CAMPUS RAINWORKS CHALLENGE

11th Campus RainWorks Challenge

A Green Infrastructure Design Challenge for Colleges and Universities

Office of Water
June 2023

EPA

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Cover Images: Excerpts from Cornell University's and Florida International University's entries in the 2021 Campus RainWorks Challenge.

PURPOSE AND BACKGROUND

The U.S. Environmental Protection Agency's (EPA) Office of Water is pleased to announce the 11th Campus RainWorks Challenge (hereafter referred to as "the Challenge")—a design competition that is open to colleges and universities in the United States and its territories. Through the Challenge, EPA engages with undergraduate and graduate students to foster effective stormwater management and climate resilience practices that showcase the environmental, economic, and social benefits of green infrastructure.

The Challenge is intended to:

- Train students to assess the multiple environmental, economic, and social benefits of green infrastructure solutions over a range of scales and geographies across the country.
- Provide a hands-on, interdisciplinary learning experience for students to gain real-world skills that can be applied to future careers.
- Facilitate stakeholder engagement across college campuses and their surrounding communities to promote green infrastructure and forge meaningful connections between students and practitioners.

Stormwater runoff is a major source of water pollution in communities across the United States. Traditionally, stormwater is drained through engineered collection systems, or "gray infrastructure," and discharged into nearby waterbodies. As stormwater moves through the landscape, it transports trash, bacteria, heavy metals, and other pollutants from the urbanized environment—contaminants that degrade water quality and threaten public health. Stormwater also causes erosion and flooding, damaging habitat, property, and infrastructure. Furthermore, climate change is causing increasing intensity and frequency of severe storms, higher storm surges, wildfires, drought, and excessive heat. Green infrastructure offers flexible solutions for addressing these hazards.

Runoff contaminated with oil and other debris is washed down a storm drain, where it will feed into local waterbodies.

A "green street" uses practices such as porous pavement and bioretention to capture, infiltrate, and evapotranspire stormwater, preventing contaminated runoff from reaching local waterbodies.

The term “green infrastructure” refers to a variety of practices that restore or mimic natural hydrological processes. While gray infrastructure moves 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 be as cost-effective, if not more, to install and maintain than traditional gray infrastructure.

Communities need planners, designers, engineers, and other professionals trained in implementing green infrastructure to create the dynamic, resilient, and affordable solutions required to address today’s environmental challenges. EPA’s Campus RainWorks Challenge invites students to apply their creativity, knowledge, and energy to become the next generation of professionals that protect public health and the environment for all Americans.

CALENDAR

Announcement:
Week of July 17, 2023

Registration:
January 2 – January 31, 2024

Entries Due:
May 24, 2024

Winners Announced:
Summer 2024

AWARDS

EPA will award a total of $50,000 to first and second place winners. 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:

Winners will be notified in Summer 2024 via email. After notifying the winners, EPA will announce the winning teams publicly and will post the winning entries on EPA's green infrastructure website at: https://www.epa.gov/greeninfrastructure.

	Student Prize	Faculty Prize
1st Prize – $35,000	$30,000	$5,000
2nd Prize – $15,000	$12,000	$3,000

ELIGIBILITY

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

Participating Institutions

Student teams must be affiliated with a post-secondary 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., 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., Federally Recognized Indian Tribal Governments, and U.S. territories or possessions.

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/

[1] See 20 U.S.C Sec. 1001 for a definition of "institution of higher education"

[2] Ibid

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://sites.ed.gov/hispanic-initiative/hispanic-serving-institutions-hsis/

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

At the time the team registers, all team members must be enrolled at an eligible post-secondary institution. Participating team members may be enrolled in a degree or diploma program or taking classes part time.

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 advisor. This faculty advisor cannot be an active team member or directly participate in the production of any Challenge materials.

Teams can, and are encouraged to, enlist additional outside professionals or other stakeholders as informal advisors at their discretion, but such advisors are not eligible for cash awards nor allowed to be team members or participate in any way in the production of Challenge materials.

Team composition and size are at the discretion of the team submitting an entry. However, interdisciplinary teams are strongly encouraged given the relevance of green infrastructure to multiple disciplines. Relevant disciplines include, but are not

limited to landscape architecture, architecture, planning, engineering, conservation biology, environmental science, landscape ecology, hydrology, soil science, economics, public administration, public health, sociology, education, business administration, and communications.

Students from more than one academic institution may participate on the same team if all the following criteria are met:

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 Challenge, teams must first complete and submit an online registration form during the registration period: https://www.epa.gov/green-infrastructure/campus-rainworks-challenge-0

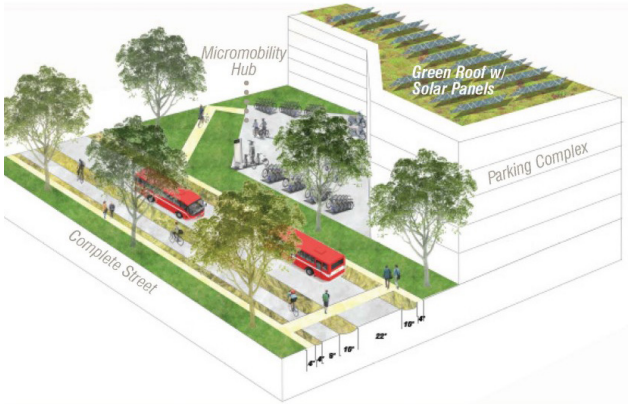
The intent of the registration form is to allow EPA to confirm the eligibility of each team. Once a team submits the registration form to RainWorks@epa.gov it will receive a registration number via email. EPA processes Campus RainWorks registrants in bi-weekly batches. Registration numbers are typically sent out on Mondays and Wednesdays during the registration period. Registration opens Tuesday, January 2, 2024 at 8 a.m. ET and closes Wednesday January 31, 2024 at 11:59 p.m. ET.

SUBMISSION OVERVIEW

Unlike past years, there are no specific submission categories. Instead, teams are required to identify a topic relevant to their own campuses; establish their own goals and objectives to address that topic; and create a design that demonstrates how green infrastructure strategies can meet those goals and objectives ***while also managing stormwater runoff effectively*** and providing other long-term benefits.

Entries should align with and/or augment existing campus master plans; these documents help identify real-world assumptions that should be addressed (e.g., student population growth or impervious surface increase over time). Entries must also understand, align

with, and reference local regulatory context (e.g., MS4 permitting, local design standards) and provide a statement of clear principles to guide future decision-making. To help ground teams in "real world" understanding of campus needs, teams are required to meet with facilities staff (see Engagement with Campus Facilities section below).



Source: University of Maryland's first place entry in the 2021 Campus RainWorks Challenge.

The following are possible topics for teams to explore. It is NOT intended to be an exhaustive list and teams can explore multiple topics if desired. Submittals should clearly identify which topics entries are addressing.

Create a design that:

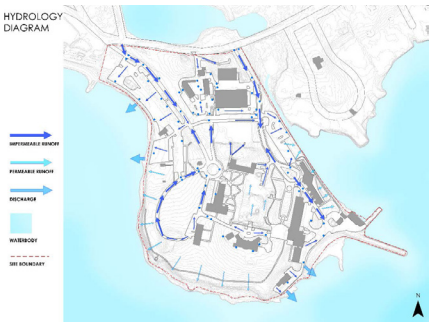
- Explores how green infrastructure can be used to mitigate current and future climate hazards and form the basis for a campus climate response plan.
- Incorporates green infrastructure in open space planning and design, allowing for the multi-use of land as landscaping and stormwater management area, and increasing developable area on campus.
- Incorporates green infrastructure into future proposed development sites on campus.
- Explores how green infrastructure can complement alternative energy planning on campus such as solar and EV charging.

Source: Florida International University's first place entry in the 2021 Campus RainWorks Challenge.

- Improves campus mobility by shifting orientation from vehicular travel to pedestrian and bike-friendly paths that also create a green infrastructure network through the campus.
- Educates the campus community member about the benefits of green infrastructure through an interconnected series of projects that demonstrate stormwater management in a variety of contexts.

- Uses green infrastructure to better connect the campus with surrounding neighborhoods (e.g., enhanced stream corridors, trails, green streets).

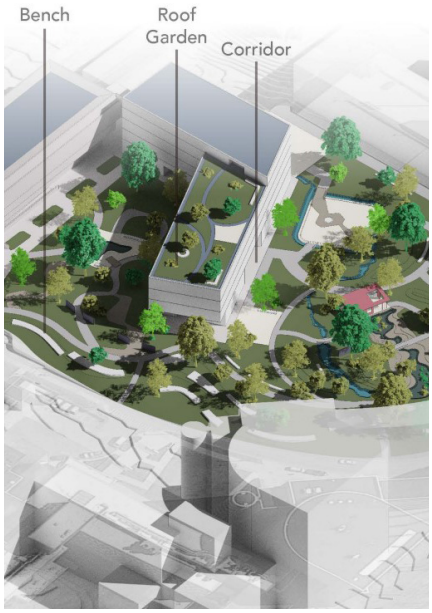
EPA encourages all site design project teams to consult with local green infrastructure practitioners in developing their design. Consulting with community and regional experts will bolster stakeholder engagement and may result in replicable designs that offer solutions to local and regional concerns.



Source: University of Connecticut's second place entry in the 2021 Campus RainWorks Challenge.

Engagement With Campus Facilities

It is required that teams connect with campus facilities staff prior to registration to effectively focus the entry to the existing needs of the campus (competition timeline has been moved to the spring, in part, to allow for engagement with facilities staff in the fall semester). Teams must periodically meet with facilities staff during development of the submission and be provided "sign off" from facilities prior to submission. See Submission Requirements section for the required content in the Letter of Support.



Source: Cornell University's second place entry in the 2021 Campus RainWorks Challenge.

Opportunity to Work With Neighboring K-12 School

As in past years, teams can elect to engage with a nearby elementary, middle, or high school. If a team elects 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). Additionally, teams are required to engage with the school's facilities staff (possibly via the school district) the same as teams working on a college or university campus.

SUBMISSION REQUIREMENTS

To compete in the Challenge, registered teams must submit the following:

- **One (1) Project Narrative**
- **Two (2) Design Boards**

- **One (1) Video Pitch**
- **One (1) Signed Letter of Support by Facilities Staff**

Incomplete entries will be disqualified. Submissions should provide detailed information of sufficient quality to enable the judges to evaluate the design based on the criteria listed in the Judging section of this document.

Work from one team's submission cannot be reused in another team's submission. Additionally, submissions from prior years cannot be resubmitted.

Project Narrative

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

- Each team must prepare a project narrative not to exceed ten (10) 8.5" x 11" pages (inclusive of a cover page and all images, graphics, tables, calculations, and references). **Any additional pages that exceed the 10-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.
- 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 Boards

The design boards shall:

- Be formatted to the size 24" x 36".
- Provide a visual understanding of the site context, design elements, governing principles, and performance calculations.
- Focus on informative graphics and limit the amount of text. The design boards should supplement, not duplicate, graphics within the project narrative.

- Include the team's registration number (see Registration section) in the upper right-hand corner.
- Include a site plan. Additional elements might include cross sections, conceptual drawings, in-situ perspective illustrations, and/or graphics representing anticipated benefits.
- Be provided in an electronic copy 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.
- Teams should develop a video pitch that is 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 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.
- Video pitches must be created from original content. Using copyrighted footage without attribution of the original source will result in disqualification. 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.
- 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 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.

Facilities Letter of Support

- The letter of support demonstrates that the team has consulted 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 (or school district if working on a K-12 school site).

- The letter must document initial consultation that the team has had with facilities staff defining the team's design; description of on-going engagement that the team had with staff over development of the design; and overall support of the final design.
- The letter does not count against the 10-page limit of the project narrative.
- 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 Challenge via email. Participating teams must email their submissions to RainWorks@epa.gov by May 24, 2024 by 11:59 p.m. ET.

Email submissions must include the registration number (###) in the email subject and in attached file names. Email submissions must include the following components:

1. Project Narrative (saved as "###-Project Narrative.pdf")
2. Design Boards (saved as "###-Design Board.pdf")
3. Video Pitch (video URL)
4. Signed Letter of Support (saved as "###-Letter.pdf")
5. List of all team members and advisor with email addresses (saved as "####-Team Contacts")

JUDGING

Two rounds of reviewers that include EPA staff, industry professionals, and/or academics from noncompeting colleges or universities will judge qualifying submissions. 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

Points will be awarded across five criteria:

- Design (25)
- Performance (25)
- Implementation (20)
- Communication (15)
- Resilience (15)

DESIGN (25)	
Does the design cohesively address the goals and objectives established in the topic selected by the team and complement existing master plans, or serve as a model for new long-term planning efforts?	☐
Does the design support multiple campus environmental, social, and economic objectives (e.g., water resource management goals, public health benefits, educational and recreational opportunities)?	☐
Do visual media and graphics in the design boards, project narrative, and video pitch complement one another and give the viewer a cohesive, visual understanding of the design context, elements, and desired performance?	☐
Does the design incorporate and complement existing features such as drainage basins, water bodies, circulation routes, or other connective features?	☐
Does the design demonstrate how project components can be flexible enough to adapt to changing circumstances over time and reflect input from facilities staff?	☐

PERFORMANCE (25)	
Does the design effectively use green infrastructure practices to capture and treat stormwater runoff on site (e.g., through infiltration, evapotranspiration, or harvest and reuse) and improve local water quality?	☐
Is the predicted performance quantified and supported by use of modeling tools and/or simple calculations?[3] Calculations should include the design storm assumed; the total amount of impervious surface being managed; and volume of runoff saved/managed.	☐

[3] EPA has calculation and modeling tools such as the National Stormwater Calculator and the Storm Water Management Model (SWMM). A full list of modeling tools can be found here.

Are additional benefits (water/energy conservation, flood management, heat island reduction, etc.) identified and in any way quantified?	☐
Does the design reference the appropriate local and/or state design manuals?	☐

IMPLEMENTATION (20)

Did the team collaborate with facilities staff to develop a design that is feasible and replicable, and do project components detail how future growth and development will impact the design?	☐
Did the team meet with other external stakeholders such as green infrastructure practitioners and/or other community/regional experts?	☐
Does the entry detail how the design could be implemented/phased over the near-, mid-, and long-term time horizons? Are the selected time frames for project implementation reasonable?	☐
Does the entry include a cost estimate for the proposed project?	☐
Did the team provide a list of grants, loans, and other sources of financing capable of covering or supplementing the cost estimate? Information included in the narrative must represent a viable financing path to project construction and long-term maintenance.	☐
Does the narrative contain information on how the project will be operated and maintained over time (e.g., maintenance requirements and schedules, sourcing labor, covering costs, developing stewardship programs where student groups can provide some maintenance)?	☐

COMMUNICATION (15)

Does the project include a description of the overall project goals and objectives, project context, existing conditions along with the problem to be solved, proposed green infrastructure approaches, and expected outcomes?	☐
Are documents well written, error-free, and of sufficient quality to enable judges to evaluate the design?	☐
Is the video pitch original and creative and does it clearly illustrate the entry topics and design?	☐
Does the video illustrate the potential environmental, economic, and social benefits of the project in plain language?	☐
Does the submission document engagement with campus facilities and planning staff?	☐

Does the project contemplate public outreach and education (e.g., examples of signage, infrastructure tours, other learning opportunities)?	☐
Did the team show how they forged partnerships and/or identified stakeholders (e.g., university staff, alumni networks, city, county, state, non-profit, and 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, design consultation, or environmental education.	☐

RESILIENCE (15)	
Does the design reflect priorities included in local, state, or regional climate resiliency initiatives, sustainability plans, adaptation plans, or climate action plans?	☐
Where applicable, does the project include regionally appropriate, native vegetation that will provide ecosystem services that integrate the natural and built environments?	☐
Does the design incorporate elements of stormwater harvest and use for non-potable water applications to offset and replace potable water demand?	☐
Does the design help mitigate flooding?	☐
Where applicable, does the design address concerns of excessive heat?	☐

Documentation Guidelines

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 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 provide references, as appropriate. Entries should adhere to appropriate state and local design standards.

Outcomes	Example Metrics and Terminology
Stormwater Management	Reduction in impervious area (sq. ft., %)
	Volume of stormwater managed (gallons)
	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/year, %)
	Reduction in potable water use for indoor uses (gallons/year, %)
	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)
	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 vegetated roof insulation/evapotranspiration or tree shading (Kwh, %)

Other Ecosystem Services	Air pollutant removal by trees, also known as dry deposition (lbs/yr)
	Carbon dioxide (CO_2) 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: an itemized estimate of annual operations and maintenance costs after construction. 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. Funding: a list of potential public, private, and/or philanthropic funding sources appropriate for the campus. Projects should have funding sufficient to operate and maintain assets throughout their period of service (i.e., the expected useful life of the asset). 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, or 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.

Source: Cornell University's second place entry in the 2021 Campus RainWorks Challenge.