

Rain Garden Installation at The North Carolina Arboretum, Asheville, NC



Introduction

In Western North Carolina, a best management practice of choice is the rain garden. Rain gardens treat pollutants carried in stormwater from small drainage areas such as a roof top, parking lot or lawn area. In the fall of 2003 North Carolina State University's Water Quality Group designed two rain gardens at the Plant Professional Landscape Garden at the North Carolina Arboretum. The grounds crew at the Arboretum installed the gardens. The project was funded by the Environmental Protection Agency's Section 319 grant program, which is administered through the North Carolina Department of Environment and Natural Resources.

Rain Gardens

Rain gardens, or infiltration basins, are gardens that are built to catch stormwater, many times holding and filtering polluted runoff. The rain garden is a depression in the landscape that collects and holds runoff for a brief period of time as it drains through the ground. This process cleans the water in two ways – by filtering it and allowing it to be absorbed in the plants and surrounding soil. It should be noted that some sites will require an underdrain because the infiltration rate is low.

The area is usually planted with indigenous plants that can withstand both intense periods of rain as well as drought-like conditions. The more diverse the indigenous species, the more varied the organisms that inhabit the rain garden.

Site Design

Two rain gardens were constructed to treat an eroding swale that carried sediment into a jurisdictional wetland. The PPLG is a demonstration garden that also serves as a testing site for green industry professional training and certification. Design goals included demonstrating the use of indigenous species, creating attractive gardens and improving water quality. One way to improve water quality is constructing the rain gardens differently to achieve aerobic and anaerobic processes.

Implementation

The rain gardens were built in the fall of 2003. The North Carolina Arboretum's ground crew, working in partnership with the North Carolina Department of Environment and Natural Resources and North Carolina Cooperative Extension and many volunteers provided the labor. The construction sequence included installing erosion control practices, clearing and grubbing, and rough grading with a backhoe.

Once the proper elevations were achieved, geotextile cloth was placed to prevent clay soil particles from migrating upward. Dual perforated underdrains and gravel were then placed in each rain garden cell.



The upper portion of the rain garden has an underdrain at the bottom of the cell to allow water to drain to the lower portion. Its underdrain slopes up enough to retain water in the lower part of the soil profile to create an anaerobic environment. This anaerobic environment may offer additional treatment by pooling water under the surface and creating an opportunity for anaerobic processes.



Gravel was placed around the perforated underdrains and topped with a filter fabric. Several feet of a bioretention mix was added to each cell. The areas were mulched with leaf litter. It should be noted that mulching with shredded hardwood or pine bark may clog or float as it each breaks down, thereby diminishing overall effectiveness.



About one half foot of freeboard was constructed around the rain gardens to allow water to pool temporarily on top of the finished grade. Excess water bypasses the rain gardens by spilling out over the pathway, into a mulched bed, and across a grassed area. Several different plant species were selected based on foliage, fall color, flowers and habitat value. The herbaceous layer includes Iris and Rushes. Shrub species include Blackhaw Viburnum, Silky Dogwood, Ninebark, and Virginia Sweetspire.

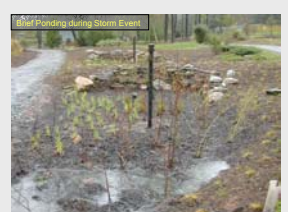


The French Broad Training Center

The French Broad Training Center is one of four NCSU Soil and Water Environmental Technology Centers offering educational programs in environmental planning, stream restoration, conservation easements, agricultural and urban stormwater runoff management and erosion control. The French Broad Training Center (FBTC) was established in the spring of 2001 as a partnership between The North Carolina Arboretum and North Carolina State University to address water quality and water quantity issues in Western North Carolina. The Training Center is located in Asheville, NC.



The Arboretum is a 426-acre public garden located within the Bent Creek Research 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.



Impacts

The rain gardens are the demonstration highlight of numerous water quality tours and workshops that include policy planners, natural resource and design professionals, homeowners and students. Tour participants adopted a more optimistic approach of using rain gardens as water treatment tools and discovered that improving water quality can be achieved in a way that balances science with natural aesthetics.

