

Case Studies: Storm Water Management

BROOK RUN RAIN GARDENS Westerville, Franklin County

Date Completed: 2010; monitoring ongoing

Description: 16 residential rain gardens and 5 right-of-way gardens were installed in a Westerville neighborhood to collect and filter storm water and mitigate runoff from impervious surfaces. The project has an educational component as a tool for informing everyday citizens about the benefits of stormwater management, and also as an object of study for students at Ohio State University.

Project Size: 16 residential rain gardens (16 lots), 5 right of way rain gardens. Sizes range from 100 to 150 square feet each.



Background: Flowers
(photo: Central Ohio Rain Gardens)

Brook Run Project Report

Project

- Storm water education
- Installation of neighborhood network of rain gardens collecting storm water from impervious surfaces (rooftops, roadways, driveways, and sidewalks)
- Storm water quantity monitoring and modeling

Costs

- 16 Residential Rain Gardens, installed May-July 2010
 - \$24,606 for installation or \$13.67 per square foot
 - 3 of them required stone retention walls
- 5 Right-of-Way Rain Gardens, installed August 2010
 - \$12,121 for installation
- Monitoring
 - \$8,167 for flow meters, pressure transducers, rain gauge, and V-notched weirs

Education

- Website, brochures, workshops, conference presentations, and media attention
 - \$19,741.77 for education
 - Reached over 375,000 people so far

Funding

Ohio EPA Ohio Environmental Education Fund
Ohio Water Development Authority
In-kind services from partners

Maintenance

Residential gardens—Brook Run residents
Right-of-way gardens—Franklin County Master Gardeners

Partners

Central Ohio Rain Garden Initiative
City of Westerville
Franklin Soil and Water
The Ohio State University
Watershed Organic Lawn Care

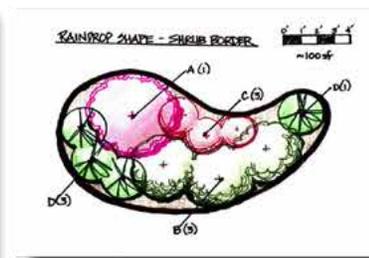
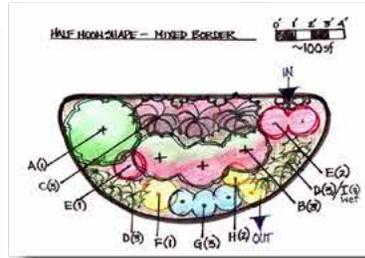
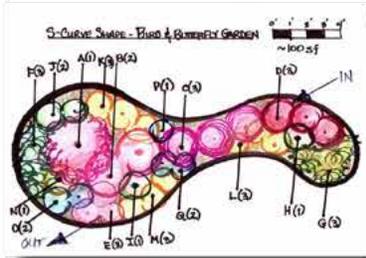


Updated May 2012
www.centralohioraingardens.org
www.franklinswcd.org

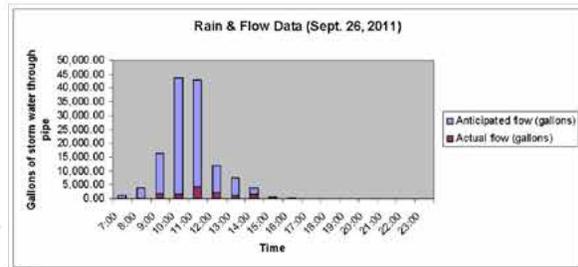
Out of 33 possible lots, 16 received rain garden through homeowners signing up at an educational workshop. Site assessments, garden preferences, and downspout disconnection logistics were a collaboration between the landscaper, homeowners, and Franklin Soil and Water. Five rain gardens in the right-of-ways were installed, and adjacent homeowners were contacted to get their approval of the locations.



The homeowners of 16 residential lots chose the plants for their rain garden based on a choice of 3 shapes and 3 layouts, depending on the sun/shade on their properties. The layouts included: bird and butterfly garden (perennials), mixed border garden (perennials and shrubs), and shrub border garden (shrubs). The shape choices included: s-curve, raindrop, and half moon. The majority of the plant choices offered are native to central Ohio.



Monitoring equipment was set up at the outfall where the neighborhood storm water drains, as well as in a control neighborhood for a basis of comparison. From late fall 2010 through spring 2012 results indicate **82-95% reduction in storm water**, exceeding the anticipated 55% reduction based on the amount of impervious surface in the neighborhood.



Pressure transducers and sampling wells were set up within each of cell in each right-of-way rain garden and within a select few residential rain gardens. Funding has also been awarded to monitor petroleum hydrocarbons in the gardens.

Samples of Flow and Rain Data 2010-2012					
	Rainfall (inches)	Rain on previous days?	Flow through pipe (gallons)	Anticipated flow (gallons)	Reduction (%)
Nov. 30, 2010	1.49	0.74", but 4-5 days prior	25,427.00	185,445.00	88
Mar. 23 - Apr. 28, 2011	7.14	All month	53,260.00	888,644.00	94
June. 18, 2011	1.03	0.45" the day before	20,552.00	128,193.00	83
July. 23, 2011	3.71	0.69" the day before	37,125.00	461,746.00	92
Aug. 21-22, 2011	0.5	Yes, 0.28" on previous day	7,916.80	62,320.00	87.3
Sept. 7-8, 2011	0.26	Yes, 1.45" over 4 days	5,791.60	32,360.00	82.1
Sept. 26-27, 2011	0.94	Yes, only 0.67" over a week	13,645.80	116,992.00	88.3
Nov. 22, 2011	0.23	0.42" the day before	1,968.70	28,625.80	93.1
Jan. 23, 2012	0.76	Yes, rain & snow over a week	4,531.00	94,590.00	95.2
Jan. 26-27, 2012	1.44		14,614.60	179,222.00	92
Mar. 15-16, 2012	0.24	Yes, 0.41" a couple days before	1,364.00	29,870.00	95
Mar. 30, 2012	0.78		10,875.00	97,079.00	89
Apr. 30 - May 1, 2012	0.75	Yes, over 1" in previous 5 days	12,208.00	93,345.00	87

Developer/Client/Owner:

Central Ohio Rain Gardens Initiative
1328 Dublin Rd., Suite 101
Columbus, OH 43215
www.centralohioraingardens.org

City of Westerville

www.westerville.org

Franklin Soil and Water Conservation District
1328 Dublin Road, Suite #101
Columbus, OH 43215
www.franklinswcd.org

The Ohio State University
Department of Food, Agricultural and Biological Engineering
230C Agricultural Engineering Building
590 Woody Hayes Drive
Columbus, Ohio 43210-1057
<http://fabe.osu.edu/>

Designer/Consultant:

Jim Roberts of Watershed Organic Lawn Care
5332 Sharon Ave.
Columbus, Ohio 43214
watershedorganic.com

Project Cost: 16 Residential rain gardens: \$24,606 total for installation (\$13.67/sq ft), required stone retention walls; 5 Right of way gardens: \$12,121; Monitoring; \$8,167 for flow meters, pressure transducers, rain gauge, V-notched weirs.

Maintenance: Right-of-Way gardens are maintained by Franklin Co. Master Gardeners. Residents maintain their own gardens.

Funding Sources / Incentives: Ohio EPA Ohio Environmental Education Fund, Ohio Water Development Authority, In-kind services from partners.

Dr. Jay Martin and Ohio State University students have been awarded two additional grants that will continue to fund research of the gardens. These grants are funded by the National Science Foundation and the Ohio Agricultural Research Development Center.

Applicable Zoning Regulations: None

Key Features / Lessons Learned: From late fall 2010 through spring 2012, results indicate an 82-95% reduction in storm water volume, exceeding the anticipated 55% reduction based on the amount of impervious surface in the neighborhood. Across more than 30 tests performed by OSU researchers, the right-of-way gardens provided an average reduction of greater than 50% for phosphorous and nearly 35% for nitrogen. These are substantial reductions that limit the formation of downstream algal blooms and improve conditions for aquatic life in Brook Run. Latest tests indicate that the gardens have reduced the volume of existing storm water by close to 70%. This reduces erosion in Brook Run and promotes infiltration to recharge groundwater aquifers.

Additional Comments:

From Dr. Martin:

“...Some of these results will be more thoroughly described in an upcoming issue of the Journal of Hydrologic Engineering next year. So far, research at Brook Run has been the focus of three Masters theses completed by OSU graduate students.

As more rain gardens collect run off from parking lots and roads, it is important to understand how effectively they remove harmful hydrocarbons present on these impervious surfaces. The OSU students plan on using the same methods they employed for the pervious studies to explore this issue.”