

## ENR2 Living Laboratory

### Grant Type

Annual Grant

### Application Type

Final Application

### Project Manager 1 Name

Olivia Miltner

### Project Manager 1 Status

Staff

### Project Manager 1 Email

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### Project Manager 1 Department

Arizona Environment (Arizona Institute for Resilience)

### Project Manager 2 Name

Maia Schneider

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### Project Manager 2 Status

Staff

### Project Manager 2 Department

AIR Education (Arizona Institute for Resilience)

### Project Manager 2 Role

Co-lead

### Project Advisor Name

### Project Advisor Email

## **Project Advisor Department**

### **Fiscal Officer Name**

Michelle Moraila

### **Fiscal Officer Email**

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### **Fiscal Officer Department**

ORP Business Office

## **Requested Funding Amount**

*Enter numbers only. Only enter this number after completing the budget sheet, as the budget template will round up your request.*

*Annual Grants may request \$10,000 up to \$50,000.*

### **Year 1:**

\$50000

## **Project Name**

ENR2 Living Laboratory

## **Primary Project Category**

Biodiversity and Ecosystem Health

## **Secondary Project Category**

Sustainability Literacy

## **Background and Context**

*This section can be used to share information about the team and the context for the project, while the questions below provide space to go into detail about the proposal.*

*Your response should include:*

- Relevant background about your organization or team, including its mission and expertise.*
- An explanation of how the project is new, or how it complements, builds upon, or scales existing initiatives.*

### **Response:**

Since ENR2 opened 10 years ago, each of the building's features has contributed to a cohesive system that visually and functionally evokes a slot canyon, tempering the outdoor space even during extreme heat while working to reduce the building's energy demand.

When the architects, engineers and contractors originally envisioned the building, they considered the overhanging concrete balconies, the thermal mass, and the aperture of the building's roof in

how they planned to reverse engineer a slot canyon.

“What we really didn't appreciate was the level to which the plants were going to make a difference,” said Henry Johnstone, chief engineer on the ENR2 team. “The evaporative cooling effect of the plants, not only the evapotranspiration, but the fact that the soil is moist, and the moist soil influences the temperature of the balconies – that's really what you're feeling down in the bottom, and that's really what's inducing this convective current that flows through (ENR2) at certain times of the day.”

The building and its cooling system have received numerous awards, including recognition in “Works with Nature,” a collaborative publication by the United Nations that was released in 2024.

Observing plant growth throughout ENR2 over the last decade has revealed which kinds of plant material tend to succeed in the building's conditions, as well as which locations have struggled to sustain plant life despite repeated re-installation. This has left certain areas within ENR2 underutilized. These challenges are suspected to stem from a blend of low light, overwatering, and soil health factors like high salinity. Additionally, although pre-planned in-person ENR2 tours are available for visitors, little up-to-date educational information about the building's unique features is available to the public.

That is why this project proposes to enhance the building's environment from both a landscaping and educational perspective to help maximize its impact on heat resilience, energy efficiency, and sustainability literacy.

As a program dedicated to promoting environmental work at the U of A, Arizona Environment is well positioned to facilitate this project because of our relationships with ENR2-related educational, research, and design and construction partners; our experience with project management; and our expertise in marketing and communications.

For example, Arizona Environment regularly collaborates with the Liverman Fellows – another program within the Arizona Institute for Resilience – on environmental and science communication training. Additionally, this project originated following our organization of ENR2's 10th Birthday Bash in September 2025, through which we connected with the building's landscape architects, Colwell Shelor, who have become key partners on this project. We look forward to continuing this momentum by enhancing ENR2's place as a living laboratory at the University of Arizona.

## **Project Description, Alignment, and Metrics**

*Please describe your project, explain how it supports the university's sustainability goals, and identify the metrics you will use to demonstrate its impact. In a later section, you will have the opportunity to provide more narrative on environmental and social sustainability impacts.*

*The proposal must align with at least one goal from the university's draft Sustainability and Climate Action Plan. The proposal must also include output- and/or outcome-focused metrics, along with the Campus Sustainability Fund's required standardized metrics, and context on how metrics will be tracked. Review standardized metrics, Action Plan goals, and output/outcome metrics to inform this response.*

*Your response must include:*

- A thorough, clear, and compelling project description.*
- Identification of one or more specific Action Plan goals to which the project is directly aligned.*

- *Strong output- or outcome-focused metrics that demonstrate tangible impact, along with the Campus Sustainability Fund's required standardized metrics.*
- *An explanation of what will change as a result of the project.*

**Response:**

The "ENR2 Living Laboratory" project's landscaping refresh and educational signage installation support two Sustainability and Climate Action Goals: Biodiversity & Ecosystem Health and Sustainable Literacy.

**Landscaping Refresh:**

The landscaping refresh will replant in locations throughout ENR2 that have experienced plant failure but remain suitable for certain plant life. This four-step process includes:

**Environmental conditions assessment**

We will work with an external soil testing lab and the U of A's Green Stormwater Infrastructure at the Campus Living Lab to measure soil health, moisture, and light conditions across ENR2's microclimates.

**Plant Strategy**

Based on the initial conditions assessments, U of A Grounds, Colwell Shelor, and the landscaping installer Santa Rita Landscaping will develop a landscaping refresh plan that identifies areas for re-planting, soil amendments, appropriate plant material, and adjustments to irrigation by adjusting scheduled length of run times and frequency.

**Plant Installation**

Santa Rita Landscaping will install plants in ENR2 based on the aforementioned strategy.

**Plant monitoring**

We will work with AIR's R&D team and the Green Stormwater Infrastructure at the Campus Living Lab during the 26-27 SY to develop multi-function environment sensors to deploy throughout ENR2. These will monitor soil and environmental conditions in the first year following planting, providing data for outcome metrics reporting and for irrigation adjustments. Long-term plant growth following installation will be monitored by U of A Grounds.

This will increase climate-adapted plants in ENR2 that support urban biodiversity, green infrastructure, pollinator habitat, and heat resilience – as the plant life in ENR2 enhances the functioning of the building's cooling system, which reduces its energy footprint and creates a more comfortable space for visitors.

**Output metrics:**

- Acres or square feet of evapotranspiration-inducing landscaping restored in ENR2
- Number and species of plants installed
- Number of students participating in landscaping data collection

**Outcome metrics:**

Reduction in localized heat island effect measured in planted zones  
Survival and long-term health rates of climate-resilient plantings over 3–5 years  
Improved green spaces expand comfort and sense of well-being for students  
Reduced energy use intensity throughout the building  
Reduced water use  
Enhanced urban soil health

**Signage:**

This project proposes partnering with the Liverman Fellows to develop six educational signs in ENR2, one per floor including the roof, to communicate ENR2's sustainability features to the building's diverse visitors.

Liverman Fellows working on this project will be supervised by Arizona Environment Program Coordinator Olivia Miltner, who will help students synthesize the information received from subject matter experts (SMEs). SMEs will include U of A Sign Committee and marcomm experts; ENR2 architects and engineers such as Colwell Shelor, Richard Kennedy, and GLHN; and U of A staff responsible for maintaining ENR2 such as the building manager, FM and the Office of Sustainability.

Students will be given proposed sign locations and subject topics and will then consult with experts to draft and revise content. Students will also update or develop a virtual ENR2 tour, digital resources, and a pre- and post-survey to measure impact.

A scientific illustrator and AIR's graphic designer will support the creation of signage visuals and layouts. All sign text and layouts will be approved by the U of A Sign Committee.

**Output Metrics:**

Signage QR code scans  
Virtual ENR2 Tour and other educational pageviews  
Number of Liverman Fellows contributing to outreach materials  
Partnerships established with campus units and design firms to advance sustainability initiatives and awareness

**Outcome Metrics:**

Demonstrated increase in sustainability literacy scores from pre- and post-program surveys

## **Timeline**

*Please provide a timeline that outlines the key steps of your project. The timeline may be provided in list or narrative format. Your response must include:*

- *Anticipated timeframes for when major activities will begin and be completed.*
- *Identification of critical deadlines or milestones that must be met.*

**Response:**

July-August 2026:

- Conduct conditions/environment assessment including soil testing (collect samples, send to lab,

receive results) and sunlight and moisture assessment

- Project managers Olivia Miltner and Maia Schneider will work with SMEs to review proposed signage locations and decide on subject topics
- Scientific illustrator will begin creating a bank of images to be used across signage and digital resources

August 2026:

- Liverman Fellows begin their 2026-27 program.
- Recruit and Hire Research Technology and Development Support Specialist

September 2026:

- Review assessment results with Colwell Shelor, landscaping installer, and U of A Grounds to develop detailed planting strategy
- Begin multi-function environment sensors development

September-December 2026:

- Liverman Fellows begin meeting with subject matter experts to collect information and start drafting signage and digital supplemental content

October:

- Procure plant materials
- Scientific Illustrator provides bank of visuals for educational resources and signage

November 2026-January 2027:

- Install plant materials with landscaping vendor (such as Santa Rita Landscaping), completing refresh

January 2027:

- Share initial signage drafts with U of A Sign Committee for feedback
- Work with FM to finalize sign frame design and begin construction
- Deploy sensors in ENR2 and begin monitoring data collection, to be completed through Dec. 2026

February-April 2027:

- Iterate on signage drafts and digital resources incorporating feedback from SME and Sign Committee

May 2027:

- Finalize signage designs, order panels through FOSSIL Graphics, finish constructing signage framing with Facilities
- Finalize and publish digital resources

June 2027:

- Install signage in ENR2!

July 2027:

- Begin tracking outreach impact through pageviews, QR code scans, and survey results. Note: This falls outside the project implementation timeline, but we will plan on tracking these metrics throughout FY28.

FY28 and Beyond:

- U of A Grounds to monitor long-term plant growth across refreshed areas.
- This educational signage is “permanent,” meaning it will be designed to withstand the outdoor elements and provide information that is evergreen. However, the graphic panels will be removable, and because the sign frames won’t be drilled into the ground, the signs themselves will be movable as well. This will provide flexibility in the future should any need arise to update the signage content or locations.

## **Project Feasibility and Logistics**

*Please describe the steps you have taken to ensure your project is feasible, including work completed to date, and any necessary approvals that have been obtained or partnerships that have been formalized.*

*If relevant partners have been coordinated with, please identify them in your response. If you have received authorization to complete your project, such as from Facilities Management/ Parking and Transportation, please indicate those collaborators. If the proposed project will make modifications to campus, please address if you have written authorization or official quotes from Facilities Management to accurately identify the cost of labor and supplies.*

*Your response must include:*

- *The steps that have been taken to ensure the proposal can be successfully completed.*
- *Any necessary approvals, authorizations, or partnerships that have been secured.*

### **Response:**

We are committed to working with all U of A and external collaborators to ensure this project is completed to the highest standards and is positioned to make a long-term, positive impact on campus.

For the landscaping refresh, this has included regular meetings with Colwell Shelor leads Allison Colwell and Michele Shelor, who have offered to provide pro-bono consultation and design. In Fall 2025, Colwell Shelor and U of A Grounds leadership conducted an ENR2 building walkthrough, and the project was confirmed by the same collaborators in a final meeting held in February. U of A grounds and Colwell Shelor agreed the three factors likely contributing to plant failure in ENR2 are lack of sunlight, over watering, and the subsequent accumulation of nutrients (esp. salt) in soils.

Colwell Shelor has provided us with an ENR2 landscaping plan that granularly identifies all areas throughout ENR2 that have experienced plant failure. This, along with the conditions assessment data, will be used to eventually identify strategic replanting locations and plant type. We will be partnering with Associate Professor of Landscape Architecture Kirk Dimond, who works with the Green Stormwater Infrastructure at the Campus Living Lab, on pre- and post-environmental monitoring. Additionally, we have received an estimate for soil testing and recommendations through Motzz Laboratories.

Santa Rita Landscaping will also support the project, primarily through assistance with defining and installing the landscaping refresh. SRL has conducted an initial walkthrough of ENR2, guided by Colwell Shelor’s ENR2 landscaping plan, and used that to develop a preliminary estimate for the installation, which includes reserving some funding for irrigation line repairs and replacement.

For the educational signage, we have confirmed our partnership with the Liverman Fellows program for the 2026-27 school year. Maia Schneider, the Liverman Fellow's program coordinator, is the project co-manager on this grant application.

We have also met with the Sign Committee's Janice Simcoe and have received her support for our project. We will review ENR2 sign content with the Sign Committee, including providing a formal presentation, during the 26-27 school year.

The U of A Sign Shop has provided informal estimates for our sign frame fabrication and placement, and we have also received an estimate from FOSSIL Graphics for costs associated with six 2'x3' graphics panels. The scientific illustrator who has agreed to work with us is a part-time U of A employee, so we propose bringing her onto the team by increasing her FTE, based on guidance we have received from her HR representative.

Partnering with our U of A and community partners will be vital for the success of this project. We are extremely grateful for the help we've already received and look forward to continued collaboration as we identify more details.

## **Budget Narrative**

*Provide justification of the funds (personnel and operational) requested in your budget sheet and how they support your project's goals. If requesting personnel funding, describe the position, responsibilities, and timeline. If your team has matching or supporting funds, identify the source, amount, and their purpose. Your response must include:*

- *A reasonable, clear budget that is aligned with project goals.*
- *Sufficient justification for all requested expenses.*
- *Identification of any matching or supporting funds, including their amount and purpose.*

### **Response:**

Santa Rita Landscaping is a local company who installed the original ENR2 landscaping 10. Following their ENR2 walkthrough, they have provided an initial recommendation for how to allocate the funds earmarked for landscaping installation. The number of sites within ENR2 that will be refreshed will depend on which plant varieties are selected (which can be classified as shrub, ground cover, and cactus with quantities of 1 gallon, 5 gallon, and 15 gallon plants), as well as whether soil amendments or irrigation repairs will be needed.

The landscaping on ENR2's overstructure sits atop a thin Hydrotech membrane that protects the building from water damage, necessitating specific expertise from landscaping installers. Because of this, U of A Landscape Architect Chris Stebe, Superintendent Sandra Obenour-Dowd, and landscape architect firm Colwell Shelor expressed the requirement to work with the original landscaping contractor on ENR2, because they have the technical knowledge and expertise to ensure all infrastructure is protected. Following the conversations, we will be pursuing a sole-source justification to contract with Santa Rita Landscaping.

The budget for the R&D student employee was developed after consulting with AIR's systems engineer, who suggested that 200 hours would be an appropriate amount of time to complete the sensor development project and provided the standard hourly rate for student employees.

In addition to the landscaping installation, Motzz Laboratories is a Phoenix-based lab recommended by Cooperative Extension that can provide complete soil testing and certified agronomist recommendations.

Educational signage expenses come from three sources: the scientific illustrator, the graphic panel printing, and the frame construction. Justifications for each of those is included below:

Kirsten Howe, currently pursuing a certificate in scientific illustration, will create a bank of illustrative visuals for use across the educational signage and digital materials based on the sign locations and topics identified in summer 2026. Her experience in botanical and wildlife illustration will be valuable for communicating about the natural elements in ENR2. Kirsten is currently a part-time employee in SNRE, so we propose to increase for FTE by .2 to add 8 hours of work on this project per week for 15 weeks, from July 2026-October 2026. Kirsten will be using this project to fulfill a requirement for her scientific illustration certificate, so this timeline will allow her to meet that goal.

The graphic panel vendor that was recommended to us from the U of A Sign Committee was FOSSIL Graphics. They have worked frequently on similar signage projects for clients that include the National Park Service. Panels will be installed using custom frames constructed by U of A Facilities, which will require no drilling or staking to protect the building and prevent permanent alteration.

## **Environmental and Social Sustainability Impact**

*Please provide a narrative description as to how your project will advance environmental and social sustainability on campus. Environmental impact can take many forms, such as reducing greenhouse gas emissions, conserving water, improving energy efficiency, managing waste responsibly, or enhancing biodiversity and ecological health. Social sustainability can include strengthening food security, improving health and well-being, addressing disproportionate burdens on frontline communities, building community resilience, or fostering a sense of belonging. Please review how the CSF defines both environmental and social sustainability on its Guides and Tips webpage.*

*Your response must include:*

*- Clear identification of environmental and social sustainability benefits.*

### **Response:**

This project advances environmental and social sustainability in multiple ways. From an energy efficiency and ecosystem health perspective, revitalizing plant material in ENR2 will enhance the functioning of ENR2's cooling system. This simultaneously reduces the building's energy footprint while also increasing climate-adapted plants that support urban biodiversity, green infrastructure, pollinator habitat, and of most relevance for this project – heat resilience, making the building's outdoor seating areas more comfortable for occupants and visitors. Because the landscaping installation process will also likely include soil interventions and reduced irrigation, this project will also likely reduce water use in the building and enhance urban soil health.

Additionally, this project will increase sustainability literacy by educating its visitors about ENR2's sustainable features, while also providing U of A students with valuable experience learning how to communicate environmental topics through the involvement of the Liverman Fellows program. These signs will educate audiences about sustainable design using tangible examples; they will deepen appreciation for the ENR2 building and the value of sustainable built environments, particularly in the context of the Sonoran Desert; and they will articulate how investment in this building embodies and supports environmental, resilience, and sustainability work at the U of A.

## **Student Relevance and Involvement**

*Please describe how your project will demonstrate relevance to students and provide broad benefit to the student body. This benefit may come through direct involvement in project activities, indirect outcomes that improve the student experience, or opportunities for education and engagement. If students will participate in planning, implementation, or leadership, include details on their roles and responsibilities, as well as how you will recruit, solicit, or market these opportunities.*

*Your response must include:*

- *An explanation of how the project will benefit or involve students.*
- *A description of meaningful opportunities for student leadership or professional development, if applicable.*

### **Response:**

U of A students will benefit from this project through direct involvement, improved student experience, and expanded educational opportunities.

First, under the supervision of the project managers and in consultation with subject matter experts, students will lead the creation and design of the educational signage through our partnership with the Liverman Undergraduate Environmental Fellows Program during the 2026-27 academic year. This program allows students to make a tangible impact in their community and local environment while developing resume-worthy skills in teamwork, leadership, problem solving, communication, and project management. Undergraduate students in the Liverman Fellows 2027 cohort will gain professional experience by working with subject matter experts to develop sign content.

The Liverman Undergraduate Environmental Fellows Program, housed in the Arizona Institute for Resilience, hosts a cohort of up to 15 interdisciplinary undergraduate students to gain skills in environmental communication through collaborative projects with community partners. These students work closely with faculty mentors and attend weekly workshops in ENR2 where they participate in place-based storytelling activities and gain hands-on experience in multimedia communication. They then use the skills they've learned to complete a communication-based project for an environmental community partner.

If funded, the Liverman Fellows 2026-2027 cohort will partner with the ENR2 Refresh and Signage project. They will work closely with Olivia Miltner, Maia Schneider, the Liverman Fellows' faculty mentors, subject matter experts, and the illustrator to develop and draft educational signage and a virtual tour that will provide a deeper understanding ENR2's sustainable features.

Another opportunity for student involvement will be through the ENR2 landscaping environmental assessment and post-installation monitoring. Kirk Dimond's students will support the pre-installation conditions assessment by manually collecting measurements of environmental conditions in prospective planting areas throughout the building. They will also be included in the landscaping design strategy development and have the opportunity to participate in a site visit during the landscaping installation. These will provide students with training and hands-on experience in data collection and demonstrating how this data will be used to inform the landscaping plan and implementation.

Lastly, this project's landscaping refresh will enhance the student experience in general by creating more comfortable outdoor areas throughout ENR2, and the installed signage will introduce an additional engagement resource to educate not only students but also community members and U of A faculty and staff about sustainable built environments.

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

*Please describe how your project will provide opportunities for the campus community to learn about sustainability. Explain how the project will educate or engage individuals, including those not currently involved in sustainability efforts, and how it will incorporate outreach or behavior change strategies. Include how you plan to communicate the project's impacts to the wider campus community.*

*Your response must include:*

- How you will educate the campus community about sustainability.*
- An explanation of how you will communicate the project's impacts to the wider campus community.*

### **Response:**

These signs will educate audiences about sustainable design; deepen appreciation for the value of sustainable built environments; and articulate how investment in ENR2 supports sustainability work at the U of A.

ENR2 is well positioned to educate the broader campus and Tucson community – and beyond – about sustainability. One report found that “the building and landscape hosts on average 1,500-2,000 visitors per week and serves as a campus landmark and primary meeting place for introducing local and international delegates to campus sustainability efforts.” Because of this, is it a key touchpoint for helping even those who aren't familiar with sustainability learn about how the concepts can be applied in tangible ways to create better living environments for everyone.

The educational signage and digital resources will be designed to be accessible for a general public audience. We will start by evaluating existing materials such as AIR's ENR2 page (<https://air.arizona.edu/enr2>) and the Planning, Design and Construction Guided Tour (<https://enr2tour.arizona.edu/>), and then determine what to update and what new resources to create, such as educational pages connected to the signs' QR codes.

Sign strategy will prioritize aligning placement and content with ENR2 tour stops and talking points, and it will follow best practices aggregated from published conservation and higher education guides. Additionally, we have been provided with copies of the Office of Sustainability's proposed

sustainability signs, including the ENR2 sign, so we will ensure our content complements that information.

These will provide both in-person and asynchronous opportunities for the public to learn more about ENR2 and, by extension, the importance and impact of sustainable built environments. This educational signage is designed to withstand the outdoor elements and provide evergreen information. However, the graphic panels will be removable, and the signs themselves will be movable as well. This will provide flexibility in the future should any need arise to update the signage content or locations.

Arizona Environment will provide outreach and marketing to promote these new resources to audiences on campus and in the local community, including promotion across our social media platforms, in our newsletters, and on the Arizona Environment website.

We will share these new resources with instructors who might be interested in incorporating them into their course materials, including instructors in landscape architecture, sustainable built environments, and natural resources programs, among others. We will also work with administrators from units within ENR2 to educate building occupants about these resources, so they can share with their own audiences. Finally, we will coordinate with the ENR2 events coordinator, building manager, and other tour hosts to encourage the use of pre- and post-survey during ENR2 tours.