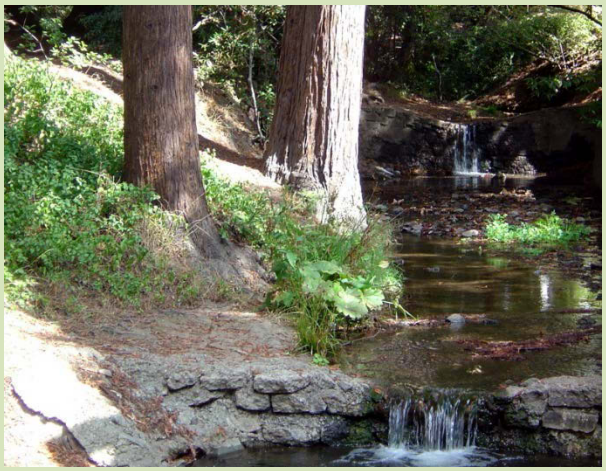
Campus RainWorks 2018

A Green Infrastructure Design Challenge for Colleges and Universities



Office of Water

EPA Publication Number 832R18001

July 2018

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Cover Images: Excerpts from the University of California, Berkeley's first place entry in the 2017 Campus RainWorks Challenge.

Introduction

The U.S. Environmental Protection Agency's (EPA) Office of Water is pleased to announce the seventh annual Campus RainWorks Challenge, a design competition that is open to colleges and universities in the United States and its territories. Through the Campus RainWorks Challenge, EPA seeks to engage with undergraduate and graduate students to foster a dialogue about responsible stormwater management and showcase the environmental, economic, and social benefits of green infrastructure practices.

Stormwater runoff is a major source of water pollution in urban communities across the United States. Traditionally, stormwater is drained through engineered collection systems, or "gray infrastructure," and discharged into nearby waterbodies. Stormwater doesn't like to travel alone: as it moves through the landscape it captures and carries trash, bacteria, heavy metals, and other pollutants from the urban environment. These contaminants degrade water quality and threaten public health. Stormwater also causes erosion and flooding, damaging habitat, property, and infrastructure. Green infrastructure offers flexible solutions for managing stormwater runoff.

Runoff contaminated with oil and other debris is washed down a storm drain where it will be conveyed to local water bodies.

A vegetated basin allows stormwater to infiltrate and evapotranspire, preventing contaminated runoff from reaching local water bodies.

The term "green infrastructure" refers to a variety of practices that restore or mimic natural hydrological processes. While "gray" stormwater infrastructure is largely designed to convey stormwater away from the built environment, green infrastructure uses soils, vegetation and other media to manage rainwater where it falls through capture and evapotranspiration. By integrating natural processes into the built environment, green infrastructure provides a wide variety of community benefits, including improving water and air quality, reducing urban heat island effects, creating habitat for pollinators and other wildlife, and providing aesthetic and recreational value. Green infrastructure solutions can also be cheaper to install and maintain than traditional gray infrastructure.

Water pollution associated with stormwater runoff is a problem that is growing in scope and magnitude in communities across the country. Communities need planners, designers, engineers, and other professionals to create dynamic, resilient, and affordable solutions for stormwater management. EPA's Campus RainWorks Challenge invites the current generation of scholars to apply their creativity, knowledge, and energy to solving these challenges today and in the future. Together, regulators, communities, and the next generation of environmental professionals have the creativity, knowledge, and energy necessary to solve the challenges of stormwater management and protect public health and the environment for all Americans.

In the seventh year of the Campus RainWorks Challenge EPA will:

- Work with students to assess the technical, ecological, and economic potential of green infrastructure solutions at a range of spatial scales across campuses, and in a range of geographic contexts across the country;
- Provide a hands-on, interdisciplinary learning experience through which students can gain real-world skills that can be applied to future careers; and
- Facilitate stakeholder engagement within the stormwater management arena, college campuses, and communities to promote the use of green infrastructure practices that provide multiple environmental, social, and economic benefits, and help create thriving, resilient communities.

Calendar

Registration:
September 1 – 30, 2018

Entries Due:
December 14, 2018

Winners Announced:
Spring 2019

A network of rain gardens captures rain where it falls to prevent stormwater pollution, provide pollinators and other wildlife with increased habitat, and provide aesthetic benefits to the surrounding community.

Awards

EPA will award a total of $16,000 to first and second place winners in the demonstration project and master plan categories (see submission categories). Winning teams will earn a student prize to be divided evenly among student team members, and a faculty prize to support green infrastructure research and/or training. Prizes will be distributed as follows:

	Student Prize	Faculty Prize
1st Prize Demonstration Project	$2,000	$3,000
1st Prize Master Plan	$2,000	$3,000
2nd Prize Demonstration Project	$1,000	$2,000
2nd Prize Master Plan	$1,000	$2,000

Winners will be notified in the spring of 2019 via email. After notifying the winners, winning teams will be announced publicly, and winning entries will be posted on EPA's green infrastructure website at:

https://www.epa.gov/greeninfrastructure

Eligibility

To compete in the Campus RainWorks Challenge, student teams must meet all of the following eligibility requirements:

Participating Institutions

Student teams must be affiliated with an academic institution that meets one of the following descriptions:

1. A public nonprofit institution/organization (limited to degree-granting public institutions of higher education[1]) located in the U.S., state and local governments, Federally Recognized Indian Tribal Governments, and U.S. territories or possessions.

2. A private nonprofit institution/organization (limited to degree-granting private institutions of higher education[2]) located in the U.S., state and local governments, Federally Recognized Indian Tribal Governments, and U.S. territories or possessions.

Student teams affiliated with a community or technical college that meet one of the descriptions above are also eligible.

[1] See 20 USC 1001 for a definition of "institution of higher education"
[2] ibid

EPA particularly encourages Minority Academic Institutions (MAIs) to apply. For purposes of this Challenge, 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:

   https://sites.ed.gov/whhbcu/one-hundred-and-five-historically-black-colleges-and-universities/

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:

   https://sites.ed.gov/whiaiane/tribes-tcus/tribal-colleges-and-universities/

3. Hispanic-Serving Institutions (HSIs), as defined by the Higher Education Act (20 U.S.C. Sec. 1101a(a)(5). HSIs are institutions of higher education that, at the time of application submittal, have an enrollment of undergraduate full-time equivalent students that is at least 25 percent Hispanic students at the end of the award year immediately preceding the date of application for this Challenge. A list of these schools can be found at:

   https://www2.ed.gov/programs/aanapi/index.html

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)). AANAPISIs are institutions of higher education that, at the time of application submittal, have an enrollment of undergraduate students that is not less than 10 percent students who are Asian American or Native American Pacific Islander. A list of these schools can be found at:

   https://www2.ed.gov/programs/aanapi/index.html

Participating Students

All team members must meet one or more of the following criteria:

1. 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 as of August 31, 2018.

2. Have received a degree (undergraduate or graduate) from a participating institution within 12 months prior to August 31, 2018.

3. Have received a degree (undergraduate or graduate) from a participating institution within the past 24 months and be enrolled in at least one class (live or online) at a participating institution as of August 31, 2018.

Participating Teams

Each student team must be sponsored by a faculty advisor. The faculty advisor must be a professor at the participating academic institution. Current graduate students and staff that are not considered faculty are not eligible to act as faculty advisors.

Team composition and size is at the discretion of the team submitting an entry. However, interdisciplinary teams are strongly encouraged, given that interdisciplinary collaboration is part of the judging criteria. Relevant disciplines include, but are not limited to: landscape architecture, architecture, planning, engineering, conservation biology, landscape ecology, hydrology, soil science, economics, public administration, business administration, and communications.

Teams may be composed of students from more than one academic institution if the team meets all of the following criteria:

1. All participating institutions are eligible per the Participating Institutions section above.
2. All participating students are eligible per the Participating Students section above.
3. The project submitted is designed for one of the institutions represented by the team.
4. The faculty advisor is associated with the same institution as the submission design.

Registration

To compete in the Campus RainWorks Challenge, teams must first complete an online registration form found on the website during the registration period:

https://www.epa.gov/campusrainworks.

The intent of the registration form is to allow EPA to confirm the eligibility of each team. Once a team submits the registration form to RainWorks@epa.gov it will receive a registration number via email. EPA processes Campus RainWorks registrants in bi-weekly batches. Registration numbers are sent out on Mondays and Wednesdays during the registration period. Registration opens September 1 and closes September 30, 2018.

Submission Categories

EPA is accepting submissions in two design categories:

- Demonstration Project
- Master Plan

Individual teams may submit entries for both categories, but must submit a different design for each. Work from one team's submission cannot be reused in another team's submission. Additionally, submissions from prior years cannot be resubmitted.

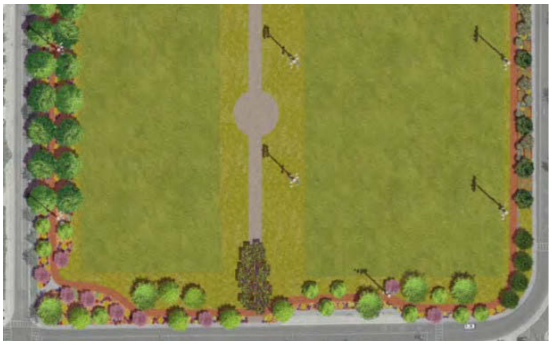
After registering for the Campus RainWorks Challenge teams may switch categories at any time up until the submission due date of December 14, 2018. Requests to switch categories should include the current registration number and should be sent to RainWorks@epa.gov.

Demonstration Project Category

For submissions in the demonstration project category EPA is seeking proof-of-concept level designs that examine how green infrastructure could be integrated into a **specific site** on the team's campus. If desired, demonstration projects can also be located at a nearby elementary, middle, or high schools. If teams elect to pursue this alternative option, the selected site must be located within the same community as the academic institution, or in a community that is directly adjacent (sharing a border).

Demonstration project entries must include individual or grouped (e.g., a treatment train) green infrastructure practices that manage stormwater within smaller drainage areas. The design must cover an area no larger than 15 acres. Designs should be realistic in nature: they should be capable of being built within a reasonable time and should seek to address one or more local stormwater management issues in a manner that provides multiple environmental, economic, and social benefits. Entries must include information on the design and performance of the proposed green infrastructure practices and should reflect extensive consultation with the facilities planning department to assess project feasibility. If a design is located offsite at a nearby school within the community, the team should consult with facilities staff at the school, school district, or municipal planning department.

Source: University of Illinois at Urbana Champaign's first place entry in the 2017 Campus RainWorks Challenge.



Source: University of New Mexico's second place entry in the 2017 Campus RainWorks Challenge.

Master Plan Category

For submissions in the master plan category EPA is seeking conceptual designs that examine how green infrastructure could be integrated into a broad area of the team's campus. Entries should provide a systemic vision for how green infrastructure could be further integrated into the campus foot print, providing long term environmental, economic, and social benefits. Entries should detail how green infrastructure will be implemented in the near, mid, and long-term time horizons. Implementation strategies should be flexible and allow for the ability to adapt over time as needed. Entries in this category should coordinate with existing campus master plans. These documents are useful tools for determining what assumptions must be addressed in master plan entries (for example, growth in the student population or the increase in impervious surface over time).

Source: University of California, Berkeley's first place entry in the 2017 Campus RainWorks Challenge.

Master plan designs must cover an area of 15 acres or more. If the participating school's campus is less than 15 acres, the team's entry must cover the entire campus. Entries from schools with larger campuses can cover an area ranging from 15 acres to the entire campus. While entries aren't required to cover the entire campus, the selected area should meaningful in terms of size and/or impact on campus. Connectivity should play a role in defining the scope of the design. Large drainage basins or circulation routes may help the team determine where green infrastructure interventions should be located.

Source: University of Maryland, College Park's second place entry in the 2017 Campus RainWorks Challenge.

Submission Requirements

To compete in EPA's Campus RainWorks Challenge, registered teams must submit the following which describe an innovative green infrastructure project for a location on their campus:

- One (1) Project Narrative
- One (1) Design Board
- One (1) Video Pitch
- One (1) Signed Letter of Support

Incomplete entries will be disqualified. Submissions should provide detailed information of sufficient quality to enable the judges to evaluate the design based on the challenge's judging criteria. A

description of the Campus RainWorks Challenge judging criteria begins on page 10 of this document. Submissions should describe overall project goals, how the project fits within the context of the campus or watershed, existing conditions along with the problem to be solved, proposed green infrastructure approaches, and expected outcomes.

Project Narrative

The intent of the project narrative is to provide a summary of each team's approach to meeting the challenge criteria (see Judging section).

- Each team must prepare a project narrative not to exceed sixteen (12) 8.5" x 11" pages (including a cover page, images, graphics, tables, calculations, and references). **Any additional pages that exceed the sixteen-page limit will not be reviewed.** Pages should be consecutively numbered with 1" margins, and text should be single-spaced in standard 12-point font. Headings may be larger than 12-point font; text labels for graphics or images may be smaller than 12-point font; page numbers may be outside of the 1" margin.

- The project narrative must include a cover page. The cover page must display the team's registration number, project title, names and academic majors of team members, and the name and academic department of the team's faculty advisor. Teams that don't meet these formatting requirements will be disqualified.

- The project narrative must include a project abstract of no more than 250 words.

- Teams must provide an electronic copy of the project narrative in Adobe Acrobat® PDF format. Instructions on submitting deliverables are provided below. Alternative formats will not be accepted.

Design Board

- The intent of the design board is to provide a visual understanding of the site context, design elements, and design performance.

- The design board must focus on visual elements and limit the amount of text. The design board should supplement, not duplicate, graphics within the project narrative.

- Each team must prepare one 24" x 36" design board. The design board must include the team's registration number (see Registration section) in the upper right-hand corner.

- The design board must include a site plan. Additional elements might include cross sections, conceptual drawings, or graphics representing anticipated benefits.

- Teams must provide an electronic copy of the design board in Adobe Acrobat® PDF format. Submission instructions are provided below. Alternative formats will not be accepted.

Video Pitch

- Each team must prepare a video pitch about the project not to exceed 3 minutes. Videos longer than 3 minutes will not be viewed.

- The video pitch should be persuasive in illustrating the potential environmental, economic, and social benefits of the project.

- The video pitch could include, but is not limited to: a tour of the potential site; discussion of design components; interviews with team members, faculty or industry practitioners; or financing options. Content and style are at the discretion of the student team. Creativity and enthusiasm are encouraged and appreciated. Show us what sets your entry apart from the rest.

- Teams must upload their video pitch to YouTube or a similar video-sharing website and provide a link with their submission (see submission instructions). Videos should be set as "unlisted" or "private" so that entries cannot be detected by search engines prior to the submission deadline. Once the submission deadline has passed, it's crucial that teams set their videos to "public" so that judges can access them during their review period. Instructions on how to upload a video on YouTube and how to change a video's privacy settings on YouTube are available online. The inability to review a video will result in disqualification.

Letter of Support

- The intent of the letter of support is to demonstrate consultation with the college or university's facilities planning department to develop a feasible design. The letter of support cannot be written by the team's faculty advisor. Each team must submit a letter from a member of the college or university's facilities planning department demonstrating support for the proposed design. If a demonstration project design is located off-site at a nearby school within the community, the letter of support must come from facilities staff at the selected school, school district, or a municipal planning department.

- The letter does not count against the 16-page limit of the project narrative. Letters of support are not to exceed two 8.5" by 11" pages. Pages that exceed the limit will not be reviewed.

- The letter must be on appropriate letterhead. Additionally, the letter must be signed by a member of the facilities planning department, and include the registration number and project title.

- The letter must be provided in Adobe Acrobat PDF format. Instructions on submitting project files are provided below. Alternative formats will not be accepted.

Submission Instructions

EPA will collect submissions to the Campus RainWorks Challenge via email. Participating teams must email their submissions to RainWorks@epa.gov by Friday, December 14, 2018 by 11:59 PM EST. Email submissions must include the registration number (###) in the email subject and in attached file names. Email submissions must include the following components. Note that the total size of all files must not exceed 15 MB.

1. Project Narrative (saved as "###-Project Narrative.pdf")
2. Design Board (saved as "###-Designboard.pdf")
3. Video Pitch (video URL)
4. Signed Letter of Support (saved as ###-Letter.pdf")

Judging

Qualifying submissions will be judged by two rounds of reviewers that include EPA staff, industry professionals, and/or academics from noncompeting colleges or universities. First round judges will score submissions on a scale of 0 to 100 using the criteria identified below. Based on the average of all scores for each submission, the top submissions will be recommended to a Final Panel of judges. The Final Panel will then rank the top submissions based on the criteria identified below and recommend finalists in each category to a lead judge in EPA's Office of Water. The lead judge will assess the recommendations using the criteria below and select the first and second place winners in each category.

Judging Criteria

The criteria listed below apply to both competition categories, with the exception of specific criteria that are highlighted green. Please note that these criteria are unique to the master plan category and do not need to be taken into consideration for demonstration project entries.

1. DOCUMENTATION (10)
    - Are the documents well-written and free of errors?
    - Are the documents of sufficient quality to enable the judges to evaluate the design?
    - Does the project include a description of the overall project goals, project context, existing conditions along with the problem to be solved, proposed green infrastructure approaches, and expected outcomes?
    - Are references supportive of the design concept?

2. PERFORMANCE (15)
    - Will the design retain and treat stormwater runoff on site (e.g., through infiltration, evapotranspiration, or harvest and use) to improve water quality?

- Is the project focused at appropriate scale (see category descriptions)?
- Will the design address multiple water resource goals (e.g., water conservation, flood mitigation, groundwater recharge, water harvesting and use, water reuse)?
- Where appropriate, is the predicted performance quantified and supported by modeling and calculations? Calculations should include the design storm managed and/or the annual reduction in runoff volume.

3. RESILIENCY (5)
    - Does the project demonstrate how the use and predicted performance of green infrastructure practices can build resilient communities capable of effectively managing stormwater runoff?

4. INNOVATION AND VALUE TO CAMPUS (10)
    - To what extent were innovative approaches developed to simultaneously address campus environmental, social, and/or economic objectives?
    - Will the design protect and/or improve ecosystem services (e.g., those provided by soil, vegetation, or other means)?
    - Does the project describe how the design will be integrated into campus life and how the design will benefit the campus community (e.g., by providing educational or recreational opportunities)?
    - Are the predicted benefits quantified and supported by appropriate assumptions?
    - (Master Plan entries only) Does the design take advantage of or further facilitate campus connectivity using drainage basins, water bodies, circulation routes, or other connective features?

5. INTERDISCIPLINARY COLLABORATION (5)
    - Does the project demonstrate collaboration between different disciplines (e.g., landscape architecture, architecture, engineering, environmental science, biology, economics, public administration, business administration, communications)?
    - Do the project components convey the functionality and value of the design with a cohesive, multiple disciplinary perspective?

6. LIKELIHOOD OF IMPLEMENTATION (5)
    - Did the team collaborate with the facilities department in developing the design?
    - Does the project detail how the design would be implemented over the near, mid, and long-term time horizons? Are the selected time frames for project implementation reasonable?
    - (Master Plan entries only) Does the design complement existing master plans or serve as a model for new long-term planning efforts?
    - (Master Plan entries only) Does project components detail how future growth and development will impact the design. Does the design incorporate flexible implementation strategies that allow planning efforts to adapt to changing circumstances over time?

7. FINANCIAL VIABILITY (10)
    - Does the team present a cost estimate for the proposed project?
    - Does the narrative include detailed information on how the project could be paid for?

- Did the team research grants, loans, or other sources of financing that must cover the entire projected cost of the project. Information included in the narrative must represent a viable financing path to project construction.
- Does the team account for the cost of long-term operations and maintenance?
- (Master Plan entries only) Did the team explore long-term funding strategies? Does the project or academic institution have a sustainable revenue stream or sources of funding capable of paying for multiple phases of implementation? Information included in the narrative must represent a viable financing path to plan implementation.

8. COMMUNITY ENGAGEMENT (10)

- Does the project contemplate public outreach and education (e.g., examples of signage, infrastructure tours, or other learning opportunities)?
- Will the proposed project complement efforts within the broader community or help address environmental, economic, or social areas of need?
- Does the project forge partnerships and/or identify stakeholders (e.g., alumni networks, city, county, state, non-profit, private entities) that could help support the proposed project? The purpose of such partnerships or stakeholder involvement could include, but is not limited to financial support, operations and maintenance, or environmental education.

9. MAINTENANCE (10)

- Does the design allow for easy and effective maintenance?
- Does the narrative contain information on how the project will be operated and maintained over time?
- Did the team collaborate with the Facilities department in developing a plan for operations and maintenance?

10. QUALITY OF GRAPHICS (10)

- Is the design board the correct dimensions?
- Are the design board and additional graphics legible to the viewer?
- Are the design board and additional graphics original and complementary to the project narrative?
- Do the design board and additional graphics give the viewer a strong visual understanding of the site context, design elements, and desired performance?

11. VIDEO PRESENTATION (10)

- Is the video pitch persuasive and does it use plain language?
- Does the video pitch illustrate the environmental, economic, and social potential of the project?
- Is the video pitch original, creative, and unique?

Documentation Guidelines

For both the demonstration project and master plan categories, the design performance, value to campus, and financial viability of the project are very important criteria. The following table provides examples of metrics or resources that teams may use to document how their projects meet these criteria. This information is not required, as not all of it may be relevant to a particular design. To the extent that this information is relevant, however, quantitative information on the anticipated outcomes of a team's design will be more compelling to the judges than narrative descriptions. Teams that opt to present any of the information listed below are encouraged to use the suggested units to facilitate the judging process. Teams are also encouraged to describe the methodologies used and to provide references, as appropriate.

Outcomes	Example Metrics and Terminology
Stormwater Management	Reduction in impervious area (sq. ft., %)
	Reduction in directly connected impervious area (sq. ft., %)
	Reduction in runoff depth from existing and/or natural condition (in/year, %, or size of design storm managed)
	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, %)
Integrated Water Management	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 captured rainwater or recycled gray water) (gallons/yr., %)
	Reduction in potable water use for indoor uses (gallons/yr., %)
	Annual groundwater recharge (gallons/year)
Other Ecosystem Services	Area of protected or restored soils (acres, sq. ft.)
	Area of protected or restored native plant communities (acres, sq. ft.)
	Increase in canopy cover (10 years after installation) (% of site area)

Other Ecosystem Services (continued)	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 building electricity consumption due to vegetation roof insulation/evapotranspiration or tree shading (Kwhs, %)
	Air pollutant removal by trees, also known as dry deposition (lbs/yr)
	Carbon dioxide (CO2) sequestered by new trees " (lbs/year)
	Change in plant diversity (plant list before and after project; use of native plants; use of minimum input minimum maintenance plants; % of plants in specified category)
	Change in pollinator and/or wildlife diversity (list of species supported by plants before and after project)
Financial Viability	Total Project Cost Estimate: an itemized estimate of the project cost based on the projected period of construction. Operations and maintenance: Appropriate operation and maintenance activities ensure that green infrastructure will continue to function properly and yield expected water quality and environmental benefits, protect public safety, meet legal standards, and protect communities' financial investments. The cost of maintaining infrastructure over time is an important consideration when planning a project. Useful life: The period of service for an infrastructure asset. Projects should have funding sufficient to operate and maintain assets throughout their period of service. For more information on sources of funding for green infrastructure visit: **EPA's Green Infrastructure Program** https://www.epa.gov/green-infrastructure/green-infrastructure-funding-opportunities **EPA's Water Infrastructure Finance and Resiliency Center** https://www.epa.gov/waterfinancecenter **EPA's Water Finance Clearinghouse** https://ofmpub.epa.gov/apex/wfc/f?p=165:1::::::

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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 project narrative, design boards, video pitch for any educational purpose and in any media.

Privacy

The information collected for this Challenge 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 at:

https://www.epa.gov/greeninfrastructure.

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