

**TITLE:** Upper Christina River Stream Restoration Project

**PARTNERS/SPONSORS:**

- Department of Natural Resources & Environmental Control;
- City of Newark;
- U. S. Environmental Protection Agency
- Christina Basin Clean Water Partnership
- State Representative Terry Schooley (Retired)
- State Representative Paul Baumbach

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## **Background**

Beginning in January 2010, property owners, former State Representative Terry Schooley, and State Representative Paul Baumbach's staff have expressed concerns about the potential threat to homes, the loss of trees as well as the loss of property along the upper Christina corridor. They have requested assistance from the Division of Watershed Stewardship to rectify the problems exacerbated by upstream development, a lack of stormwater management controls, and increased amounts of impervious surface throughout the watershed. Approximately 3,675 feet of stream restoration is in need of restoration work along the upper Christina River located west of Newark (West Branch, Christianstead, Pheasant Run and Timber Creek subdivisions).

Severe bank erosion is occurring along numerous properties adjacent to the stream channel. The banks are being undercut, causing mature trees to fall into the stream channel. Tremendous sediment loads are being released into the waterway with every storm event, impairing habitat and creating high turbidity conditions in the water column.

Implementing the appropriate stream restoration techniques will help stabilize the stream banks resulting in reduced sediment and nutrient loading to the Christina, improvements to habitat and water quality, and will allow the channel to be resized for the flow volumes that pass through the systems during average storm events. Bank-toe protection and vegetative plantings, along with other stream restoration construction techniques, will be utilized to stabilize the degrading stream banks and improve habitat and water quality.

The objectives and resulting benefits of the proposed stream restoring project west of Newark along the Upper Christina River include:

- ❑ stabilization of the stream banks to reduce erosion;
- ❑ creation of habitat – putting in sequences of riffles and pools in the stream channel, random boulder placement in the channel, and planting the banks with a trees and shrubs;
- ❑ improvements to water quality;
- ❑ reduce landowner's loss of property and threat to dwellings;
- ❑ reconnecting the stream channel with the floodplain; and
- ❑ maintaining the natural look of the stream.

The Division of Watershed Stewardship's Watershed Assessment & Management Section is the primary agency responsible for completing this project. The Division's Stream Restoration Program has a great deal of experience with managing all aspects of stream restoration projects (identification, planning, permitting, project management, design, oversight, contracting, pre- and post-biological monitoring, and construction). The Division has successfully maintained a stream restoration program since 2004. The projects have proven to be very successful and have been the highlight of field trips and steam restoration classes within the Mid-Atlantic region.

The stream channel and adjacent banks will be restored using a host of restoration techniques (e.g., rock toe and log toe protection, cross vanes, log vanes, root wads, riffle and pool sequences, and random bolder placement). These methods of stream restoration take into account the watershed inputs and valley type (e.g., size of drainage area, topographic relief, overland runoff) and provide a means to change the stream's pattern, profile and dimension to accommodate for the effects caused from urbanization and restore stability, sediment transport and biological functions.

The Upper Christina River is an excellent candidate for stream restoration because of its unique environmental and other related features:

- ❑ serves as a source for public drinking water;
- ❑ one of only six trout put-and-take stocked streams in the State;
- ❑ provides a habitat corridor in an area of dense development;
- ❑ reduces total suspended solids in water column;
- ❑ provides better habitat for macro-invertebrates;
- ❑ improves water quality

The general timeline for implementing this project will include the following steps:

- ❑ Survey of the project area for Phases I & II (completed);
- ❑ Contract with a firm to prepare stream restoration design plans for Phases I & II Phases I & II (completed);
- ❑ Secure permits (U.S. Army Corps of Engineers; DNREC Wetlands and Subaqueous Lands Section for Phases I & II (completed);
- ❑ Secure funding for Phase I (completed);
- ❑ Secure funding for Phase II (on-going);
- ❑ Execution of Project Agreements between DNREC and property owners (on-going);
- ❑ Bid notification process for construction services (in progress); and
- ❑ Initiate construction (anticipated August 2014)



The lack of proper riparian buffer vegetation and maintenance is evidenced by lawn grass being cut to the edge of the bank. The shallow root systems of the plants cannot hold the soils in place.



Stream bank erosion and bank undercutting has caused numerous mature trees to fall into the stream as evidenced by the photo above (left). Exposed roots (right) depict the large volume of topsoil that has been removed by stream erosion, jeopardizing the fate of mature trees as shown in the photo.



A deeply-incised stream channel and vertical stream banks along the Upper Christina River. Excessive volumes of sediment are being deposited into the stream channel resulting in the loss of property and wildlife habitat. In some areas along the Upper Christina dwellings are being threatened due to the rapidly-eroding stream banks.



The unstable nature in this reach of the Upper Christina River is demonstrated by the in-stream sediment bars that have formed. The overabundance of bed load material deposited in the center of the channel is shown above.



Photo on the left shows a sand bar which has accumulated in the center of the channel. The dwelling to the left is being threatened by the eroding bank conditions. Pieces of firewood are floating downstream following a heavy storm event. Photo on right shows exposed tree roots which indicate the large volumes of sediment that have eroded away from this cut-bank (these trees have fallen into the stream since photo was taken over a year ago). The banks need to be stabilized to reduce erosion.