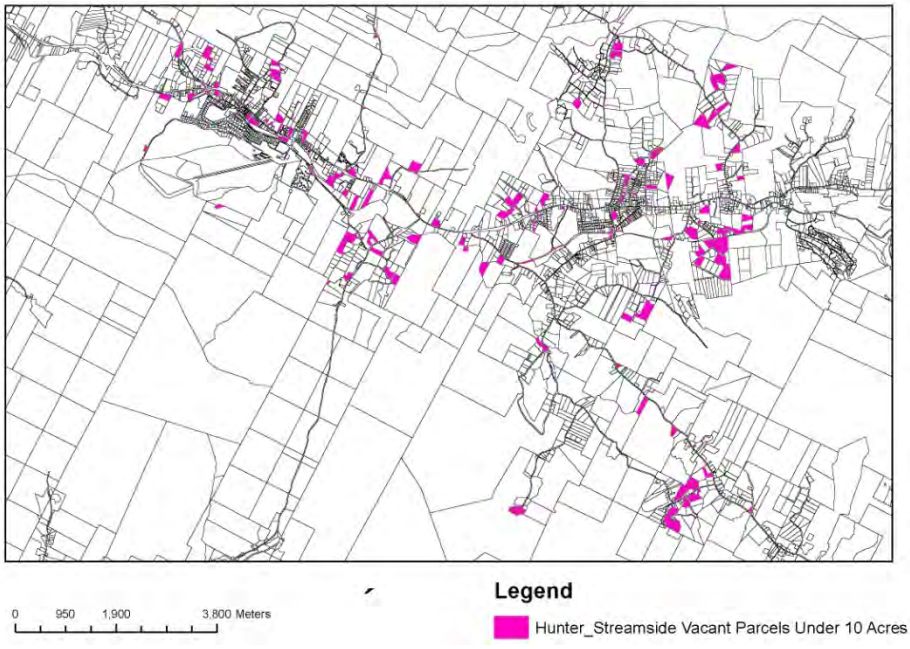



Map by Catskill Center for Conservation and Development
3/25/2013

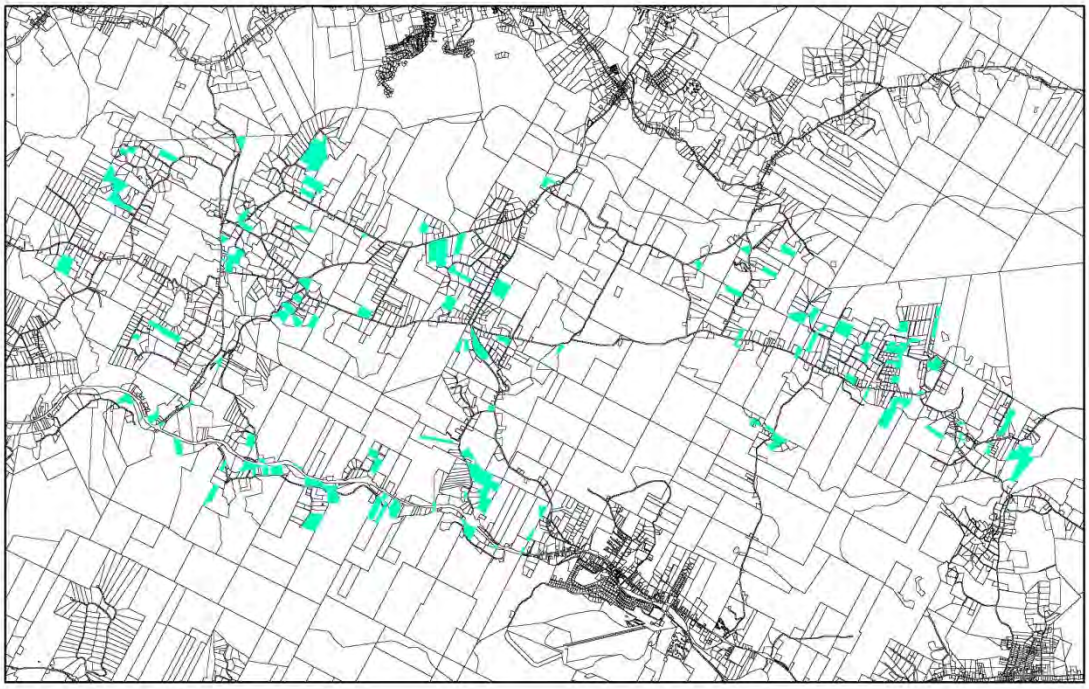
## Schoharie Basin Tax Parcels




## Schoharie Basin Tax Parcels



## Schoharie Basin Tax Parcels



0 1,100 2,200 4,400 Meters

**Legend**

Jewett_Streamside Vacant Parcels Under 10 Acres

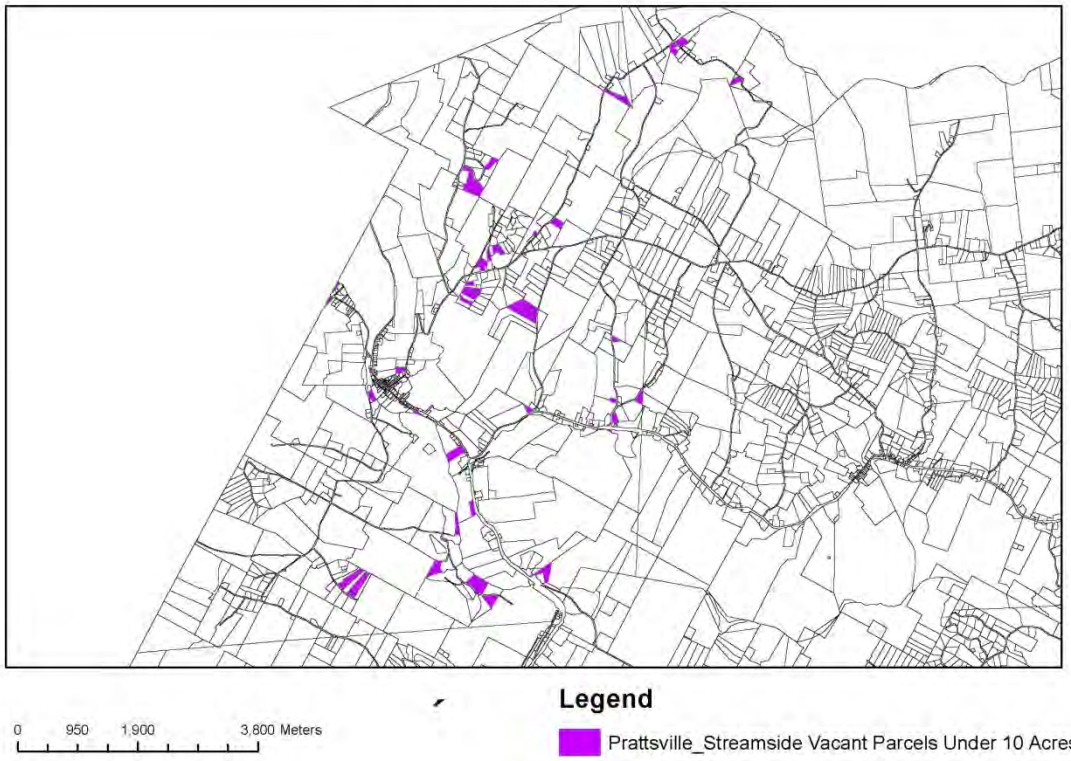
## Schoharie Basin Tax Parcels

0 1,050 2,100 4,200 Meters

**Legend**

Lexington_Streamside Vacant Parcels Under 10 Acres

## Schoharie Basin Tax Parcels

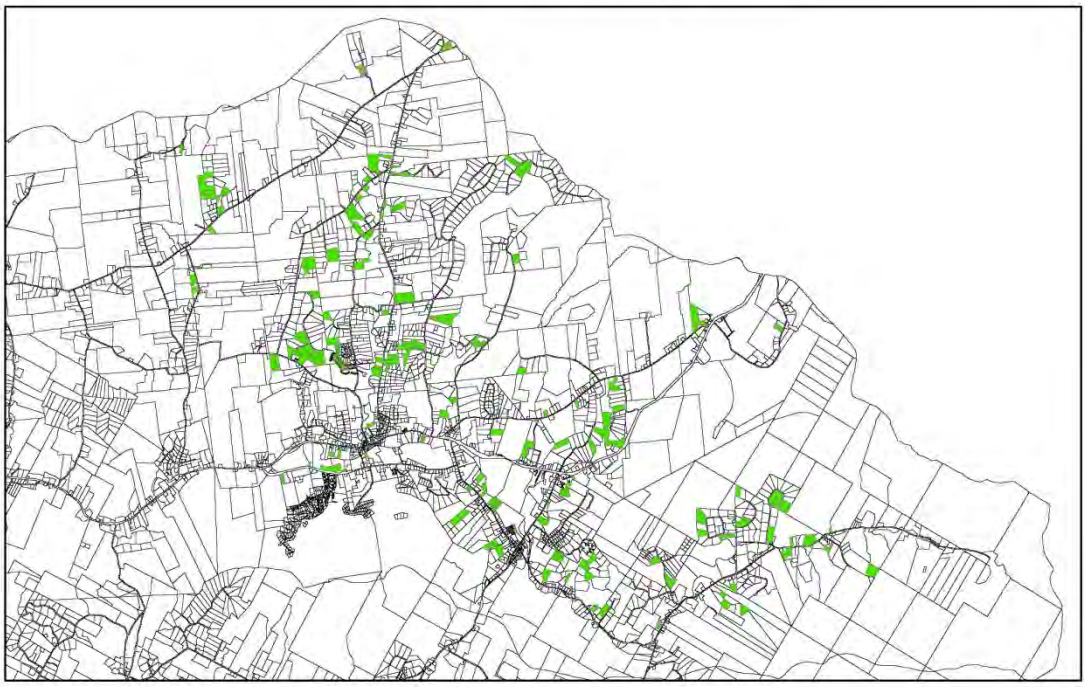


0 950 1,900 3,800 Meters

**Legend**

Prattsville_Streamside Vacant Parcels Under 10 Acres

## Schoharie Basin Tax Parcels



0 1,125 2,250 4,500 Meters

**Legend**

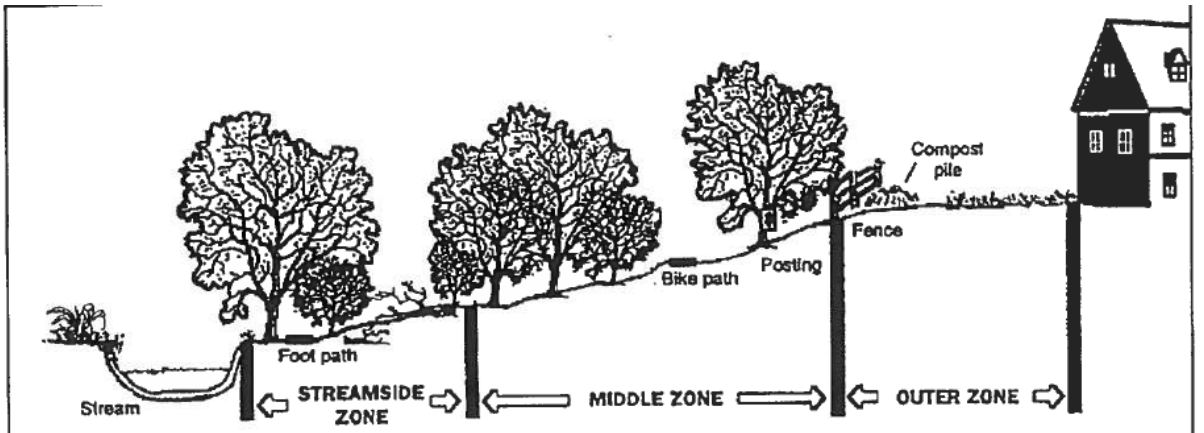
Windham_Streamside Vacant Parcels Under 10 Acres

FIRST SOLICIATION, PILOT PROGRAM

| POINTS | Buffer Acreage | POINTS | 100-Yr Floodplain | POINTS | SMP FOCUS | POINTS | Mapped Watercourse |
|---|---|---|---|---|---|---|---|
| | *(Acres)* | | (% Acreage of Parcel) | | (Linear Feet, Both Banks) | | (Linear Feet, Both Banks) |
| 10 | 50+ | 10 | 75-100% | 10 | >1000 | 10 | >1000 |
| 9 | 35-49 | 9 | 50-74% | 9 | 900-999 | 9 | 900-999 |
| 8 | 31-34 | 8 | 35-49% | 8 | 800-899 | 8 | 800-899 |
| 7 | 26-30 | 7 | 21-34% | 7 | 700-799 | 7 | 700-799 |
| 6 | 21-25 | 6 | 15-20% | 6 | 600-699 | 6 | 600-699 |
| 5 | 15-20 | 5 | 10-14% | 5 | 500-599 | 5 | 500-599 |
| 4 | 10-14 | 4 | 6-9% | 4 | 400-499 | 4 | 400-499 |
| 3 | 6-9 | 3 | 4-5% | 3 | 300-399 | 3 | 300-399 |
| 2 | 4-5 | 2 | 3-4% | 2 | 200-299 | 2 | 200-299 |
| 1 | 2-3 | 1 | 2% | 1 | 100-199 | 1 | 100-199 |
| 0 | <2 | 0 | <2 | 0 | <100 | 0 | <100 |

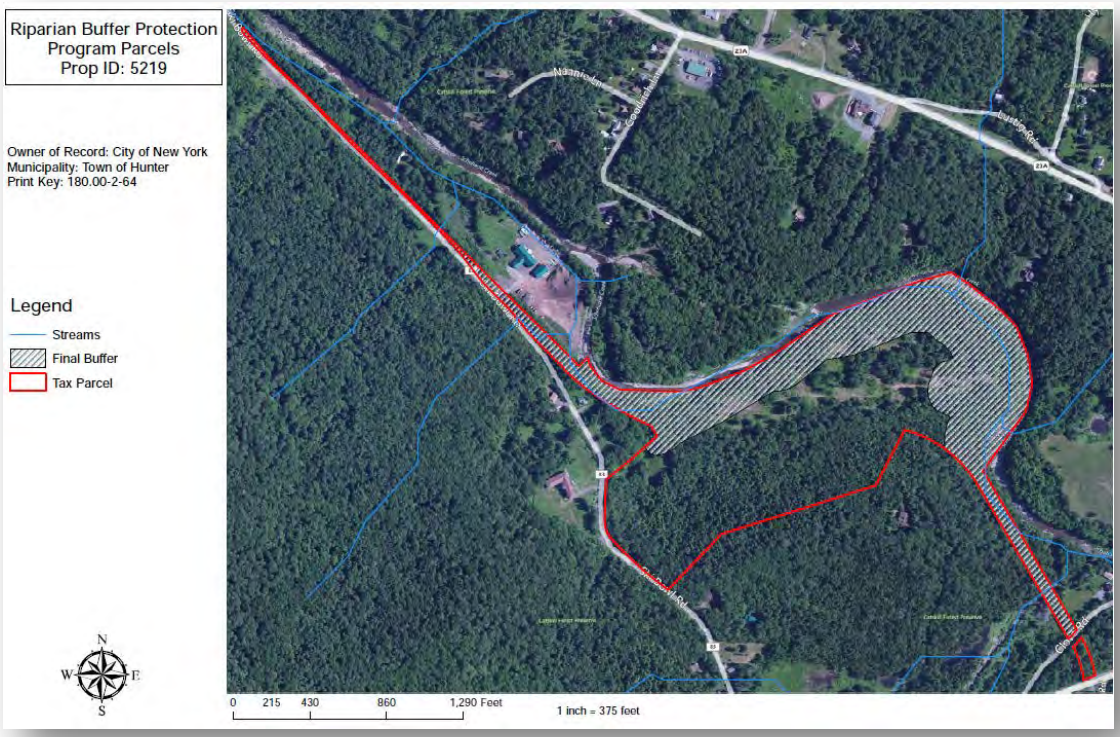
APPRAISAL ROUND 1

| POINTS | WILLING LO | POINTS | Configuration | POINTS | GREENWAY | POINTS | CONTIGUITY |
|---|---|---|---|---|---|---|---|
| | (Acres) | | | | | | |
| 10 | FEE | 10 | Includes >75% Water Features | 10 | As-Of-Right | 10 | Abuts, strong connection |
| | | 8 | Low Boundary-to-Area Ratio | | | | |
| | | 6 | No Outparcels | | | 6 | Abuts, weak connection |
| | | 4 | No Orphans | | | | |
| 3 | CE | | | 3 | Grantor Approved Req'd | | |
| | | 2 | No Right to Pass Through | | | 2 | Doesn't abut |
| 0 | Neither | | | 0 | None | | |

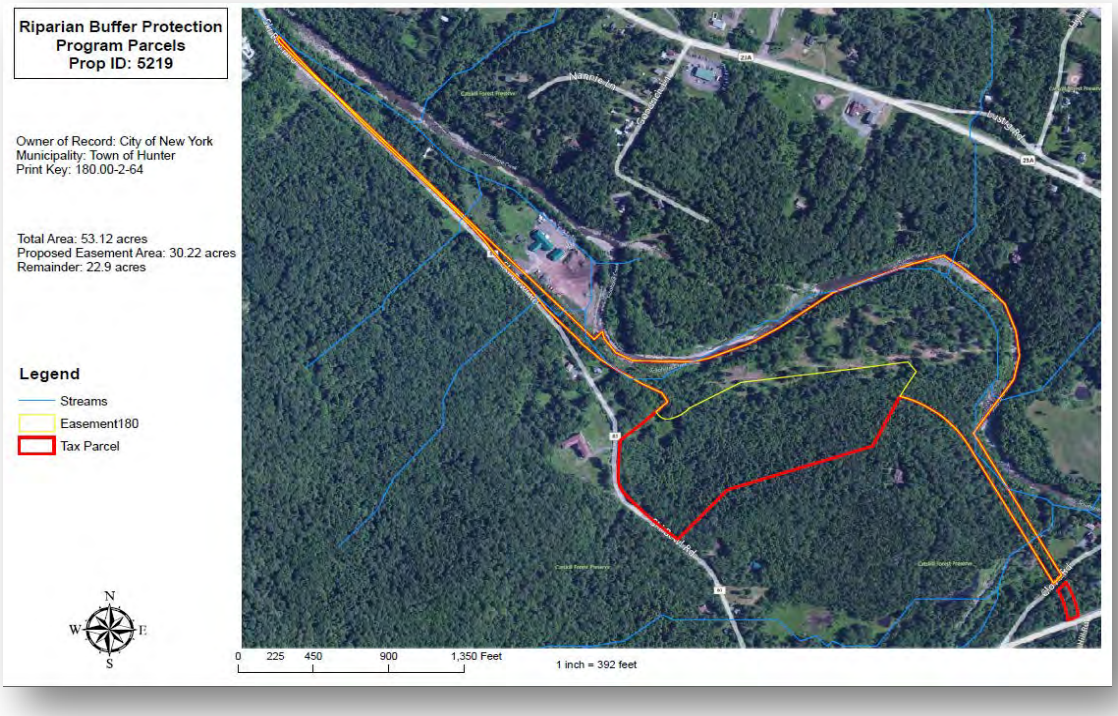


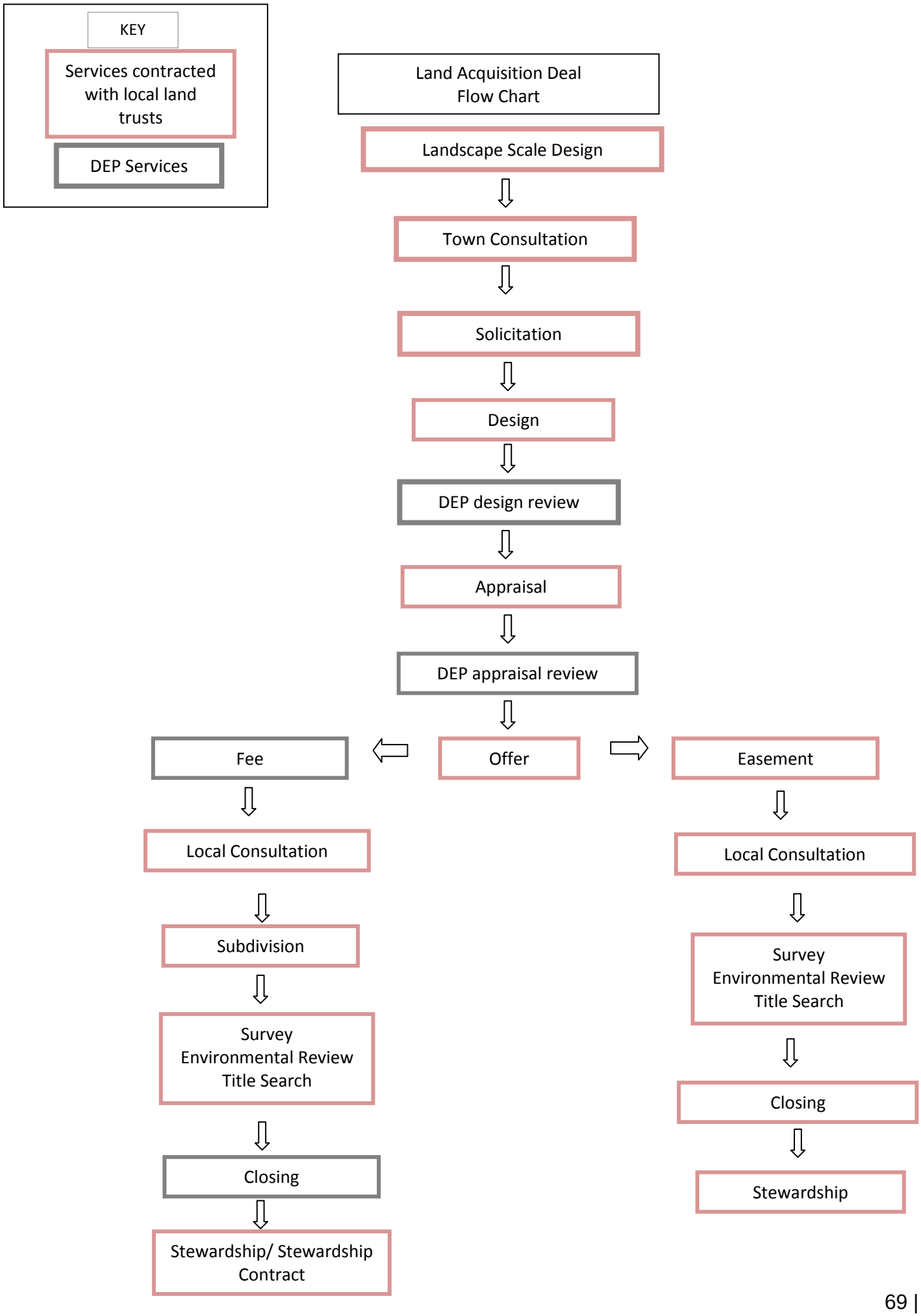

| CHARACTERISTICS | STREAMSIDE ZONE | MIDDLE ZONE | OUTER ZONE |
|---|---|---|---|
| FUNCTION | Protect the physical integrity of the stream ecosystem | Provide distance between upland development and streamside zone | Prevent encroachment and filter backyard runoff |
| WIDTH | Min. 25 feet, plus wetlands and critical habitats | 50 to 100 feet, depending on stream order, slope, and 100 year floodplain | 25 foot minimum setback to structures |
| VEGETATIVE TARGET | Undisturbed mature forest. Reforest if grass | Managed forest, some clearing allowable | Forest encouraged, but usually turfgrass |
| ALLOWABLE USES | ***Very Restricted*** e.g., flood control, utility right of ways, footpaths, etc. | ***Restricted*** e.g., some recreational uses, some stormwater BMPs, bike paths, tree removal by permit | ***Unrestricted*** e.g., residential uses including lawn, garden, compost, yard wastes, most stormwater BMPs |

**E**

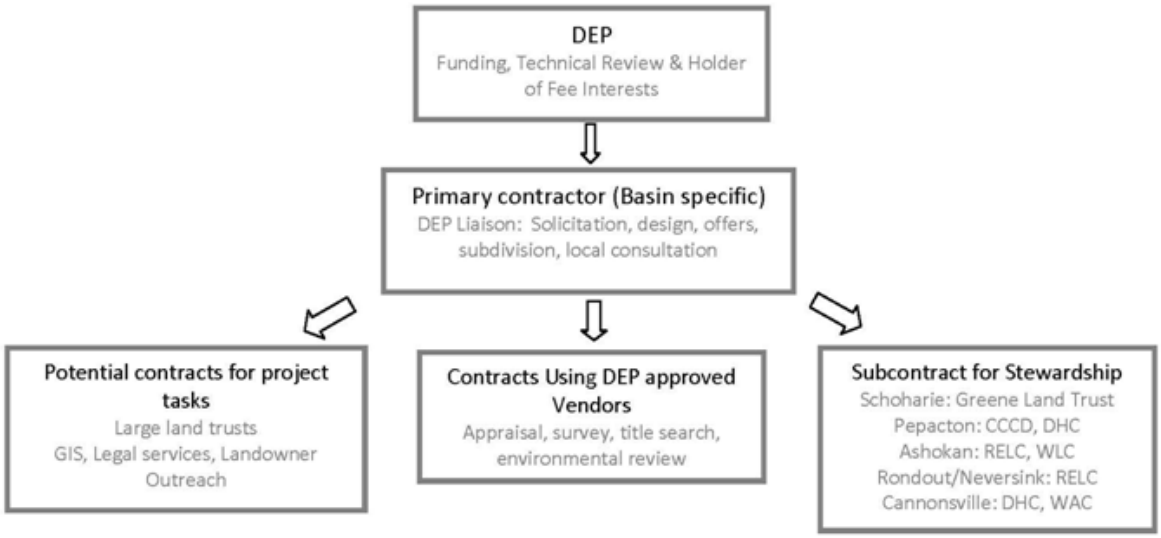

Riparian Buffer Protection
Program Parcels
Prop ID: 5219
Owner of Record: City of New York
Municipality: Town of Hunter
Print Key: 180.00-2-64
Legend
Streams
Final Buffer
Tax Parcel
N
W
E
S
0 215 430 860 1,290 Feet
1 inch = 375 feet

**F**


Riparian Buffer Protection
Program Parcels
Prop ID: 5219
Owner of Record: City of New York
Municipality: Town of Hunter
Print Key: 180.00-2-64
Total Area: 53.12 acres
Proposed Easement Area: 30.22 acres
Remainder: 22.9 acres
Legend
Streams
Easement180
Tax Parcel
N
W
E
S
0 225 450 900 1,350 Feet
1 inch = 392 feet


KEY
Services contracted with local land trusts
DEP Services
Land Acquisition Deal Flow Chart
Landscape Scale Design
Town Consultation
Solicitation
Design
DEP design review
Appraisal
DEP appraisal review
Offer
Fee
Local Consultation
Subdivision
Survey
Environmental Review
Title Search
Closing
Stewardship/ Stewardship Contract
Easement
Local Consultation
Survey
Environmental Review
Title Search
Closing
Stewardship

Potential Organization Structure




Assumptions

- No current excess capacity within DEP, watershed programs, or partners
- New capacity will require either DEP hiring or contracted services
- Preliminary discussion suggests DEP preference for contractual approach
- Land trusts willing to engage to varying degrees from principle contracts to service contracts

VALUATION SCHEDULE
PFR FOOTPATH (IN FEE)

| | FOOTPATH LENGTH (4'-10' WIDTH) - RPD #1816. MOD. # | | |
|---|---|---|---|
| STREAM PFR VALUE PER EQ.MI. | <100' | 100'-500' | >500' |
| $5,625 | $500 | $500 + $3 x (L-100') | $1,700 + $1.50 x (L-500') |
| $11,250 | $600 | $600 + $3 x (L-100') | $1,800 + $1.50 x (L-500') |
| $16,800 | $700 | $700 + $3 x (L-100') | $1,900 + $1.50 x (L-500') |
| $22,500 | $800 | $800 + $3 x (L-100') | $2,000 + $1.50 x (L-500') |
| $30,000 | $900 | $900 + $3 x (L-100') | $2,100 + $1.50 x (L-500') |
| $45,000 | $1,000 | $1,000 + $3 x (L-100') | $2,200 + $1.50 x (L-500') |

VALUATION SCHEDULE
PFR PARKING AREA (IN FEE)

| | PARKING AREA SIZE - RPD #1816, Mod. # | | |
|---|---|---|---|
| PFR VALUE PER EQ. MI. | <4,000 SQ. FT. | 4,000 SQ. FT - 8,000 SQ. FT | 8,001 SQ. FT.- 12,000 SQ. FT. |
| $5,625 | $1,500 | $2,000 | $2,500 |
| $11,250 | $1,650 | $2,200 | $2,750 |
| $16,800 | $1,800 | $2,400 | $3,000 |
| $22,500 | $1,950 | $2,600 | $3,250 |
| $30,000 | $2,100 | $2,800 | $3,500 |
| $45,000 | $2,250 | $3,000 | $3,750 |

TABLE I
PFR VALUATION SCALE

| PRIORITY RATING POINTS | VALUE PER EQ. MI. - BOTH BANKS OF STREAM |
|---|---|
| 10-23 | $5,625 |
| 24-46 | $11,250 |
| 47-69 | $16,800 |
| 70-92 | $22,500 |
| 93-96 | $30,000 |
| 97-100 | $45,000 |

TABLE II
"SHORT PARCEL" (IE. 1000 FT., OR 0.09470 EQ.MI. OR LESS)
PFR VALUATION SCALE (ONE BANK OF STREAM)

| PRIORITY RATING POINTS | SEGMENT LENGTH 50 FT OR LESS | VALUE PER ADD'L FOOT, UP TO 1,000 FT | MAX VALUE FOR 1,000 FT | VALUE FOR 1,001 FT |
|---|---|---|---|---|
| 10-23 | $500 | $0.59/foot | $1,060 | $1,066 |
| 24-46 | $750 | $0.88/foot | $1,586 | $1,592 |
| 47-69 | $1,000 | $1.19/foot | $2,131 | $2,133 |
| 70-92 | $1,400 | $1.51/foot | $2,835 | $2,844 |
| 93-96 | $2,100 | $2.27/foot | $4,257 | $4,266 |
| 97-100 | $2,800 | $3.00/foot | $5,650 | $5,659 |