



# Green Infrastructure & Stormwater Management CASE STUDY

## North Carolina Botanical Garden Visitor Education Center

**Location:** Chapel Hill, NC

**Client:** North Carolina Botanical Garden

**Design Firm(s):** Swanson and Associates, P.A., and Howard Partner Landscape Architecture/Stormworks

**Landscape architect/Project contact:** David Swanson, ASLA, Swanson and Associates, P.A., and Howard Partner, Stormworks

**Email:** Swanson: [david@swansonlandscapearchitecture.com](mailto:david@swansonlandscapearchitecture.com) Partner: [stormworks@tmug.org](mailto:stormworks@tmug.org)

**ASLA Chapter:** North Carolina

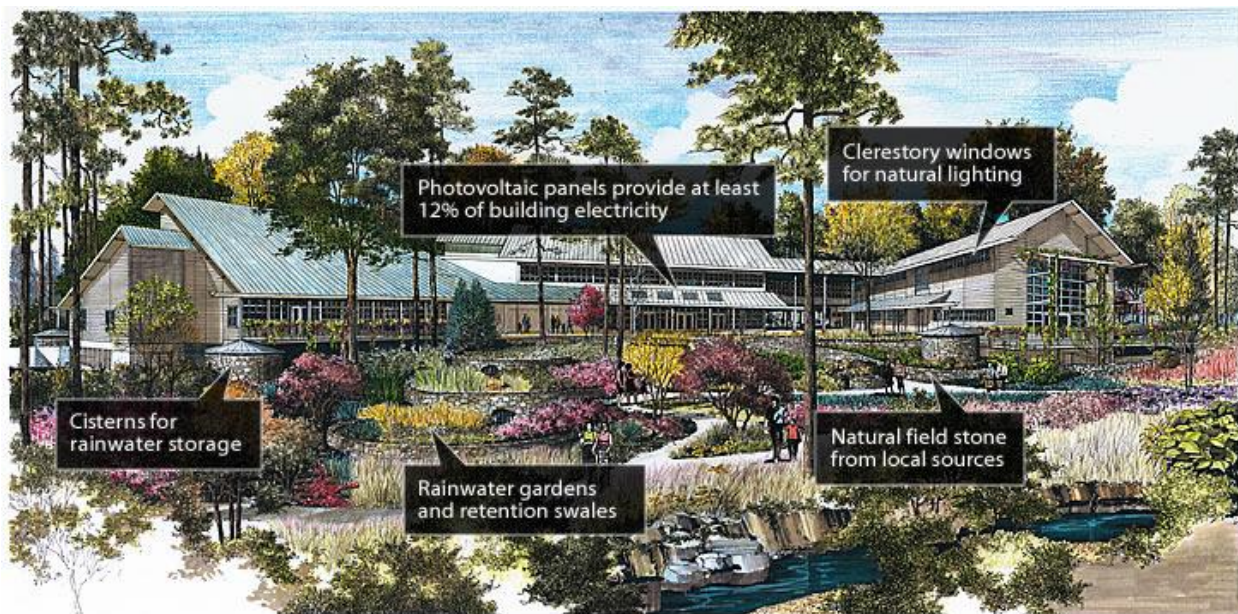


Photo: North Carolina Botanical Garden

### Project Specifications

**Project Description:** This site development for the project focused on preserving green spaces by redeveloping existing developed areas, removing existing impervious surfaces where possible, and employing these primary design techniques -- bioretention and bioswales, porous paving, and rooftop rainwater capture by cisterns -- for newly developed areas in order to match the stormwater runoff characteristics of the pre-development site conditions.

**Project Type:**

Institutional/educational and garden/arboretum  
Part of a redevelopment project

**Design features:** Bioretention facility, rain garden, bioswale, cistern, porous pavers, curb cuts, and removal of existing impervious surface asphalt.

**This project was designed to meet the following specific requirements or mandates:**

State statute, local ordinance, to meet funding criteria, developer/client preference, LEED Platinum Level

**Impervious area managed:** 1 acre to 5 acres

**Amount of existing green space/open space conserved or preserved for managing stormwater on site:** greater than 5 acres

**The regulatory environment and regulator was** supportive of the project.

**Did the client request that other factors be considered, such as energy savings, usable green space, or property value enhancements?** Yes: energy savings, usable green space, and building energy.

**Cost & Jobs Analysis**

**Estimated Cost of Stormwater Project:** \$500,000-\$1,000,000 (Public funding: None - these were private contributions for a public project)

**Related Information:** Permeable paving parking: \$425,000, including material and labor for installation, over-excavating unsuitable soils, and providing gravel storage areas. Bioretention basins: 8 x \$30,000 each = \$240,000 Bioswales and vegetative filters: \$40,000 Cisterns and rainwater harvesting: \$190,000

**Was a green vs. grey cost analysis performed?** Yes, a LEED cost benefit analysis is available. A stormwater analysis was also performed.

**Cost impact of conserving green/open space to the overall costs of the site**

**design/development project:** Because of town and university requirements that runoff and peak discharge not exceed pre-development conditions, and a further requirement for pollution abatement for runoff from developed areas, minimizing the developed areas by preserving green spaces mitigated the need for special stormwater controls, reducing costs. Additionally, as a public botanical garden, preserving green spaces adds to the intrinsic value of the entire project.

**Cost impact of conserving green/open space for stormwater management over traditional site design/site development approaches (grey infrastructure)?** Slightly increased.

**Number of jobs created:** 25

**Job hours devoted to project:**

Planning and Design: more than 800 hours (7-year planning/design endeavor)

Construction: 2 year construction buildout

Annual Maintenance: 100 hours

## Performance Measures

**Stormwater reduction performance analysis:**

Following are percentages of stormwater retained on site for existing and developed conditions. Numbers are for entire Botanical Garden site. 1-year storm - existing 63%, developed 63% 2-year storm - existing 56%, developed 55% 10-year storm - existing 44%, developed 44% 100-year storm - existing 33%, developed 33%

**Community & economic benefits that have resulted from the project:** Economic benefits for public institutions are indirect. However, other benefits included protection of water quality, educational benefits, and providing a model for green development for the community.

## Project Recognition

LEED Platinum Level

## Additional Information

**Links to images:** <http://www.ncbg.unc.edu/pages/4/>

<http://www.frankharmon.com/current/11/>



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