

Meadow Creek Stream Restoration Project

Spring 2013 Update

Project Summary and Purpose

The Meadow Creek Stream Restoration project has been a collaboration between the City of Charlottesville and The Nature Conservancy and is funded by the Virginia Aquatic Resources Trust Fund. The stretch of Meadow Creek from Hydraulic Road through Greenbrier Park was selected to undergo major restoration to address increased sedimentation, a condition that poses a serious threat to the health of the creek and the Rivanna River. The project included restoration through 9,000 linear feet of Meadow Creek and permanent protection of over 70 acres of forest and wetlands.

Numerous local assessments had documented the deteriorated state of Meadow Creek and identified the need for its restoration. In addition, the Virginia Department of Environmental Quality has listed Meadow Creek and a segment of the Rivanna River downstream as “impaired waterways.” Impairment in these waters is due in large part to excessive sedimentation from streambank erosion.

In natural settings, rivers create meanders and floodplains that slow their flow during storm events, dissipating energy and reducing erosion. In urban environments, however, watersheds often contain large areas of impervious surfaces such as rooftops and roads which prevent runoff from infiltrating into the ground. Instead, it drains into stormwater systems, and then into waterways, with much greater volume and speed than it naturally would. This rapid drainage and increased quantity of runoff results in high peak flows as well as high volumes and velocities of water in streams and rivers. Erosion of the streambed and streambanks produces excess sediment, which carries pollutants into waterways, suspends in the water column and blocks sunlight needed for the growth of aquatic vegetation, clogs the gills of fish (sometimes suffocating them) and eventually destroys aquatic habitat in streambeds when it settles.

In Meadow Creek, these conditions were made worse by the fact that the stream was once straightened, reducing the natural capacity of the waterway to slow down and dissipate the water's energy, and trapping all but the most extreme storm flows within the channel and essentially disconnecting the stream from the floodplain. The result was a stream with unstable meanders, severe erosion of stream banks, scouring of the stream bed, and excessive sedimentation.

Restoration Activities

The project used an approach called “natural channel design” to establish a stable meandering pattern, reduce stream bank erosion and sedimentation, reconnect the stream to its floodplain, provide habitat for aquatic organisms, and protect and enhance the streamside forest. The old unstable channel was modified to create appropriate and stable meanders and reduce the height of streambanks. Rock and log structures were installed in the stream channel to provide bank stability and prevent scour. Riffles and pools were created to provide habitat for aquatic life. The floodplain, a key component of the stream system, was also enhanced. Depressional features were created along the stream to help naturally dissipate flow energy and provide wetland habitats typical of natural floodplains. These wetland areas enhance the already existing 12 acres of wetlands along Meadow Creek in the project area. In addition, over 15,000 trees and shrubs, along with nearly 50,000 herbaceous plants, were planted throughout the project area to restore native forest habitat and enhance stream stability. The stream corridor was further enhanced by removal and treatment of invasive vegetation which threatens the health and diversity of the streamside forest. The restoration will result in a stabilized stream and improved water quality, as well as enhanced aquatic and forest habitats and aesthetic values.

Next Steps

Restoration work began in May 2012 and was completed in March 2013. Though construction is complete, the project team will continue to be actively involved in the project in both the short and long term. A description of future activities is provided below.

Short-term Maintenance

Restoration of the stream corridor incorporated natural channel design principles to re-establish channel and floodplain conditions that have been observed to be stable in naturally occurring systems. However, as a natural system, a degree of adjustment in the design grading is anticipated, particularly prior to the vegetation becoming well established. The need for minor maintenance is typical in the early stages following completion of construction, as the stream is adjusting to its newly established pattern, and the vegetation which aids in stabilizing the constructed channel and floodplain is not yet fully established. To ensure the project is performing as designed and any maintenance needs are identified, the project team frequently inspects the project corridor and will periodically re-work areas where scour is evident and persistent. Re-grading (usually by hand), re-seeding, installing erosion control matting, plant replacement and the re-application of herbicides to control invasive species will be ongoing as the site matures over approximately 2 years.

Long Term Monitoring

The restored stream channel and streamside vegetation will be monitored for a period of 10 years to assess stream stability and function, native plant survival, and effective eradication of invasive plant species. The Nature Conservancy, as stewards of the project, will oversee the monitoring and take appropriate corrective actions necessary to maintain the integrity of the project. The Nature Conservancy and the City of Charlottesville will also work to establish long-term plans for invasive species control, likely utilizing volunteers.

Biological Monitoring

The Nature Conservancy began assessing the health of Meadow Creek in 2007 by conducting biological monitoring of the benthic macroinvertebrates living in the stream bottom, which are insects that are key indicators of stream health. StreamWatch protocol and volunteers have been utilized to conduct the monitoring and this will continue in the future to measure the stream's health as the restored system matures over time.

Conservation Easement Monitoring

The City of Charlottesville placed a conservation easement on the lands along Meadow Creek, which protects the corridor in perpetuity. The Nature Conservancy, as holder of the conservation easement, will monitor the site to ensure the property continues to be protected as a natural riparian forest.

Litter Cleanup

The City of Charlottesville has found groups to officially adopt Meadow Creek in the project area. These groups will conduct regular litter cleanups. Additional volunteer cleanup events are anticipated.

Recently Asked Questions

The project team is very pleased with the restoration outcome and has received positive feedback from many members of the community. However, the team has received questions and comments from residents regarding the current and future condition of the restored stream and floodplain. The restored stream corridor represents a drastic change from the preconstruction conditions, both visually and functionally. The extensive grading work required to establish the appropriate channel and floodplain conditions resulted in the removal of the previously established dense vegetation (much of it invasive) that essentially hid the channel from view. Efforts aimed at eradication of more than 25 species of invasive plants and vines has further exposed the corridor. With the completion of the grading work in winter and plant installation also occurring during the dormant season for growth, the newly constructed channel appeared stark in the winter months and was susceptible to localized erosion as the channel naturally adjusted without the stabilizing benefits of vegetation. These conditions have already improved as the spring rains and warmth have increased vegetative growth in the corridor, and will continue to improve as the growing season progresses. Observations by the community over the winter months have resulted in questions from residents regarding the conditions and long term function of the new corridor.

The following comments are provided in response to those questions and concerns.

Why is standing water evident in some of the low-lying areas along the stream channel?

Areas of standing open water and “flooding” are more visible after implementation of the project. This is a primary result of the design goal, which modified the shape and height of the channel and the floodplain so that the stream is now able to top its banks during higher storm events, accessing the floodplain and allowing shallow, low velocity flow down the valley along the channel. The depressional wetland areas that were created in the floodplain hold water after the storm has subsided, leaving standing water in the depressions. With the lack of vegetation and low evapo-transpiration during the winter months, these conditions have been particularly evident within the construction area. However, these conditions also occur throughout the corridor, beyond the extent of the construction work. Twelve acres of wetlands already exist in the floodplain forest along both sides of Meadow Creek in the project area. Standing water and wetlands outside the restoration project area are less visible due to the dense cover of vegetation. As the growing season progresses, the plant materials and seed that were installed throughout the winter will continue to grow, taking in water, stabilizing the soil and providing over a foot of cover throughout the exposed floodplain. Similarly, as daylight and temperature increase, standing water will begin to evaporate more quickly, reducing the time water is standing in the depressions.

There are areas of erosion on the streambank and matting which was ripped from the stream and floodplain following storm events. Is this normal?

Immediately after construction, the newly exposed soil is vulnerable to the erosive forces of stream flow. This is particularly true along the stream banks. Natural adjustments in the channel and floodplain are anticipated and are common following completion of stream restoration projects. Erosion control matting is installed to protect the exposed soil to limit soil loss during normal rainfall and more extreme storm events. Some events may result in disturbances to the matting if little or no vegetation has begun to grow. The areas where erosion is determined to be problematic will be re-graded, re-seeded and re-matted by the project team to stabilize the eroded areas. When deemed necessary, disturbed matting will be re-placed or removed. The project team regularly inspects the site to ensure the stream is functioning as designed and to identify and address any maintenance needs. This process will be on-going for the next 2 years.

Plants that were planted as part of the restoration appear to have been removed and there are a number of bare areas in the floodplain.

Over 15,000 trees and shrubs, along with herbaceous vegetation, were installed along the stream corridor. Plant installation began in October 2012 and continued through March 2013. The entire area of disturbance has also been seeded and reseeded to ensure good cover. Evidence of these plantings, beyond the pink flags now visible across the floodplain, will become more apparent as the growing season progresses. It is common and expected for some plant materials to be disturbed by storm events during the winter months, as well as by predation and vandalism. The contractor has a 2 year warranty period and plant survival/coverage will be monitored during the fall of each year. The Nature Conservancy will also be conducting monitoring of the vegetation for a period of 10 years following construction, and plants will be replaced as necessary to establish the coverage required by state and federal permit conditions.

It looks like fill material has recently been placed in the field next to Michie Drive. Is that part of the stream project? What is the plan for future use of this field?

The field is owned by the City of Charlottesville and is located outside of the conservation easement area. Plans for the field include restoring the mostly open flat grassy area for neighbors to use for ball games, kite flying, dog walking, etc. A small set of gardens will be built on the Region 10 end of the field, and a small children's playground will be built on the north end of the field. This is part of the publically developed plan for the corridor which can be found at www.charlottesville.org/meadowcreekstreamvalley.

When will the trails be restored for proper use?

The Rivanna Trails Foundation will be working in the next month to improve the natural surface trail along the east bank of the creek and in Greenbrier Park. After the master plan for the stream valley is approved this summer, the City will begin the process of constructing an 8-foot wide stone dust surfaced trail along the west bank of the creek (behind the shopping centers) and through Greenbrier Park, following the sewer corridor where possible. There are plans to restore the bridge that was near the senior center, and to add a few more trail bridges along the corridor where needed as funding becomes available. The City will continue to work to make the trail underpasses at the railroad and under Route 250 and Hydraulic Road legal and safe for trail users.