New York City Department of Environmental Protection
Bureau of Water Supply

Stream Management Program
Request for Approval for Three Water Quality Stream Projects:
East Branch of the Neversink River at Ladleton
(Neversink Basin)
West Branch of the Delaware River at Riverhaven Farm
(Cannonsville Basin)
and
West Branch of the Delaware River at Birdsong Farm
(Cannonsville Basin)

November 2020

Prepared in accordance with Section 4.6 of the NYSDOH
2017 Filtration Avoidance Determination

Prepared by: DEP, Bureau of Water Supply

Introduction

Stream restoration projects are a core component of the New York City Department of Environmental Protection (DEP) Stream Management Program (SMP); they have a primary purpose of improving water quality, especially by reducing erosion of streambanks and stream channels and entraining fine sediments that contribute to turbidity.

The 2017 Filtration Avoidance Determination (FAD) requires the SMP to design and complete construction of at least 24 Stream Projects that have a principal benefit of water quality protection or improvement by December 31, 2027; at least eight of these 24 projects shall be in the Ashokan watershed. By November 30 of each year, DEP is required to propose new Stream Projects for approval by the New York State Department of Health (NYSDOH) pursuant to the FAD.

To date, 11 Stream Projects have been approved towards fulfillment of the 24 required Stream Projects having a principal benefit of water quality protection or improvement (Table 1). DEP refers to these as Water Quality Stream Projects (WQSPs) for FAD reporting purposes.

Table 1. Status of WQSPs towards fulfillment of the 2017 FAD requirement.

Project Name	Status	Length (feet)	Basin
Batavia Kill at Kastanis	Completed	3,800	Schoharie
Bush Kill at Watson Hollow	Completed	250	Ashokan
Batavia Kill at Red Falls Project 1	Approved	2,700	Schoharie
Batavia Kill at Red Falls Project 2	Approved	4,400	Schoharie
West Branch Neversink River at Clothes Pool	Completed	900	Neversink
Hillslope Stabilization at Bull Run	Approved	300	Pepacton
East Kill at Colgate Lake Road	Completed	700	Schoharie
Warner Creek Site 1	Approved	540	Ashokan
Warner Creek Site 2	Approved	560	Ashokan
Stony Clove Above Jansen Road	Approved	1,600	Ashokan
West Kill Above Wolff Road	Approved	1,000	Schoharie

Through this report, DEP formally requests NYSDOH approval for three additional WQSPs to be counted towards the 2017 FAD requirement: (1) East Branch of the Neversink River at Ladleton in the Neversink basin; (2) West Branch of the Delaware River at Riverhaven Farm in the Cannonsville basin; and (3) and West Branch of the Delaware River at Birdsong Farm in the Cannonsville basin.

Project Description: East Branch of the Neversink River at Ladleton

The East Branch of the Neversink River begins in the Town of Denning, with headwaters draining Table, Lone, Rocky, Balsam Cap, Friday, Cornell, and Slide Mountains, flowing into the Town of Neversink to join the West Branch, and on to the Neversink Reservoir. Passing in and out of state-owned land, the stream runs roughly parallel to Denning Road. A stream feature inventory (SFI) of the Neversink River's mainstem and main branches (East and West) conducted by the Rondout Neversink Stream Program (RNSP) in 2011 identified a hillslope failure and bank erosion at the Ladleton site as a significant contributor of fine sediment loading to the Neversink Reservoir.

The Upper Neversink River Stream Management Plan, completed in 2013, recommended additional monitoring at Ladleton to confirm the rate of erosion and support development of treatment options. A Bank Erosion Monitoring Study conducted in 2014 ranked 46 bank erosion sites on the Neversink River's mainstem and tributaries in terms of total area contributing fine sediment; the Ladleton site ranked near the top of that list. The clay-rich glacial till in the hillslope and in the eroding bank opposite and downstream has been observed on numerous occasions, especially during freeze/thaw cycles, to create significant turbidity during elevated flow events. Hydraulic erosion at the toe of the hillslope has undermined its stability, maintaining an over-steepened condition that prevents the establishment of a stable angle of repose and natural revegetation, resulting in the ongoing introduction of both fine and coarse sediment and large wood. The channel alignment has evolved over the past decade to acquire a tight radius of curvature at the base of the hillslope, increasing velocity vectors and impinging shear stress. Site analysis of monitoring data in the years since the Bank Erosion Monitoring Study concluded that the hillslope is unlikely to restabilize within reasonable management time frames without significant intervention.

Design of a WQSP for the Ladleton site is underway, and DEP anticipates that construction will begin in 2021 or 2022. The project will likely include the construction of a vegetated, bankfull elevation bench at the toe of the hillslope, approximately 1,200 feet of channel realignment, grade control and flow diversion structures (rock vanes), soil lifts, and bioengineering. It may also include stormwater management practices on the terrace above the slope failure to address road ditch outfalls that saturate the terrace before flowing, incised, over the hillslope.

The following four images further support the nomination of the Ladleton project as a FAD-approved WQSP. Figure 1 depicts the project location within the Neversink basin. Figure 2 depicts the primary hillslope failure at the project site. Figure 3 depicts the secondary lower bank at the project site. Figure 4 provides an aerial view of the project site, with bank failure locations highlighted in red shading.

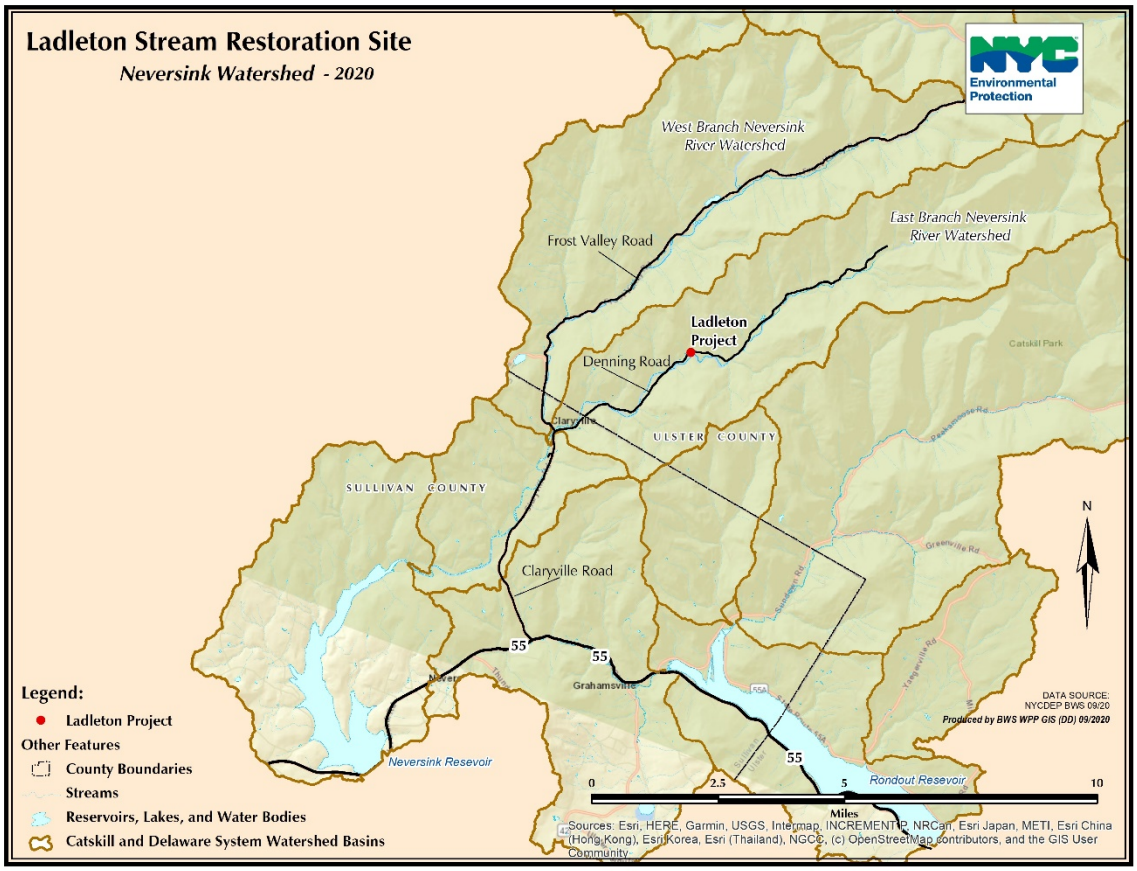

Figure 1. Location of the proposed Ladleton WQSP within the Neversink basin.

Figure 2. Primary hillslope failure at the East Branch of the Neversink River at Ladleton.

Figure 3. Secondary lower bank at the Ladleton project site.

Figure 4. Aerial view of the Ladleton project site, with bank failure locations highlighted.

Project Description: West Branch of the Delaware River at Riverhaven Farm

The West Branch of the Delaware River (WBDR) flows 51 miles from its origin at Utsayantha Lake in Stamford, NY to its impoundment at the Cannonsville Reservoir. Delaware County Soil and Water Conservation District (DCSWCD) identified a reach of chronic instability on the WBDR at Riverhaven Farm as a potential WQSP in 2019. The reach was confirmed as a WQSP through review of available remotely sensed imagery (2001–2016) and field investigation in 2019 and 2020. A full channel restoration is proposed to address fine sediment loading and associated nutrient loading from eroded bank sediment in this agricultural setting.

The SFI prioritization process undertaken for the WBDR Stream Corridor Management Plan identified management unit 21, which includes Riverhaven Farm, as the second most unstable unit on the WBDR; between 2009 and 2016, DCSWCD estimates that erosion at Riverhaven Farm made up 68% of the total eroded area within the management unit. Further, using remotely sensed imagery and field measurements along with assumptions of total phosphorus (TP) and total nitrogen (TN) concentrations (based on past sampling in similar soils), DCSWCD estimates that approximately 14,012 cubic yards (778 dump truck loads) of soil were eroded into the WBDR between 2009 and 2019. Using these assumed nutrient concentrations, the eroded soil may have yielded approximately 8,631 pounds of TP and 31,055 pounds of TN.

Instability at this site is attributable to (1) tributary confluence dynamics (flooding and sediment delivery), (2) channel alignment with hydraulic shear stress against a bank composed of unconsolidated fine sediment with no woody riparian vegetation, and (3) in-channel deposition leading to increased shear against the eroding bank.

Full channel restoration seeks to mitigate the erosion and associated nutrient loading occurring at this site. Appropriate planform and channel dimensions will be established over 2,350 linear feet of stream channel. The channel will be designed to pass the bankfull discharge of the 243-square mile watershed and re-connect the WBDR to its adjacent floodplain. The design will include the stabilization of 1,920 linear feet of actively eroding streambank through the placement of stone material, soil cover, and revegetated. Both streambanks will be revegetated with native trees and shrubs to provide long term streambank stability and ecological function of the riparian area.

The following two images further support the nomination of the Riverhaven Farm project as a FAD-approved WQSP. Figure 5 illustrates the accelerated erosion at the project site. Figure 6 provides orthoimagery of the project site with superimposed extents of streambank erosion as of 2019. The location of this project site is depicted in a map (Figure 9) at the end of this report.

Figure 5. Accelerated erosion at the Riverhaven Farm project site (upstream view).

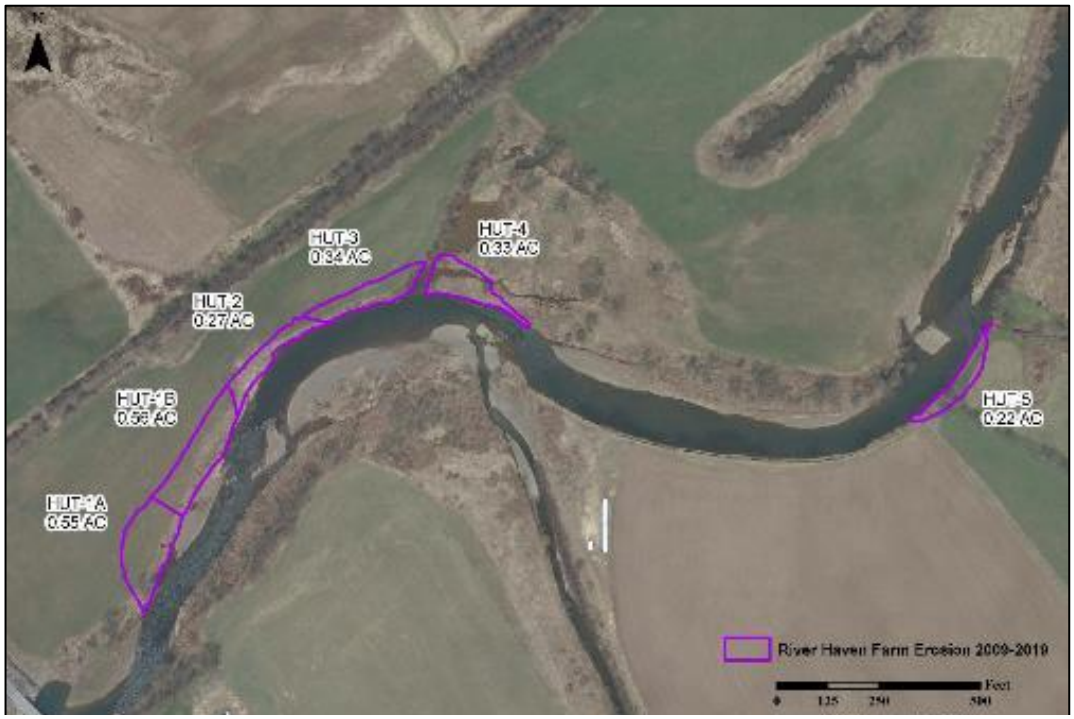

Figure 6. Orthoimagery of Riverhaven Farm on the West Branch Delaware River with superimposed extents of streambank erosion as of 2019.

Project Description: West Branch of the Delaware River at Birdsong Farm

The SFI prioritization for the WBDR Stream Corridor Management Plan identified management unit 20 as the most unstable unit on the WBDR. DCSWCD has identified the Birdsong Farm reach, located within this management unit, as a second WQSP for its disproportionate contribution of fine sediment and nutrients. Analysis by DCSWCD of remotely sensed imagery between 2009 and 2016 determined that the measured erosion at Birdsong Farm made up 77% of the erosion within management unit 20. Using the method described in the Riverhaven Farm analysis, DCSWCD estimates 16,005 cubic yards (889 dump truck loads) of soil were eroded into the WBDR and the eroded soil may have yielded approximately 11,896 pounds of TP and 70,458 pounds of TN between 2009 and 2019.

At Birdsong Farm, remotely sensed imagery indicates that an island upstream of the current instability began forming in the early 2000s. This island directed flow towards a sparsely vegetated streambank, resulting in accelerated erosion that has over-widened the stream channel causing increased deposition and further exacerbating channel erosion. This lateral migration of the WBDR continues to erode and push downstream.

Full channel restoration seeks to mitigate the erosion and associated nutrient loading occurring at Birdsong Farm. Appropriate planform and channel dimensions will be established over 2,000 linear feet of channel to pass the bankfull discharge of the 222-square mile watershed and to re-connect the existing floodplain. Placed stone covered with soil and vegetation will be installed to stabilize the 1,830 linear feet of active erosion. Three hundred linear feet of hillslope failure will also be stabilized just downstream of the primary source of erosion. Both streambanks will be revegetated with native trees and shrubs to ensure long term streambank stability and ecological function of the riparian area.

The following three images further support the nomination of the Birdsong Farm project as a FAD-approved WQSP. Figure 7 illustrates the accelerated erosion at the project site. Figure 8 provides orthoimagery of the project site with superimposed extents of streambank erosion as of 2019. Figure 9 shows the location of this project site, along with the proposed Riverhaven Farm site, within the Cannonsville basin.

Figure 7. Accelerated erosion at Birdsong Farm on the West Branch Delaware River (upstream view).

Figure 8. Orthoimagery of Birdsong Farm on the West Branch Delaware River with superimposed extents of streambank erosion as of 2019.

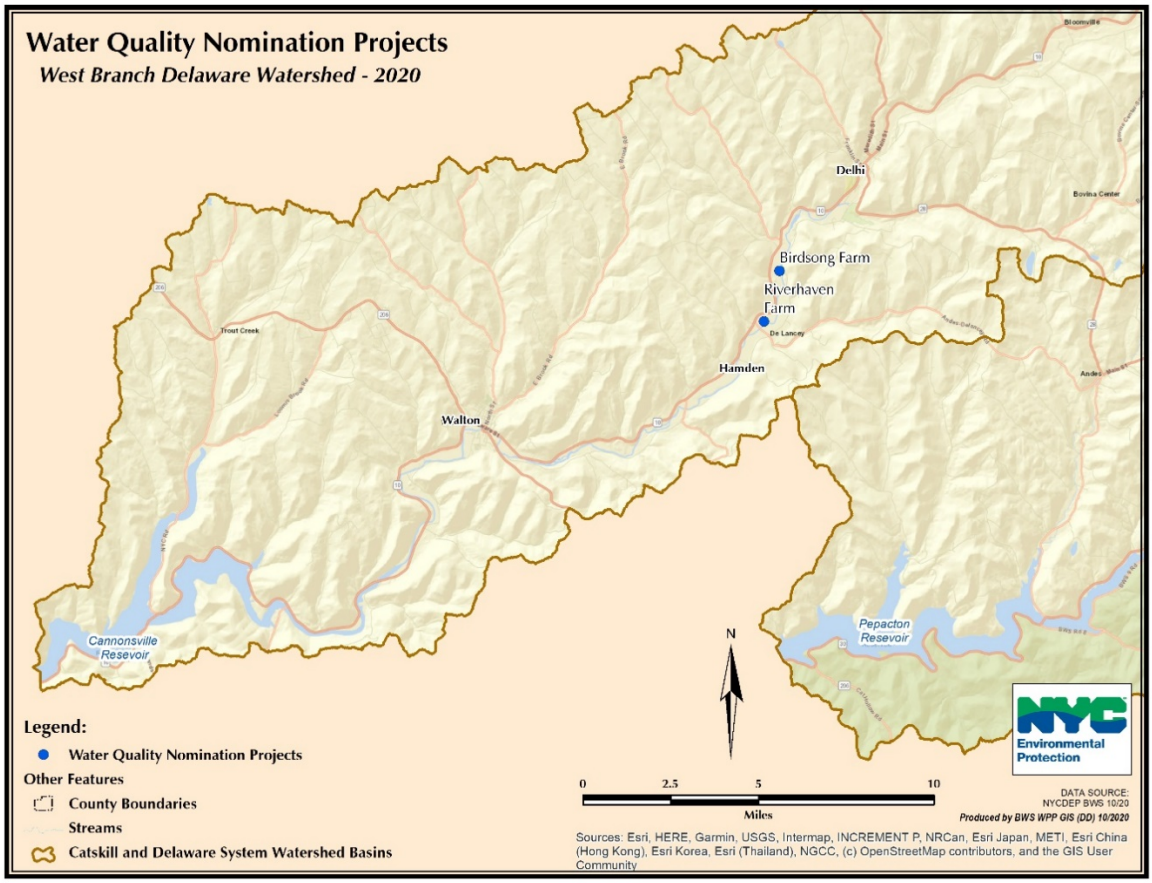

Figure 9. Location of the proposed Riverhaven and Birdsong WQSPs within the Cannonsville basin.