NONPOINT SOURCE SUCCESS STORY

District of Columbia

Regenerative Stream Channel Design and Bioretention Retrofit Restores Springhouse Run

Waterbody Improved

The Springhouse Run project is part of an integrated watershed-based restoration approach. Before restoration, Springhouse Run was a highly linear, channelized stream that experienced significant stream bed and bank erosion. The stream was added to the 2008 Clean Water Act (CWA) section 303(d) list of impaired waters for multiple pollutants. The urbanized character of the upper section of the watershed creates conditions for flashy and intense stream channel flows. Implementing education and outreach about the harmful effects of stormwater pollution, returning Springhouse Run to its natural state as a self-sustaining stream, and replacing five stormwater pipes and outfalls with bioretention facilities led to improved Index of Biological Integrity metrics and stream water temperature.

Problem

Located in northeast Washington, DC, Springhouse Run is a tributary of Hickey Run, which feeds into the Anacostia River and the Chesapeake Bay. The drainage area of the watershed is approximately 152 acres and is composed of two distinct parts: an upper portion that is piped and a lower portion that flows at the surface, with New York Avenue NE serving as the dividing line between the two sections. Springhouse Run's headwaters originate in a pipe at an unidentified location. The stream daylights in the U.S. National Arboretum, just south of New York Avenue NE, and flows to the southwest approximately 1,800 feet where it joins Hickey Run (Figure 1). The heavily urbanized character of the upper section of the Springhouse Run watershed and its impervious nature produce conditions for flashy and intense stream channel flows.

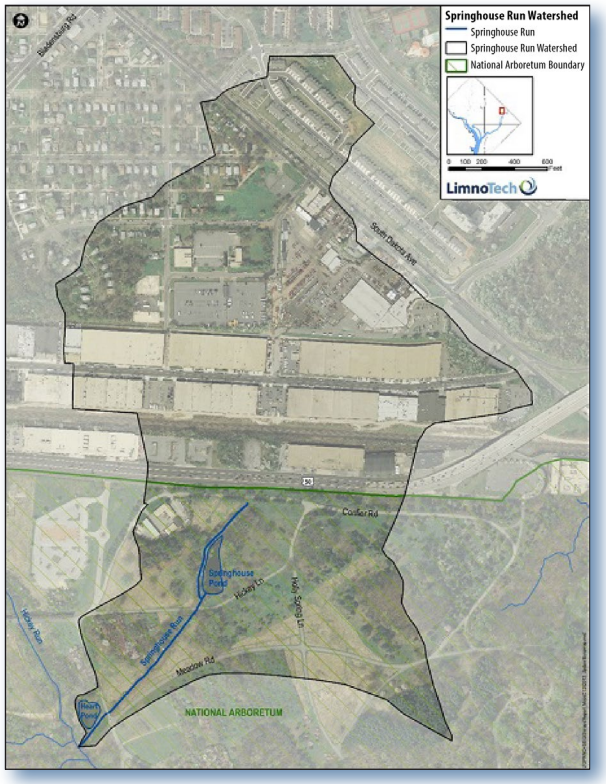

Figure 1. Springhouse Run is in Washington, DC.

Story Highlights

The Springhouse Run stream restoration project is part of an integrated watershed-based restoration approach. For nearly a decade, District Department of Energy and Environment (DOEE) conducted outreach and education to residents and businesses within the Hickey Run and Springhouse Run watersheds about the harmful effects of stormwater pollution on receiving waterbodies: tributaries of the Anacostia River, the river itself and the Chesapeake Bay. DOEE's many RiverSmart programs (e.g., RiverSmart Homes, RiverSmart Communities, RiverSmart Schools) provide resources to residents, students and educators about stormwater's effects on local waterways. The programs also provide incentives to install best management practices (BMPs) to reduce the volume of stormwater runoff entering local waterways. Other strategies include the GreenWrench Technical Assistance

Program, which provides free pollution prevention guidance for mechanics and auto body shops.

Stream restoration activities, which began in 2016, included returning Springhouse Run to its natural state as a self-sustaining stream by using regenerative stream channel and legacy sediment removal techniques along 3,600 feet of stream (Figure 2). The regenerative stream channel approach incorporates natural stream channel design techniques and materials. This innovative restoration approach results in a system of physical features, chemical processes and biological mechanisms that enhance the ecological and aesthetic value of the stream. Features of regenerative stream channels include a series of riffles and pools, sand and wood chip fill, rock weirs and large woody debris (e.g., reusing trees felled during construction). Goals include increasing infiltration and subsurface water flow, reconnecting the stream with the floodplain, managing stormwater, reducing sedimentation and nutrient transport downstream, and providing habitat diversity. The project also removed 1,000 truckloads of legacy (existing) fill and sediment from the stream channel to recreate the floodplain valley.

The second BMP included retrofitting the U.S. Arboretum's visitor parking lot with five bioretention facilities (6.17 acres total). Prior to the retrofit, stormwater from the parking lot entered catch basins and discharged directly to Hickey Run.

Results

DOEE awarded a grant to the Metropolitan Washington Council of Governments to perform pre- and post-restoration monitoring. Monitoring includes three primary components: (1) physical, geomorphic and baseflow conditions; (2) baseflow water quality conditions; and (3) a biological community assessment. The biological data assessment showed that the benthic macroinvertebrate index of biological integrity (IBI) improved from a score of 1.6 (very poor) in 2014 to a range of 2.1–3.0 (poor–fair) in 2018 after restoration. Both the number of individuals collected and the total number of taxa in the stream increased after restoration (Table 1). In addition, two new species of fish were collected in 2018 sampling (after restoration) that had not been observed in the 2014–2015 monitoring years. The Fisheries and Wildlife Division of DOEE conducted monitoring surveys of the

Figure 2. Springhouse Run, before and after project.

Table 1. Springhouse Run macroinvertebrate IBI data.

Sample date	Individuals collected	Number of taxa	MBSS IBI score	MBSS IBI ranking
4/28/2014	28	7	1.6	Very poor
4/11/2018	163	30	3.0	Fair
8/14/2018	158	17	2.1	Poor

Springhouse Run project area and found 68 species of birds in 2015–2016 (before restoration) and 72 species in 2017–2018 (after restoration).

Another monitoring project, using a series of strategically placed data loggers, indicated that the system of subsurface flow patterns created by a coarse sand lens and perforated pipes decreased water temperature. As the stream matrix matures through an increased area of root matting and vegetative cover, the temperature during summer will continue to improve.

Partners and Funding

Partners included the designer, LimnoTech; the construction contractor, Underwood and Associates; the U.S. Environmental Protection Agency's (EPA's) nonpoint source pollution program, the U.S. National Arboretum; Friends of the National Arboretum and DOEE. The project cost, including design and construction, totaled $1.8 million. Funding sources included local funding, EPA Chesapeake Bay Implementation grant and EPA's CWA section 319 nonpoint source pollution grant ($614,000).

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