



Title: Stormwater Wetland Installation at The North Carolina Arboretum, Asheville, NC

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Organization: NCSU

State: NC

Region: Southern

Year of Funding: 2003

Theme: Environmental Restoration

Situation: In the summer of 2002, a stormwater wetland was installed at the Plant Professional Landscape Garden (PPLG) located at The North Carolina Arboretum (TNCA) in Asheville, NC. The stormwater wetland is an example of an end of the pipe, best management practice (BMP) retrofit. It treats pollutants carried in stormwater from a rooftop, parking lot and lawn area and also reduces peak discharge, minimizing erosion downstream. The Water Quality Group at North Carolina State University (NCSU) designed this project; The North Carolina Arboretum Grounds Crew implemented it.

Objectives: TNCA expressed a desire to address the unsightly culvert outfall at the entrance of the newly installed Plant Professional Landscape Garden (PPLG). The PPLG is a demonstration garden that also serves as a testing site for green industry professional training and certification. Design opportunities were sought to make the area attractive and improve water quality. Several design options were considered, including retrofitting BMP's higher in the watershed to minimize the erosive flows and armoring the existing swale up to the culvert outfall. However, a stormwater wetland was the most cost-effective option providing the maximum water quality benefit. The stormwater wetland would also serve as an aesthetically pleasing entrance to the PPLG and demonstrate the use of indigenous plant materials.

Methods: Since the project is highly visible, the design included elements that reveal a sense of time and place by utilizing indigenous plants and local materials. A stacked stone headwall was built around the shortened culvert and several large boulders were placed for visual interest. Twelve indigenous plant species were planted at elevations according to their ability to remain saturated for long periods of time. For example, Juncus effusus (soft rush) and Iris virginica (blue iris) were placed at the lowest elevation, and Sporobolus heterolepis (dropseed) -- an upland species -- was placed around the rim at the highest elevation where it would be infrequently overtapped by water. Engineering considerations included determining the maximum footprint and volume. A stormwater routing model was used to predict the volume needed to detain the design storm for almost three days. The wetland was perched above the water table by compacting in situ clay. The stormwater wetland installation began in August 2002 and lasted approximately two weeks. The Department of Corrections, TNCA's staff and volunteers and NCSU Extension provided the labor. The construction sequence included: installing erosion control practices, cutting the existing culvert back to increase the footprint, clearing and grubbing, and rough grading which included the removal of approximately forty yards of soil. Grading equipment included a track hoe excavator, dump truck, and skid loader. Next, stacked stone walls were constructed around the headwall and boulders were placed. The existing clay soil was topdressed with a manufactured soil, composed of part compost and part saprolite, about two inches deep throughout the stormwater wetland. Biodegradable, erosion control fabric was placed on steeper slopes and then plants and mulch were installed. Hours after the stormwater wetland was finished, droughty weather conditions ended and it rained!

Partnerships: The French Broad Training Center (FBTC) was established in the spring of 2001 as a partnership between TNCA and NCSU to address water quality and quantity issues in Western North Carolina and to provide educational programming for landowners, concerned citizens, natural resource managers, and public officials in Western North Carolina. The training center is one of the four NCSU Soil and Water Environmental Technology Centers. Educational programs offered through the Training Center include topics such as environmental planning, conservation easements, agricultural and urban stormwater runoff management, and erosion control. In addition, technical assistance is provided for agricultural BMP's vegetated riparian buffers, stream bank stabilization, natural channel design, livestock exclusion and watering systems, and pasture management. The Training Center is located at TNCA in Asheville, NC. TNCA is a 426-acre public garden located within the Bent Creek Research and Demonstration Forest of the Pisgah National Forest. A center for education, research, conservation and economic development, and garden demonstration, the Arboretum offers a wide range of activities for visitors of all ages. TNCA is a public institution -- integrating education, landscape, and research -- that elevates the aesthetic, cultural, and economic quality of life in North Carolina. The Arboretum, through conversion of the traditional values, environmental resourcefulness, and botanical mystique of the Southern Appalachian region, broadens contemporary expressions of landscape stewardship. For more information please refer to <http://www.ncsu.edu/waterquality/>

Research: The project has integrated research, education and outreach by following the extension delivery model.

Resources: Funding was provided by the Environmental Protection Agency's Section 319 grant program, which is administered through the North Carolina Department of Environment and Natural Resources. The North Carolina Arboretum Grounds Crew, volunteers, North Carolina Extension and NC Department of Corrections provided matching funds.

Results: Specific outputs included many tours and workshops that reached a cross section of the population whose participants include policy planners, natural resource and design professionals, homeowners and students. The participants were exposed to storm water BMP's and results included changing attitudes and perceptions that BMP's could be attractive and effective. Storm water does not have to be out of sight and therefore out of mind.



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