

# Green Infrastructure Leadership and Engagement

##### Grant Type

Annual Grant

##### Application Type

Final Application

##### Project Manager 1 Name

Ashley Danforth

##### Project Manager 1 Status

Student

##### Project Manager 1 Email

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##### Project Manager 1 Department

College of Architecture, Planning, and Landscape Architecture; School of Landscape Architecture and Planning

##### Project Manager 2 Name

Xavier Fernandez

##### Project Manager 2 Email

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##### Project Manager 2 Status

Student

##### Project Manager 2 Department

College of Architecture, Planning, and Landscape Architecture; School of Landscape Architecture and Planning

##### Project Manager 2 Role

Co-lead

##### Project Advisor Name

Dr. Bo Yang

##### Project Advisor Email

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##### Project Advisor Department

College of Architecture, Planning, and Landscape Architecture

##### Fiscal Officer

Carmen Robles

##### Fiscal Officer Email

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##### Fiscal Officer Department Name

College of Architecture, Planning, and Landscape Architecture

##### Requested Funding Amount

Only enter this number after completing the budget sheet (the budget template will round up your request).
Mini Grants may request $250 up to $5,000.
Annual Grants may request $5,001 up to $100,000, and up to three years of funding.

#### Year 1:

$15300

#### Year 2:

$14900

#### Year 3:

$15600

##### Project Name

Green Infrastructure Leadership and Engagement

##### Primary Project Category

Water

##### Secondary Project Category

Built Environment

##### Background and Context

Please provide relevant background about your organization/team including your mission and/or expertise. Lay out the rationale for the proposed project, focusing on the issue that your project would address. You may also share how the project is new or how it complements, builds upon, or scales existing initiatives. This section is meant to give us more information about you and the context for the project, while the questions below provide space to go into detail about your proposal's plan and specifics.

###### Response:

Our team is an interdisciplinary group of dedicated students and faculty collaborating to tackle environmental challenges through innovative, research-driven solutions. Pursuing their master’s in landscape architecture, our two project leads have expertise in Sustainable Built Environments and Sustainable Plant Systems. Together, we are committed to advancing resilient and sustainable practices for our unique arid climates.
As University of Arizona (UA) students, we are uniquely attuned to the challenges of drought and extreme heat, especially in the wake of adverse effects from climate change. Our mission is to enable UA students to utilize, contribute to, and deepen their understanding of Green Stormwater Infrastructure (GSI), a sustainable and low-impact development strategy essential for our desert urban areas. We aim to achieve this by developing a comprehensive, accessible database that measures the performance of existing GSI sites on campus, providing insights into untapped opportunities and fostering awareness of GSI’s benefits. Additionally, by incorporating ongoing student-led research from the UA Campus Agriculture Center (CAC), we highlight the effectiveness of GSI, transform complex findings into engaging content, and uphold our university’s land-grant mission of linking research to improving quality of life.
Tucson has been a leader in lowering its water use, even as the city grows, but much of that effort was achieved through indoor water-saving technologies like low-flow adapters. Initiatives like ours are critical because there has been limited progress in reducing outdoor water use. GSI serves as a crucial mitigation tool to address challenges such as extreme heat, urban flooding, and drought while also providing many co-benefits. Large-scale implementation of GSI requires widespread understanding, real-world examples, and accessible data. A campus-wide, interactive GSI database will offer students hands-on experience with these sustainable practices, positioning them at the forefront of climate-resilient development.
Over the past two years, our team has studied the landscape performance of native and desert-adaptive trees, comparing traditional irrigation methods with GSI-based practices. This was made possible by funding through the Arizona Board of Regents’ (ABOR) Research Grant for Smart Tree Watering in Arizona’s Urban Environment, which allowed the team to develop compelling research that won the 2024 National American Society of Landscape Architects (ASLA) Student Honors Award in Research. With funding from the Campus Sustainability Fund, we will secure three additional years of critical GSI research and launch the first campus-wide database quantifying UA’s long-term sustainability efforts.
This project builds on UA’s leadership in applied water conservation and heat resiliency research, leveraging existing initiatives like the Learning Lab and the Campus Sustainability Map to expand and scale ongoing work.

##### Project Description

Please provide a thorough description and explanation of your project. Be explicit in what your team is proposing. What will your project’s outcomes be and how will you achieve them? Outcomes should be specific, measurable, achievable, realistic, and timely.

###### Response:

Our project enhances GSI research and implementation at the UA by expanding upon existing initiatives such as the Living Lab and the Campus Sustainability Map. This initiative will not only document where GSI features are located but also quantify their impact, enabling data-driven decisions for future development. Our project consists of three main components: (1) main campus database creation, (2) student-led research and leadership enhancement, and (3) city partnership and outreach.
(1) The foundation of our project is the development of a comprehensive GSI database that quantifies existing infrastructure through a zoning system. The campus will be divided into major zones that we will complete one at a time over the 3 years. We will identify all GSI sites using faculty advisement from Professor Grant McCormick and Dr. Vanessa Buzzard, catalog site features, and measure basins and swales to determine their water-holding capacities. Additionally, we will calculate stormwater runoff potential by analyzing factors such as nearby roof water runoff, curb cuts, and road runoff. The database will also document plant materials used, which are used as a strategic tool when using GSI, and future site indicators will be identified, such as areas prone to erosion or low-elevation zones suitable for water harvesting. Using tools like ArcGIS Field Maps, standard measuring practices, and drones to collect information, students will ensure accuracy and data efficiently. Signage will be placed at key sites to provide instant access to this information (via QR code) and instill a sense of pride and acknowledgment.
(2) Past findings from student-led research will be integrated into the GSI database. Our work at CAC aims to assess tree health and survival under natural rainfall conditions. Outcomes will be determined through biomass measurements, root growth analysis, shade density studies, and microclimate effects. These controlled conditions will allow us to assess water usage, health, and overall growth rates, providing critical insights into the effectiveness of GSI in arid environments. New research data will be incorporated into the database to refine best practices and provide students with up-to-date data.
(3) Beyond data collection and research, outreach is a vital component of our initiative. We will offer hands-on learning experiences by bringing students to the CAC to observe and participate in student-led research plots. Additionally, we will organize guided tours for local community members and officials across campus, fostering collaboration between academia, industry professionals, and policymakers. Student-led workshops and networking events will further promote professional development in sustainable and resilient development fields. Through these efforts, we aim to bridge the gap between research and real-world application, ensuring that our work has a lasting impact both on campus and in the broader community.

##### Timeline

Please provide a timeline breakdown for the key steps in your project. The timeline can be basic, but please include anticipated timeframes for each major step, including any key dates for when certain elements must start or be completed. The timeline can be in list format.

###### Response:

Fall 2025: Establish partnerships with students, city, and nonprofits. Develop a GSI database by zoning the campus based on watersheds. Begin Phase 1, mapping GSI sites, measuring, and monitoring CAC research plots. Students handle site visits, maintenance, and sensor data collection.
Spring 2026: Finalize Phase 1 data collection and integration. Start Zone 1 signage coordination and use this process to plan signage for other zones. Host a research symposium (Feb/March) to review the GSI inventory and CAC progress, with UA faculty, students, and administration. Organize campus and CAC field trips for students in water harvesting courses and arrange a trip for professionals and community leaders.
Fall 2026: Begin Phase 2, expanding on Phase 1 data. Continue monitoring GSI sites and hosting CAC field trips for related courses.
Spring 2027: Complete Phase 2; integrate data into the GSI database. Continue CAC field trips for students and professionals, demonstrating water harvesting and green infrastructure benefits.
Fall 2027: Begin Phase 3, further mapping drainage infrastructure and potential sites. Organize a UA CAC field trip for students and professionals.
Spring 2028: Conclude Phase 3; integrate all data into the GSI database. Host a second symposium (Feb/March) to present findings, review findings, and discuss scaling the project. Share results with UA faculty, students, and administration. Organize the final CAC field trip, possibly with a celebration of the project’s impact.
Fall 2028: Submit the final GSI database, officially concluding the project.

##### Budget Narrative

Use this section to provide supplemental justification for the items you are requesting on your budget sheet. Please break down your justifications into the budget categories: Personnel or operating budget. Do not list out each expense or repeat notes made in the budget template, but instead address why the line items are being requested and the purpose they will serve, providing elaboration when necessary.
If you are requesting funding for personnel, use this section to elaborate on the position you are creating and how the budget and timeline was established for it. If you plan to hire students, describe in what capacity. Describe relevant details thoroughly (wages, responsibilities, duration of job, extent of involvement, how you will solicit/ market these opportunities etc.).
Ensure the descriptions match the line items in the budget sheet.
If matching or supporting funds are secured for the project, identify the source and amount in this section, and detail the impact of the matching funds on your overall budget.

###### Response:

Funds are requested to cover two student co-leads and an additional two student team members to conduct project activities. Additional funds are requested to cover space rental costs at the UA Campus Agriculture Center (CAC) for experimental research and Student Union to host two campus-wide symposia. Funds are also requested to cover car rental for field trips at UA CAC, GSI measurement equipment like field materials and a drone, and additional funds for campus-wide signage. The co-advisors will provide matching funds to support project activities.

(1) Personnel (graduate and undergraduate students)
• Two Student Co-Leads. Hourly student
$17/hr x 3 hrs/wk x 40 wks/yr = $2,040/yr
ERR (2% ERE rate) = $40.80/yr

• Two additional team members. Hourly student
$17/hr x 2 hrs/wk x 40 wks/yr = $1,360/yr
ERR (2% ERE rate) = $27.20/yr

FY 2026 = Wages $6,800 + ERE $136 = $6,936
FY 2027 = Wages $6,800 + ERE $136 = $6,936
FY 2028 = Wages $6,800 + ERE $136 = $6,936

Total Wages and ERE = $6,936 x 3 yrs = $20,808

(2) Rental and materials
• UA Campus Agriculture Center (CAC) space rental
$4,000 CAC annual space rental fee. To support on a research project on smart tree watering technologies
$4,000 x 3 years = $12,000

Total CAC rental = $12,000

• UA Student Union space rental
$500 for conference rooms at Student Union for campus-wide symposia (in 2026 and 2028)
• Rooms for 50-100 guests with row seating (vs. round table seating) range from $140-$160
o According to the Student Union, additional fees will be added for microphones, projector use, food, etc.
o $250 per conference x 2 proposed conferences (in 2026 and 2028) = $500

Total Student Union space rental = $500

• UA Motor Pool car rental
$900 car rental for field trips to UA CAC and sites in Tucson

Field trips in UA Campus Agriculture Center, guided by the student team.
Field trips in project sites in City of Tucson, guided by partners from government departments and nonprofit organizations.

Rental cost: 7-person van is $100+
Current rate from UA Moto Pool (https://www.fm.arizona.edu/rentvehicle/)
Estimated $300/year x 3 years = $900

Total Car rental = $900

• Measurement Tools
Drone $200, one time purchase
Estimated budget for field tools $100/ year x 3 years = $300

• Signage
Large bronze signs $2000 each x 3 years = $6000
- One for each of the three zones
Smaller acrylic signs for remaining sites
Costs equal to around $100 x 50 sites / 1 zone per year = $1,500 year 1, $1,500 year 2, $2,000 year 3

Rounded Annual Grant Funding Request = $45,800

(3) Matching Funds provided by co-advisors.
Matching funds from other sources: co-advisor Dr. Bo Yang’s funding from USFS and NSF to support two 0.25 FTE GRAs for the proposed project.

$1,0875/year x 2 GRAs x 3 years = $65,250

Summary:
Total requested from Campus Sustainability Fund = $45,800
Total matching fund = $65,250
Total Project cost: + $65,250 = $111,050

##### Project Feasibility and Logistics

The Campus Sustainability Fund will only fund projects that have completed the necessary work to ensure they can succeed, be completed in the grant’s timeline, or have an accurate budget.
Please provide a description of the work that has been completed so far to make this project feasible. Please provide a description of the work that has been completed so far to make this project feasible. If relevant partners have been contacted/coordinated with, please identify them in your response.
For example, have you received consent or authorization to complete your project (such as from Housing and Residence Life, Facilities Management, Parking and Transportation, etc.)? If you are making modifications to campus, do you have written authorization or official quotes from Facilities Management to accurately identify the cost of labor and supplies?

###### Response:

Our project’s feasibility is reinforced by strong collaborations, dedicated leadership, and institutional support. Our student leads come from the College of Architecture, Planning, and Landscape Architecture (CAPLA), which focuses on built environment research, teaching, and engagement. Faculty advisors Dr. Yang, Dr. Buzzard, and Professor McCormick bring decades of GSI research and implementation experience across CAPLA and the College of Agriculture, Life & Environmental Sciences (CALES). These colleges work collaboratively on interdisciplinary projects, advancing science and sustainability through research and engagement. Our reputation for innovation fosters meaningful partnerships and a culture of collaboration.
Our active student team plays a vital role in sustaining these connections. Several members are ASLA leaders, with national award recipients increasing visibility and interest in our work. Club involvement facilitates outreach to other student organizations, such as Hydrocats, to explore how our project can enhance their work and organization goals.
Faculty support strengthens our project’s logistics. Professor McCormick has implemented many GSI features on campus, while Dr. Buzzard connected us with Dr. Quist, Director of the UA Campus Arboretum. Dr. Quist sees our project as an opportunity to enhance campus resiliency and inform Arboretum initiatives like the UA Landscape Master Plan, along with a curated list of climate-resilient trees for 2050. She has also offered guidance on signage development and student engagement. Professors Buzzard and McCormick manage the Living Lab and will help our team build a dedicated GSI database modeled after the Campus Sustainability Map, for which they have had experience in developing.
Beyond campus, we have strong city and county partnerships. Past projects, such as CAC’s first two years of research, established collaborations with The Nature Conservancy and the Million Trees Program through the ABOR Research Grant. Many of our members have also taken Pima Smartscape courses, maintaining ties with instructors and strengthening research communication. We are currently working with the program coordinator to identify opportunities for future collaboration.
By integrating tree data, GSI research, and campus signage, we bridge multiple disciplines and institutions. These collaborations ensure our project’s long-term success by providing expertise, resources, and a shared commitment to sustainable development.

##### Environmental Sustainability Outcomes

Please provide a description of how you expect your project to advance environmental sustainability on campus. A definition of environmental sustainability is provided on our Guides and Tips page.

###### Response:

The research conducted at the CAC plays a critical role in validating GSI effectiveness, and our database translates those insights into an engaging and accessible format. Together, these tools promote informed decision-making and expand the understanding and implementation of GSI, starting on campus and potentially extending to other desert communities. CAC research has demonstrated how GSI technology improves tree health, soil conditions, and microclimates in the Sonoran Desert. By integrating this research into the campus database, we can quantify and establish a baseline for GSI’s collective impact on water conservation while also identifying areas for future expansion.
Data from the CAC provides controlled, evidence-based findings that inform how existing and future GSI sites should be designed, maintained, and expanded. The on-campus database further supports this work by establishing key performance metrics that enhance resilient development practices. Collectively, these efforts contribute to strategies that optimize water use, strengthen landscape resilience, and advocate for a more sustainable future.
Access to reliable data empowers campus leaders to make informed decisions about future sustainability initiatives. Expanding research and making it accessible through user-friendly tools will promote the adoption of nature-based solutions like GSI. These solutions contribute to environmental co-benefits, such as increasing green space and improving urban habitat health, which, in turn, lead to a cooler and more resilient desert campus for students, faculty, and staff. Additionally, integrating research on our four native and desert-adaptive tree species will highlight their ecological benefits, including water efficiency, support for local wildlife, and reinforcing a sense of place that connects the campus to its desert environment.
Our project plays a vital role in enhancing campus environmental sustainability by improving water conservation, supporting data-driven decision-making, and integrating research. By developing a comprehensive database, we can optimize irrigation strategies and reduce reliance on outdoor water use. This tool will measure both passive and active water harvesting, allowing us to quantify conservation efforts and track progress toward the campus’s environmental goals.

##### Social Sustainability Outcomes

Please provide a description of how you expect your project to advance social sustainability on campus. A definition of social sustainability is provided on our Guides and Tips page.

###### Response:

Our project advances social sustainability by fostering informed decision-making, student engagement, and long-term campus investment. By developing a comprehensive database, we provide campus leaders with data-driven insights to guide sustainable initiatives. Just as we have built upon past efforts, future students and researchers will expand upon our work, aligning with the mission of our land-grant goals to promote ongoing learning and innovation. The advancement of GSI will not only enhance campus sustainability but also create a healthier, more desirable environment for students.
Interactive signage, the database, and student-led informational outreach sessions will strengthen students' connection to their campus, encouraging them to take an active interest in its present and future, even as alumni. As this project continues to grow, it will offer opportunities for students to gain leadership experience, conduct research, and build stronger networks. These interdisciplinary collaborations foster deeper connections between students, faculty, and academic programs, enhancing cohesion across campus.
By committing to the development of sustainability projects like GSI, the UA can continue to lead in sustainable innovation, benefiting both the institution and its students. A campus visibly dedicated to sustainability influences students' values and behaviors, integrating environmental consciousness into their daily lives. Seeing sustainable initiatives and informational signage regularly creates a "cue to care," inspiring students to engage with and support environmental stewardship. Following advice from Dr. Quist, we hope to develop a signage system that shows the importance of our work. We will use three major GSI sites that link the entirety of our project together. Bronze signage will anchor these more substantial sites that combine our best GSI features and potentially trees from our research, linking our on and off campus efforts.

##### Student Leadership & Involvement

Please provide a description of how your project will benefit students on campus regarding the creation of leadership opportunities or student engagement. What leadership opportunities exist within your proposal? If you plan to seek student involvement, include relevant details thoroughly and how you will solicit/ market these opportunities.

###### Response:

Student involvement and leadership are essential to our project’s success, with structured roles that promote collaboration, skill development, and project completion. Students work together, fostering communication, problem-solving, and teamwork to achieve shared goals.
The student lead plays a key role in organizing and executing project plans. For the CAC, this includes scheduling irrigation based on seasonal variables, collecting data, and overseeing the development of the new site. For the database project, the Student Lead is responsible for creating a structured framework to document campus GSI features over three years. This involves dividing the campus into sections, assigning responsibilities to team members, mapping key landmarks, and ensuring effective communication of the project plan. Additionally, they manage logistics such as coordinating with campus groups, faculty, off-campus organizations, and local professionals.
The student co-lead supports the student lead by assisting in plan development, taking on leadership responsibilities, and preparing to transition into the lead role in the future. They play a crucial role in synthesizing research and data while also contributing to project completion, team delegation, and professional outreach.
The student team actively participates in both project development and day-to-day maintenance tasks. Responsibilities include maintaining the research site by watering trees, fixing irrigation systems, monitoring site conditions, troubleshooting issues, and synthesizing data for outreach. For the database project, students conduct site surveys, take measurements, input data into ArcGIS Field Maps, and gather relevant existing data. During outreach, student team members will be responsible for informing others about the work we do and helping guide people through our sites and our site development processes.
Ultimately, all team members are invested in the overall success of our work and support the group however necessary. Through these roles, students gain hands-on experience in sustainability research, site management, leadership, and technical skills.

##### Education, Outreach, and Behavior Change

What opportunities does this project provide for members of the campus/community to learn about sustainability? How will your project educate the campus community and/or incorporate outreach and behavior change, particularly those who are not currently engaged with sustainability or environmental work?
Please provide a description of how you expect your project will communicate its impacts to the campus community.

###### Response:

This project creates valuable opportunities for the campus community to engage with sustainability through education, outreach, and hands-on involvement. By gathering GSI data across the university, we will build a comprehensive database detailing each feature’s purpose, selection purpose, water-holding capacity, and broader environmental benefits. This resource, accessible via QR-coded signage, will empower students, faculty, and staff to explore and understand the green infrastructure surrounding them.
 The CAC will remain a hub for sustainability research, providing a living laboratory where students and community members can witness smart watering techniques in action and study the resilience of different tree species in arid conditions. Field trips to our campus sites and CAC research plots will offer immersive learning experiences, inspiring students to see firsthand how innovative water conservation strategies can transform landscapes. These experiences will not only deepen their appreciation for green infrastructure but also motivate them to take an active role in shaping a more sustainable future.
Ongoing data collection from our interactive database will track the volumes of water harvested over time and showcase the university’s contributions to water conservation, heat mitigation, and ecosystem health. With faculty support and efforts from our dedicated student team, our database will eventually resemble what is seen with the Campus Sustainability map and be featured on their website.
Conferences in Spring 2026 and Spring 2028 will provide milestones to reflect on progress, share findings, and set future goals. More than just a research project, this initiative will leave a lasting legacy—shaping student perspectives, fostering a culture of environmental stewardship, and equipping future generations with the knowledge and motivation to build resilient, sustainable communities.