# Green Infrastructure & Stormwater Management CASE STUDY

## Syme Residence Hall Rain Garden

**Location:** North Carolina State University, NC
**Client:** NCSU Housing Department
**Design Firm(s):** NCSU Landscape Architecture Department Students
**Landscape architect/Project contact:** Andrew A. Fox, RLA, ASLA
**Email:** andrew_fox@ncsu.edu
**ASLA Chapter:** North Carolina

*Photo: North Carolina State University*

### Project Specifications

**Project Description**: The project was done as part of a grant for innovative teaching from NC State University's Provost office. T he summer studio was a 10-week course that offered students the opportunity to design a rain garden adjacent to Syme residence hall on campus. The intent of the design was to utilize Low Impact Design practices to capture and clean stormwater in an area that was experiencing excessive moisture and erosion while

simultaneously offering a safe, aesthetically pleasing space for Syme Hall residents and visitors to the garden's adjacent walks.

**Project Type**:
Open space - park
A retrofit of an existing property

**Design features**: Rain garden, cistern, and downspout removal. To further the goal of stormwater management, the students cut into a downspout on the adjacent Syme Residence Hall building to capture and filter runoff from its roof. This water is collected in a cistern and used for irrigation of the site during dry months. The site also features three water conveyance channels and collects and filters air conditioning condensate.

**This project was designed to meet the following specific requirements or mandates:** To meet funding criteria, developer/client preference

**Impervious area managed:** 5,000 sq/ft to 1 acre

**Amount of existing green space/open space conserved or preserved for managing stormwater on site:** 5,000 sq/ft to 1 acre. No new hard surfaces or buildings were built on the site. All soft surface spaces were preserved in the retrofit and their perviousness was enhanced to allow for greater stormwater management and filtration.

**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?** Safety was a top priority for the garden's design. To address safety, an additional lighting fixture was installed along a previous dark corridor of the brick walk adjacent to the garden. In addition, a number of mature Nandina domestica shrubs next to a retaining wall were left in place because the railing lining the wall does not comply with current safety codes.

## Cost & Jobs Analysis

**Estimated Cost of Stormwater Project:** $10,000-$50,000 (Public funding: State - $20,000 grant from NCSU Provost's Office and Student Tuition and Fees)

**Related Information:** The Project was funded by a $20,000 innovative teaching grant from the NCSU Provost's Office. Hard costs associated with the project were as follows: Labor - Largely free as the garden was built by students Materials - $4,542.44 Equipment - $2,722.86

**Was a green vs. grey cost analysis performed?** No

**Cost impact of conserving green/open space to the overall costs of the site design/development project:** Not applicable. Green spaces were largely preserved with the exception of rain water conveyance runnels and an infiltration bed.

**Cost impact of conserving green/open space for stormwater management over traditional site design/site development approaches (grey infrastructure)?** Did not influence costs. As a grey infrastructure comparative cost analysis was not done, the financial impact of the rain garden is unknown. A comparative cost analysis of the financial benefits of having students design and construct the garden versus hiring design and construction professionals that is being done demonstrates a substantial cost savings to the university. Due in part to numerous donations of materials and tools as well as free student labor, the actual costs of constructing the rain garden in the context of the design-build studio were approximately 30% of the estimated equivalent costs of hiring design and construction professionals.

**Number of jobs created:** One Assistant Professor and one Teaching Assistant for 10-week summer term

**Job hours devoted to project:**

Planning and Design: 491
Construction: 3,000
Annual Maintenance: 40

## Performance Measures

**Stormwater reduction performance analysis:**

The garden was designed to fully manage 100% of a 1" storm event (260 cubic feet of water) falling on both the garden as well as approximately 5,000 sq/ft of the building's roof area.

**Community & economic benefits that have resulted from the project:** As a result of the success of the Syme rain garden project, the NC State University Landscape Architecture Department (LAR) has received an additional grant from the campus Housing Department to install five more sites featuring low-impact design (LID) adjacent to other campus housing facilities over the course of the next five years. These spaces will be built by students in the context of a series of summer session design-build studios. In addition to offering additional financial resources to the LAR Department, the educational benefits of the design inquiry into LID methodologies, the resulting technical drawings and the construction process offer invaluable learning experiences for students seeking professional design careers.

## Project Recognition

Tri-State Student Award (Georgia, South Carolina, North Carolina); City of Raleigh Environmental Aware for Institutional Innovation

## Additional Information

**Links to images:** Announcement re: http://www.ncsu.edu/housing/news/article.php?id=189 Article re: Syme Rain Garden and design-build studio format: http://www.ncsu.edu/faculty-and-staff/bulletin/2010/08/grassroots-education/ YouTube videos documenting site construction: http://www.youtube.com/watch?v=3vVGLkxvHXI&feature=player_embedded

The Syme Rain Garden project led to a number of strategic partnerships between the Landscape Architecture Department, the University Provost's Office, the NC State University Housing Department, landscape architecture students and members of the local building and construction communities. The intent of the Syme Rain Garden and the forthcoming LID sites to be installed over the course of the next five years is demonstrate that environmental health can be enhanced through designs that provide social, aesthetic and educational benefits to students and the community.

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