





BUILDING A CAMPUS

RAINGARDEN

**AN ECOLOGICALLY AND
VISUALLY PLEASING SOLUTION**

BY SHANNON BRENNAN AND JEANNE ARANOVITCH

Though rain gardens may appear to be purely ornamental perennial campus adornments, they are designed to filter and slow the rate of stormwater runoff while using vegetation to remove pollutants. As both a powerful green initiative and beautification project, rain gardens are becoming increasingly common on college campuses.

In essence, a rain garden is a shallow depression that is designed to host any number of native flowers, grasses, shrubs, and plants that thrive in wet conditions. Designed to collect rainwater from sidewalks or down spouts, a rain garden allows excess water to seep slowly back into the ground. In this slow infiltration process, many pollutants are filtered out, so that they gradually break down in the soil rather than flowing into storm drains.

Messiah College Rain Garden

Whether studying bank erosion along the Yellow Breeches Creek, identifying plants and trees along the Stabler Fitness Trail, or recreating in the lush green space of Starry Athletic Field, Messiah students have many opportunities to enjoy the natural environment of the College's scenic 471-acre campus. Elements of the campus—such as the creek—provide a unique learning lab for students who are partnering with educators to use the wide-open spaces of the Grantham campus to practice environmental stewardship locally.

A sampling of Messiah's conservation efforts includes an on-campus garden and development of alternative energy including solar and biodiesel. In addition to these ongoing projects and a thirty-year, campus-wide commitment to recycling, a team of students recently designed and implemented a rain garden stormwater management system for the new Cottage Brook Lane housing development. Whenever it rains (or pours) in the new Cottage Brook Lane residential development on Mill Road, homeowners will reap the rewards of the beautiful and functional flowering rain gardens that David Foster, professor of biology and environmental science, and a number of his Messiah College biology students designed and built last year. These three rain gardens form the first such system in Upper Allen Township to combine bio-filtration and stormwater management on the scale of a residential subdivision. Traditionally, stormwater flowing along the streets of a residential subdivision has been collected and held in a detention basin so as not to overwhelm nearby streams and creeks with excessive and possibly contaminated runoff. These earthen berm and concrete detention basins, while functional, can be eyesores, and the standing water sometimes

creates a breeding ground for buggy pests.

Rain gardens, when well designed and maintained, are a visually delightful and ecologically-sound alternative with root and soil systems which treat many contaminants found in residential runoff, permitting the clean water to percolate naturally through to nearby waterways.

The developers of the Cottage Brook Lane project, Jim and Joy MacDonald, are Messiah College alumni who had talked with Foster about the possibility of this project during the design phase in 2007. The project engineers, Fischbach Morgan and Associates, LLC, and—later—J.W. Gleim Excavating, participated in the project to create site grading that would deliver the stormwater to the area designated for the three rain gardens. In addition to the need for selecting plants that could bio-remediate runoff water and tolerate a broad set of soil moisture conditions, the developers also desired to improve site views by obscuring infrastructure and walls and providing a spread of texture and flower colors across the various seasons of the year.

Plant Ecology and Planning

An additional objective was to plant primarily native species of plant that would spread vigorously within the rain garden area. Last spring, students enrolled in Plant Ecology worked together with Foster to create the planting design and select the plants for the principal rain garden, which covers approximately 275 square meters. The grouping of plants was selected to give the appearance of a naturalized wetland. Once the plants were selected, students in the Ecological Field Techniques class worked with Foster and Black Landscape Contracting to locate and plant the rain gardens. Evaluation and ongoing maintenance of this multi-faceted project will be undertaken by future students in the College's Plant Propagation course.

The beautiful flowers that bloom at Cottage Brook Lane each season are a visual reminder of the cooperation of the participants; the students, community, township, environment, and clients all continue to benefit. Foster, summing up the positive nature of this effort, says, "This project is a model of service learning for students in technically demanding areas. It combines professional knowledge, skills, and community service

with real projects. It benefits the community and builds community and expertise at the same time.”

Lynchburg College Students Plant Rain Garden

Capturing and cleaning stormwater runoff is an increasingly important way to improve water quality in rivers and lakes, and Lynchburg College installed a \$65,000 biofilter and rain garden to help protect Blackwater Creek and the James River. Dr. Tom Shahady, professor of environmental science, proposed the project, which provided hands-on learning for students as they planted a rain garden near the Lakeside Drive entrance to the college. “This project improves rainwater coming off the steep grade of the new loop road around the Drysdale Student Center, as well as the main driveway,” Dr. Shahady said. “The aquatic plants we put in the pond, in addition to two biofilters, will infiltrate the stormwater instead of discharging it directly into Blackwater Creek.” Infiltration of stormwater into groundwater is the best treatment available.

Effective Biofilters

Two biofilters, composed of mulch, rocks and sand, now pretreat the water before it reaches the pond, where aquatic plants absorb nutrients and prevent their escape to Blackwater Creek. Excessive nutrient loads are one of the biggest pollutants in Virginia’s rivers and lakes, as well as the Chesapeake Bay.

Rob Smith, LC’s director of buildings and grounds, said there may be the occasional heavy rain event that overwhelms the system, but it is a huge improvement over previous conditions. “In 90 percent of the storms, it’s going to filter the water,” he said.

“This commitment to cleaning up the water will have ongoing costs,” Smith said. The biofilters will likely need to be replaced about every seven years, at an estimated cost of between \$7,000 and \$8,000.

Two Rain Guardian turrets, which capture trash, will have to be cleaned out regularly. They represent innovative technology suggested by Erin Hawkins, the city’s water quality manager. Hawkins said she learned about the turrets at the annual Environment Virginia Symposium at Virginia Military Institute. They were developed by a soil and

water conservation district in the western U.S. Hawkins said LC’s project sets a good example of innovative ways to decrease stormwater runoff. She said the project is unusual because it’s one of the first voluntary rain gardens of its kind in the city. The cost of the project was offset by a \$114 reduction in the College’s stormwater fee, which was previously \$2,000 a month.

UNE Classes Use Environmental Grant to Create Biddeford Campus Rain Garden

The rain garden project began last year when five UNE faculty and staff members collaborated to apply for an Environmental Protection Agency (EPA) sub-contract through the Maine Campus Compact—a coalition of seventeen college campuses that aims to reinvigorate the civic mission of higher education. Several UNE faculty and staff were

“After the first year or two, there won’t be much maintenance required, but this rain garden is very much a work in progress. There is a lot of experimentation to see what works, which plants are thriving in which locations, and we adjust and rearrange when necessary.”

—JORDAN TATE, AN ENVIRONMENTAL SCIENCE MAJOR '15

successful in securing a \$5,000 grant to pursue a community-based environmental project. They proposed the creation of a Biddeford Campus rain garden: Alethea Cariddi, UNE’s Sustainability coordinator; Thomas Klak, Ph.D., professor in the Department of Environmental Studies; Theo Dunfey, M.A.L.D., coordinator of Citizenship and Service Learning; Christine Feurt, Ph.D., assistant lecturer in the Department of Environmental Studies, director of the Center for Sustainable Communities, and codirector of the Saco River Estuary Project; and Bethany Woodworth, Ph.D., assistant lecturer in the Department of Environmental Studies.

continued...



While the rolling hills and proximity to the Saco River lend aesthetic charm to UNE's Biddeford Campus, its uneven topography coupled with its closeness to the Saco River present a unique environmental challenge. Rainwater, carrying environmental pollutants, flows from areas of high elevation to low elevation and makes its way through underground pipelines in the campus that eventually release the rainwater into the river. Additionally, the downhill flow of rainwater erodes soil. Christine Feurt's Sustaining Water class performed extensive background research on rain gardens. One of her students, Jordan Tate, an environmental science major in the class of 2015, who was serving as an "eco-rep," a federal work-study student in the UNE Sustainability Office, volunteered to be an intern for the rain garden project.

Sustainability and Ecological Restoration Classes

A Sustainability and Ecological Restoration class taught by Thomas Klak grew the plants to be used in the rain garden, using only species that are native to Maine. The students

raised the plants from seeds in an on-campus greenhouse.

Alethea Cariddi's Sustainability Lab students created a design and installation plan for the rain garden, considering factors not only related to the garden's function but its acceptability to the UNE Community. They strived to make the garden aesthetically pleasing and sought to create a place that students could enjoy. Purchasing an Adirondack-style chair from the Biddeford company Conversion Products, Inc. made entirely out of 240 recycled milk jugs, the students created a serene nook in the garden for the community's use while echoing the commitment to environmental protection that is at the heart of the rain garden project.

With the help of UNE grounds staff, Cariddi's Sustainability Lab class prepared the location by digging out the area where the rain garden was to be created. Students in Klak's Sustainability and Ecological Restoration class completed the plantings. Tate laid down topsoil and stones to help to break up water momentum. She also added supplemental plants. Several students in Dunfey's

Citizenship class volunteered to perform weeding, lay additional soil, and add mulch. "After the first year or two, there won't be much maintenance required," Tate explained. "But this rain garden is very much a work in progress. There is a lot of experimentation to see what works, which plants are thriving in which locations, and we adjust and rearrange when necessary."

Challenges and Solutions

Tate has dealt with several challenges thus far and has come up with various solutions. "We were having some flooding initially, so we had to change the design a lot. We had to fill up sections of the garden with rocks," she noted. Erosion also plagued the rain garden, requiring unanticipated amounts of mulch. The latest obstacle is an infestation of aphids on some of the plants. "The other thing that you have to think about when planning a rain garden is that it has to withstand times of draught as well as times of extreme moisture," said Tate. "So the selection of plants and their precise placements are key to the success."

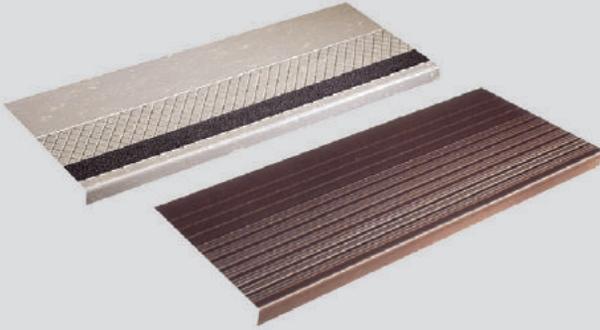
The rain garden is home to 17 native plant species, including more than 160 individual plants. New England aster, mountain mint, pale leaved sunflowers, sheep laurel, great blue lobelia, milk weeds, and sweet fern are a few of the types of plants one can see in the garden. The very center, the moistest area, contains an island of Siberian irises, a water-loving plant, surrounded by a circle of stones. Complete with a rain gage, a pebbled walking path, and a cedar bridge, the garden is marked with a plaque that explains the function of the garden and honors those who led to its creation.

ABOUT THE AUTHORs: Shannon Brennan is director of media relations at Lynchburg College; she also writes a nature column for *The News and Advance*. The Messiah Rain Garden piece was contributed by Messiah College Office of Marketing and Communications.

Jeanne Aranovitch is a graduate of Colby College who works in the Communications Office at the University of New England on its Biddeford Campus. She promotes the university both in print and online and serves as a contributing writer for the *UNE Magazine*.

ONE SOURCE FOR ALL YOUR FLOORING NEEDS

Rubber & Vinyl Stair Treads for Interior Applications



Sheet Rubber



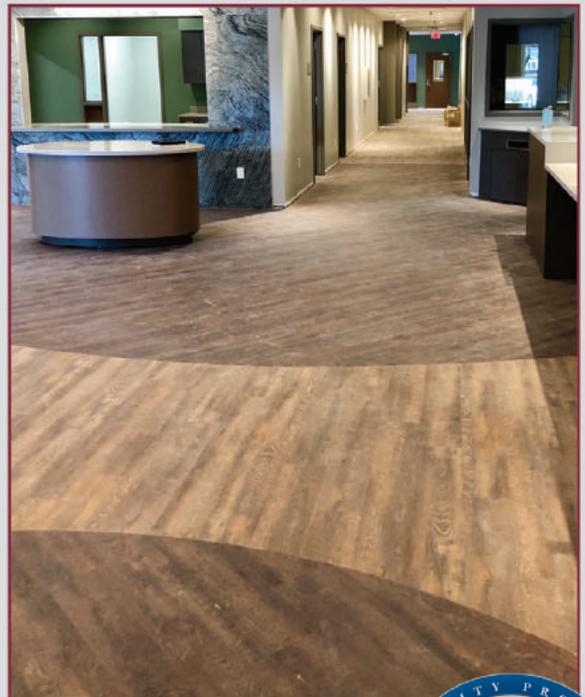
Entrance Matting



Rubber Stair Treads for Exterior Applications



40 Mil LVT



For more information
visit our website at
www.mussonrubber.com
or email us at
info@mussonrubber.com



MUSSON RUBBER CO.

P.O. Box 7038 • Akron, Ohio 44306
800-321-2381 • Fax 330-773-3254
info@mussonrubber.com • www.mussonrubber.com