# NONPOINT SOURCE SUCCESS STORY

## District of Columbia

# Daylighting a Tributary to Broad Branch and Installing Treatment Practices Improve Stream Health

### Waterbody Improved

Runoff from urban areas resulted in degraded water quality in Broad Branch, a tributary to Rock Creek and the Potomac River in Washington, DC (the District). In the spring of 2014 the District Department of the Environment (DDOE) worked with the National Park Service, District Department of Transportation (DDOT), and others to daylight (restore to the surface) a tributary of Broad Branch that had previously been piped underground. This restoration is expected to improve ecological functioning and decrease the runoff of pollutants to Broad Branch.

## Problem

The unnamed tributary to Broad Branch detailed in this success story originates from a hillside spring east of Connecticut Avenue and west of 36th Street in the District's northwest quadrant (Figure 1). Before restoration, the stream had been piped underground for a length of 1,600 feet—from just upstream of 36th Street to Broad Branch Road, across the street from the entrance to the Embassy of the Ivory Coast. The unnamed tributary drains an approximately 170-acre subwatershed of the larger Broad Branch watershed. The project area includes a portion of Rock Creek Park (which is an administrative unit of the National Park Service), a DDOT right-of-way, and a parcel of land owned by the Peruvian Embassy. The primary land use in the subwatershed is low-density residential; approximately 34 percent of the area is covered by impervious surfaces.

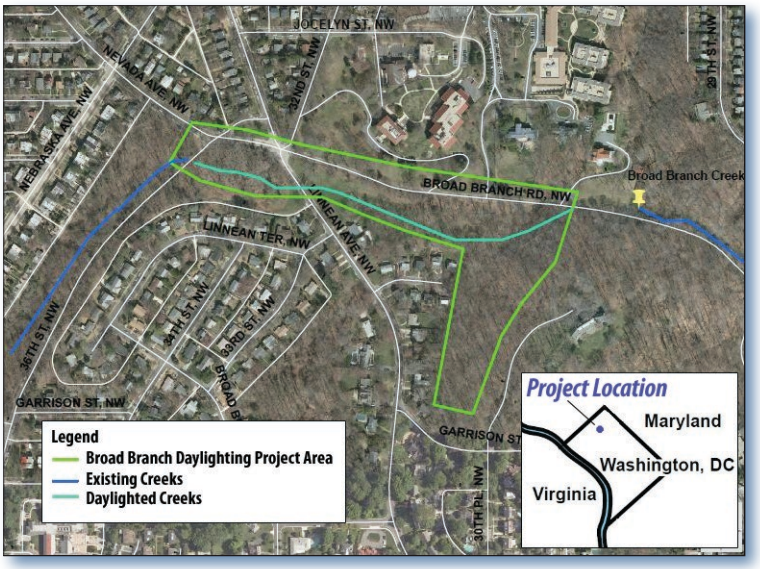


Figure 1. Watershed partners daylighted a previously piped tributary of Broad Branch.

The project was needed because the unnamed tributary to Broad Branch had been piped underground, which prevented the water carried in the stream (both base flow and stormwater) from being exposed to the biological processes that would normally help to remove pollutants in an aboveground, healthy stream. In addition, fast free-flowing stormwater had caused gully erosion on Peruvian Embassy property, eroding streambanks and causing sedimentation. This destabilized the surrounding environment, reduced infiltration of water into underlying aquifers, and compromised wildlife habitat. Finally, polluted stormwater runoff from impervious areas surrounding the stream was being conveyed directly to Broad Branch without treatment. Without intervention, fast and unclean stormwater flows would continue to degrade and pollute Broad Branch.

The tributary to Broad Branch that was daylighted and restored as a part of this project is not listed as impaired because it had been confined to a pipe and was not recognized as a stream. However, this tributary drains to Broad Branch, which is listed as impaired. The latest water quality assessment report (2012) noted that Broad Branch did not meet its primary contact use due to high *Escherichia coli* counts between 2008 and 2011. The stream also did not meet its aquatic life designated use because it

Figure 2. The Broad Branch tributary was previously confined to a pipe buried under the original stream valley (left). The daylighting project restored the stream to the surface (right).

violated the pH water quality standard five percent of the time. Visual assessments have documented that Broad Branch has become incised over time, leading to the exposure of sanitary and storm sewer pipes, the undercutting of trees, and damage to aquatic habitat.

## Project Highlights

DDOE, in partnership with the National Park Service, the DDOT, the District of Columbia Water and Sewer Authority (DC Water), and the Embassy of Peru daylighted the piped stream in the spring of 2014 (Figure 2). Three regenerative stormwater conveyance systems were installed in the daylighted stream. Partners installed 10 low impact development systems throughout the project area to treat stormwater runoff from a nearby road and alley.

The stream daylighting and regenerative stormwater conveyance systems used open-channel, sand seepage filtering systems that employ a series of shallow aquatic pools, riffle-weir grade controls, native vegetation and an underlying sand channel to slow stormwater velocities, infiltrate stormwater, recharge ground water, and treat pollutants through chemical and biological processes. The restoration techniques applied also reduce erosive forces on the banks of the streams where they are installed and positively affect the ecology of the restoration area by creating conditions favorable to aquatic macroinvertebrates and other wildlife. The stream restoration is expected to result in the removal of 67 pounds (lb) of total nitrogen per year, 11.8 lb of total phosphorus per year, and 8,570 lb of total suspended sediment per year.

## Results

The unnamed tributary to Broad Branch was photo surveyed before restoration and will be routinely surveyed to assess its stability and geomorphic function after restoration. Photo surveys will be conducted several times a year post-restoration, and traditional rod-and-level surveys will be conducted annually. The results will be used to determine how the sand seepage wetland approach to restoration compares to the natural channel design stream restoration techniques that have been applied elsewhere in the District.

Through this effort the District has already created at least 24,000 square feet of new wetlands and riparian area. In addition, this effort has led to the treatment of stormwater pollution from 70,625 square feet of impervious area using low impact development. Finally, the District has created and connected 1,600 linear feet of high-quality stream area. This restored stream reconnects a high-quality and previously disconnected stream fragment where surveys have indicated the presence of the pollution-sensitive dusky salamander *(Desmognathus fuscus)*.

## Partners and Funding

The Broad Branch restoration effort is the result of a cooperative partnership between the National Park Service, Embassy of Peru, DDOT, DDOE Stormwater Division, DC Water, the U.S. Environmental Protection Agency's (EPA's) Clean Water Act section 319 program, and EPA's Clean Water State Revolving Fund (CWSRF) program. The National Park Service aided in planning and environmental assessment development. The Peruvian Embassy and DDOT allowed the restoration to occur on some of their lands. DC Water lined sewers in the project area.

EPA provided $695,020 in CWA section 319 grant funding, and EPA's CWSRF program provided $440,000 in American Reinvestment and Recovery Act funding. Finally, DDOE's Watershed Protection Division provided $360,000 in District Stormwater Enterprise funds.

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## For additional information contact:

**Steve Saari**, Watershed Protection Specialist
District Department of the Environment
steve.saari@dc.gov • 202-535-2961

**Peter Hill**, Branch Chief
District Department of the Environment
peter.hill@dc.gov • 202-535-2241