



Campus RainWorks Challenge

A Green Infrastructure Design Challenge
for Colleges and Universities

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Cover Photo:

Terraced wetlands, a rain garden, and a 'biology pond' manage stormwater and wastewater at Sidwell Friends Middle School in Washington, DC.

Introduction

The US EPA's Office of Water is pleased to announce the Campus RainWorks Challenge for college and university students. EPA is inviting student teams to design an innovative green infrastructure project for their campus. Student teams will collaborate with a faculty advisor to develop design boards, a project narrative, and a short video describing their project. The winning teams will be awarded cash prizes as well as research funding.

As urbanization transforms our nation's landscape, stormwater from paved and compacted surfaces is degrading the health of our surface waters. In most developed areas, stormwater is drained through engineered collection systems and discharged into nearby waterbodies. The stormwater carries trash, bacteria, heavy metals, and other pollutants from the urban landscape, degrading water quality. Higher flows can also cause erosion and flooding in nearby streams, damaging habitat, property, and infrastructure.

Green infrastructure uses vegetation, soils, and natural processes to manage water and create healthier urban environments. While single-purpose "gray" stormwater infrastructure is largely designed to move urban stormwater away from the built environment, green infrastructure uses vegetation and soil to manage rainwater where it falls. By weaving natural processes into the built environment, green infrastructure not only manages stormwater, but can also cleanse the air, reduce urban heat island impacts, reduce energy consumption, and provide community amenities.

As communities develop and climate patterns shift, the problems associated with urban stormwater are expected to grow. Our nation and our planet need innovative planners, designers, and engineers to create resilient and affordable solutions. The Campus RainWorks Challenge is designed to encourage college and university students to become part of these solutions.

In the first year of the Campus RainWorks Challenge, EPA hopes to:

- Engage students in assessing the technical and economic potential of green infrastructure solutions on college and university campuses;
- Provide a hands-on, interdisciplinary learning experience through which students and faculty gain practical experience that they may apply in their future practice; and
- Promote the use of green infrastructure practices that provide multiple environmental, social, and economic benefits on college and university campuses.

In future years, EPA plans to build on this model to invite student teams to design and complete demonstration projects assessing innovative green infrastructure technology on their campus.

Calendar

Registration:

September 4, 2012 – October 5, 2012

Entries Due:

December 14, 2012

Winners Announced:

April 22, 2013

Awards and Recognition

EPA will award a total of \$46,000 to first and second place winners from each of two groups of entries: entries from large institutions and entries from small institutions.

Large institutions will be defined as those receiving more than \$35 million per year in federal funding for research and development, while small institutions will be defined as those receiving less than \$35 million per year, as listed in the National Science Foundation's publication [Federal Science and Engineering Support to Universities, Colleges, and Nonprofit Institutions](#) (See Table 12, column 2. Note that institutions that are not listed will be defined as small.

Winning teams will earn a cash prize, as well as research funds for their faculty advisor to conduct research on the potential of green infrastructure to sustainably manage stormwater. Prizes for each group of entries (large institutions and small institutions) will be distributed as follows:

| | Student Team | Green Infrastructure Research |
|---|---------------------|--------------------------------------|
| 1 st Prize Large Institution | \$2,500 | \$11,000 |
| 1 st Prize Small Institution | \$2,500 | \$11,000 |
| 2 nd Prize Large Institution | \$1,500 | \$8,000 |
| 2 nd Prize Small Institution | \$1,500 | \$8,000 |

Winners will be notified in April 2013 via email. After consultation with the winners, winning teams will be announced publicly, and winning entries will be posted on EPA's Green Infrastructure [website](#). Winning entries may also be displayed at a design exhibit at a professional conference.

Eligibility

To compete in the Campus RainWorks Challenge, student teams must meet all of the following eligibility requirements. Student teams will document their eligibility in their registration form.

Participating Institutions

Each student team must be affiliated with a degree-granting public or private institution of higher education¹ located in the U.S.

EPA particularly encourages Minority Academic Institutions (MAIs) to apply. For purposes of this competition, the following are considered MAIs:

1. Historically Black Colleges and Universities, as defined by the Higher Education Act (20 U.S.C. Sec. 1061). A list of these schools can be found at <http://www2.ed.gov/about/inits/list/whhbcu/edlite-list.html>
2. Tribal Colleges and Universities, as defined by the Higher Education Act (20 U.S.C. Sec. 1059(c)). A list of these schools can be found at <http://www2.ed.gov/about/inits/list/whtc/edlite-tclist.html>
3. Hispanic-Serving Institutions (HSIs), as defined by the Higher Education Act (20 U.S.C. Sec. 1101a(a)(5)). There is no list of HSIs. HSIs are institutions of higher education that, at the time of registration, have an enrollment of undergraduate full-time equivalent students that is at least 25% Hispanic students at the end of the award year immediately preceding the date of application for this Challenge; and
4. Asian American and Native American Pacific Islander-Serving Institutions (AANAPISIs), as defined by the Higher Education Act (20 U.S.C. Sec. 1059g(a)(2)). There is no list of AANAPISIs. AANAPISIs are institutions of higher education that, at the time of registration, have an enrollment of undergraduate students that is not less than 10% students who are Asian American or Native American Pacific Islander.

Participating Teams

Each student team must be sponsored by a faculty advisor.

Team composition and size is at the discretion of participating teams. However, interdisciplinary teams are strongly encouraged. Relevant disciplines include but are not limited to: landscape architecture, engineering, conservation biology, landscape ecology, hydrology, soil science, environmental science, environmental education, and communications.

¹ See 20 USC 1001 for a definition of “institution of higher education”

Participating Students

All team members must be enrolled in a degree program (undergraduate or graduate) at a college or university eligible to participate in the U.S. Environmental Protection Agency's Campus RainWorks Challenge (participating institution) as of August 31, 2012.

Registration Requirements

To compete in EPA's Campus RainWorks Challenge, student teams must first complete an online registration form identifying the team members, the team's faculty advisor, and a point of contact. The intent of the registration form is to allow EPA to confirm the eligibility of each team, and to conceal the identity of student teams from judges. Once a team has submitted a registration form, the team will receive a registration number via email.

Registration opens September 4, 2012 and closes October 5, 2012. Once registration opens, the registration form will be posted on the Campus RainWorks website.

Submission Requirements

To compete in EPA's Campus RainWorks Challenge, registered teams must submit two Design Boards, one Project Narrative, and one Video Presentation describing an innovative green infrastructure project for a site on their campus.

Design Boards

- The intent of the Design Board is to provide a visual explanation of the site context and design elements.
- Each team must prepare two 24" x 36" design boards. Each board must include the team's registration number (see Registration section) in the upper right hand corner in 36 point font.
- Teams must provide electronic copies of each design board in JPEG format without LZW compression. JPEGs should be provided at 300 dpi resolution. Instructions on submitting deliverables are provided below.

Project Narrative

- The intent of the Project Narrative is to discuss the technical and economic potential of green infrastructure to mitigate the environmental impacts associated with a selected site. The Project Narrative should provide a summary of each team's approach to addressing the competition criteria (see Judging section).
- Each team must prepare a Project Narrative not exceeding fifteen 8.5" x 11" pages (including images, graphics, and tables; excluding references). Pages should be consecutively numbered with 1" margins, and text should be single-spaced in

standard 12-point font. Each page must include the team's registration number in the upper right hand corner.

- Teams must provide 1 electronic copy of the Project Narrative in Adobe Acrobat® PDF format. Instructions on submitting deliverables are provided below.

Video Presentation

- The intent of the video presentation is to provide the judges with a richer sense of the project context and vision. Student teams are encouraged to be creative in explaining how their design meets the competition criteria.
- Each team must prepare a video presentation not to exceed 3.5 minutes.
- Teams must provide 1 electronic copy of the video presentation in MPEG-4 (.mp4) format with H264 video compression. Instructions on submitting deliverables are provided below.

Copyright

You represent and warrant that the work submitted is your own original work and that it does not infringe upon the intellectual property rights of any other person.

By submitting your work, you grant EPA a royalty-free license to copy, distribute, modify, publicly display, and otherwise use and authorize others to use, your design boards, project narrative, and video for any educational purpose and in any media.

Privacy

The information collected for this competition will only be used to contact student teams in direct relation to the competition.

After consultation with the winners, winning teams will be announced publicly, and winning entries will be posted on EPA's Green Infrastructure [website](#). Winning entries may also be displayed at a design exhibit at a professional conference.

Submission Instructions

All electronic deliverables should be saved to one PC-compatible CD-ROM. The CD-ROM must contain electronic copies of the Design Boards, Project Narrative, and Video Presentation. Each file should be labeled with the registration number (###) as follows:

- Design Board 1: "###-Design1.JPG"
- Design Board 2: "###-Design2.JPG"
- Project Narrative: "###-Project Narrative.pdf"
- Video Presentation: "###-Video.mp4"

The CD-ROM jewel case and any additional files should also be labeled with the registration number.

Entries must be postmarked by Friday, December 14, 2012 and sent to:

John Kosco
Tetra Tech
10306 Eaton Place, Suite 340
Fairfax, VA 22030-2201

Judging

Judges

Submissions will be judged by EPA staff with expertise in green infrastructure as well as landscape architects and engineers from the private sector. Judges will score submissions based on the six criteria identified below. Judges will be asked to assign submissions a score of 0-20 points for each criterion, for a total of 0-120 points for each submission. The average score for each submission will be calculated, and the top six submissions will be recommended to a Selection Official in EPA's Office of Water. The Selection Official will assess the top submissions based on the criteria below and select the four winning entries.

Judging Criteria

To determine the winning entries, judges will consider the following criteria:

1. **Analysis and Planning:** Design is based on an assessment of the existing master plan and existing site conditions. Assessment explores opportunities to protect and improve ecosystem services, as well as opportunities to meet the needs of site users.
2. **Preservation or Restoration of Natural Features:** Design preserves, enhances, or restores natural features (such as riparian, wetland, forest, or shoreline areas) that improve flood control and water quality, stabilize soils, control erosion, and provide wildlife habitat.
3. **Integrated Water Management:** Design reduces the need for stormwater treatment and minimizes the use of potable water resources. Stormwater management facilities are integrated within the site design to more closely mimic natural hydrology, improve the quality of stormwater leaving the site, and reduce the use of centralized control and treatment infrastructure.
4. **Soil and Vegetation Management:** Design protects and restores ecosystem services associated with a site's soils and vegetation, such as water absorption, pollutant interception, greenhouse gas regulation, microclimate regulation (which can reduce building heating and cooling needs), and habitat provision.
5. **Value to Campus:** Design enhances sense of community and sense of stewardship. Design elements that add value could include: aesthetic character, accessibility, navigability, and opportunities for education, recreation, or social interaction.

6. **Likelihood of Implementation:** Project narrative discusses capital costs, maintenance requirements, and lifecycle costs. Project narrative addresses stakeholder buy-in and project financing.

Documentation Guidelines

The following table provides examples of metrics that teams could include in their submission to document how their design meets the competition criteria. These metrics are not required, and student teams should not feel bound by or limited to these examples. Note, however, that quantitative information on the technical and economic aspects of a team’s design may be more compelling to the judges than narrative descriptions. Teams that opt to present any of the metrics listed below are encouraged to use the suggested units to facilitate the judging process. Teams are also encouraged to describe their methodology and provide relevant references.

| Criteria | Example Metrics |
|---|---|
| Analysis and Planning | Maps of existing conditions and resources (e.g. topography; floodplain boundaries; extent of wetlands; extent of stream buffers; extent of healthy soils; land cover types; vegetation types; seasonal groundwater elevations; pollution sources) |
| | Maps of historic conditions and resources (e.g. extent of artificially modified streams, wetlands, or shorelines; extent of soils disturbed by previous development; description of native plant communities disturbed by previous development) |
| | Description of watershed conditions (e.g. water quality assessments; biological assessments; sources of impairments) |
| | Description of campus master plan |
| Preservation or Restoration of Natural Features | Maps showing existing resources that will be preserved or enhanced (e.g. floodplains; wetlands; stream buffers; soil and vegetation protection zones) |
| | Maps showing historic resources that will be restored or rehabilitated (e.g. artificially modified streams, wetlands, or shorelines; soils disturbed by previous development; native plant communities disturbed by previous development) |
| Integrated Water Management | Reduction in impervious area (square feet, %) |
| | Reduction in directly connected impervious |

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| | area (sq ft, %) |
| | Change in annual runoff depth from existing and/or natural condition (inches/year, %) |
| | Change in annual stormwater pollutant load from existing condition (pounds/acre/year) |
| | Change in stormwater peak flow from existing and/or natural condition (based on 1-year, 24-hour design storm and expressed as cubic feet/second/acre, %) |
| | Reduction in landscape water requirement (may be attributed to change in plant species or change in irrigation efficiency) (gallons/year, %) |
| | Reduction in potable water use for irrigation (may be attributed to reduction in landscape water requirement or use of stored rainwater) (gallons/yr, %) |
| | Reduction in potable water use for indoor uses (gallons/yr, %) |
| Soil and Vegetation Management | Area of protected soils (acres, sq ft) |
| | Area of restored soils (acres, sq ft) |
| | Area of protected native plant communities (acres, sq ft) |
| | Area of restored native plant communities (acres, sq ft) |
| | Increase in canopy cover (10 years after installation) (% of site area) |
| | Increase in roof area shaded by vegetation (% of roof area) |
| | Increase in hardscape area (roads, sidewalks, parking lots, courtyards) shaded by vegetation (% of hardscape area) |
| | Map showing locations of windbreak vegetation relative to buildings |
| | Reduction in energy consumption associated with indoor climate control (%) |
| | Air pollutant removal by trees (lbs/yr) |
| | Change in plant diversity (plant list before and after project) |
| | Change in pollinator diversity (list of pollinators supported by plants before and after project) |
| Value to Campus | Map showing design and location of educational or interpretive elements |
| | Map showing entrances, exits, and pathways |

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| | Total number of site users per year |
| | Description of potential user groups and activities |
| | Illustrations of locations and character of outdoor spaces |
| Likelihood of Implementation | Description of user/stakeholder input |
| | Capital cost |
| | Lifecycle cost (including operations and maintenance) |
| | Cost savings compared to existing site |
| | List of potential funding sources / partners |
| | Financing strategy |

Contact Us

To sign up for email updates or ask a question about the Campus RainWorks Challenge, please send an email to RainWorks@epa.gov