



## NAU Green Fund

### Calsense 2024 Expansion & Turf Conversion Expansion Impact Report

**Green Fund Mission Statement:** “The NAU Green Fund promotes student participation in and provides funding for projects that reduce NAU’s negative impact on the environment and create a culture of sustainability on-campus.”

#### Contact Information

| Project Lead Information |               |
|--------------------------|---------------|
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| Approval Date:           | October 2024  |
| Project Cost:            | \$158,047.66  |

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|---------------------|--------------------------|
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| Project Category:   | Water Conservation       |

## **Problem Statement**

Before this initiative, the university lacked a system to distinguish between landscapes requiring active watering and those that did not, resulting in the overwatering of large portions of campus. While approximately 30% of campus irrigation utilized smart systems, the remaining functional turf areas relied on standard timer-based schedules with limited weather adaptivity. Furthermore, turf grass areas on campus use water inefficiently, costing the university higher utility bills.

## **Project Overview**

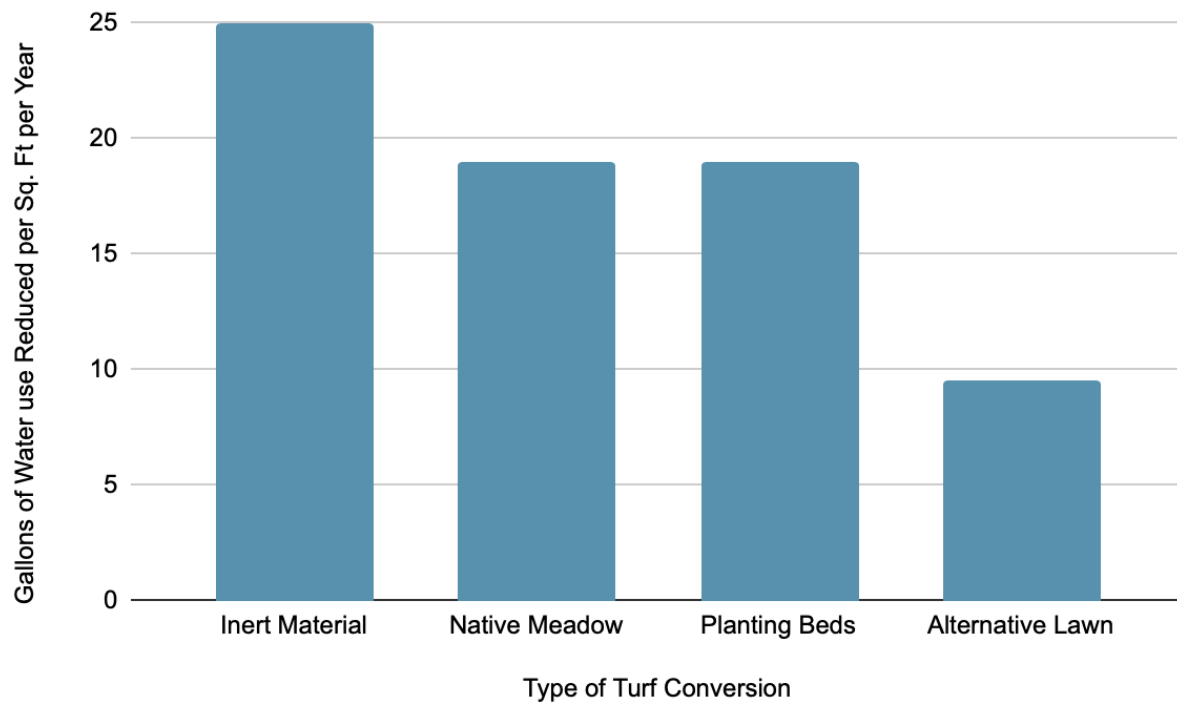
This project, funded in tandem with the WIFA Water Conservation Grant, implemented a comprehensive strategy to reduce outdoor water usage through infrastructure upgrades and landscape conversion. The primary effort involved purchasing and installing four new Calsense smart irrigation controllers and flow meters to manage functional turf areas more efficiently. Simultaneously, the project converted non-functional turf grass to low-water native vegetation, reducing irrigation needs significantly. To ensure these new spaces remain accessible and inviting to the campus community, the project also installed crusher fines paths and recycled seating features, such as benches and tables, encouraging students to connect with the natural environment.

# Quantitative Impact

## Turf Conversion Initiative

By strategically transitioning away from water-intensive turf grasses at the Adel, SBS West, and Raymond sites, the University has made a significant investment in sustainable landscaping. By prioritizing highly efficient landscape conversion types, we have maximized both our water conservation and financial returns.

Water Use Reduction of Types of Turf Conversion (Gallons per Sq. Ft Per Year)



To maximize water savings, the University employs four distinct landscaping strategies. Replacing traditional grass with inert materials yields the highest conservation rate at 25 gallons per square foot annually. Native meadows and grow beds are also highly efficient, each saving an impressive 19 gallons per square foot per year. Finally, alternative, low-mow lawns maintain a traditional green aesthetic while still conserving 9.5 gallons per square foot per year.

**Annual Impact:**

- **Water Conserved:** 582,225 gallons per year
- **Financial Savings:** \$2,767.48 per year
- **Average Efficiency:** \$0.090 saved per square foot converted annually

**Site-Specific Performance:**

- **Adel:** 292,211 gallons saved | \$1,388.96 saved annually (\$0.083 / sq. ft.)
- **Raymond:** 176,006 gallons saved | \$836.61 saved annually (\$0.090 / sq. ft.)
- **SBS West:** 114,008 gallons saved | \$541.91 saved annually (\$0.096 /

sq. ft.)

### **Calsense Expansion Initiative**

The expansion of the Calsense smart irrigation system has driven a 38% overall reduction in landscape water use across the four expansion zones. By utilizing advanced, data-driven water management, the University has dramatically curtailed water waste while maintaining campus aesthetics.

#### **Annual Impact:**

- **Water Conserved:** 2,044,192 gallons per year
- **Financial Savings:** \$8,464.16 per year

#### **Site-Specific Performance (Gallons Saved):**

- **Gabaldon:** 709,659 gallons
- **Gammage:** 628,218 gallons
- **Riles:** 442,709.8 gallons

- **Central Quad:** 263,605 gallons

### **Total Combined Impact:**

Together, these initiatives save the University an estimated **2,626,417 gallons of water** and **\$11,231.64** every single year.

## **Qualitative Improvements**

Beyond the measurable reductions in water use and utility costs, this project has delivered substantial qualitative benefits to the campus environment.

- **Campus Engagement & Placemaking:** By installing new crusher fines paths and recycled seating (benches and tables), former non-functional turf zones have been transformed into active, inviting gathering spaces. This directly encourages students to spend more time outdoors and connect with the natural environment.
- **Enhanced Biodiversity:** The transition from monoculture turf to low-water native vegetation promotes a healthier local ecosystem. Native meadows and planting beds create habitats for local pollinators and birds, contributing to broader campus biodiversity goals.
- **Reduced Maintenance Footprint:** The adoption of alternative lawns and inert materials naturally decreases the noise pollution, emissions, and labor hours historically associated with frequent commercial mowing and turf upkeep

## Future Outlook

The success of the Calsense Expansion and Turf Conversion project establishes a highly replicable blueprint for future campus sustainability efforts. Because approximately 30% of campus irrigation previously utilized smart systems, there is a significant opportunity to expand this infrastructure to the remaining standard timer-based zones. The Turf conversion initiative now has quantifiable resource savings and can be expanded to new areas on campus to further improve the campus environment and support sustainable financial decision-making.

## Methodology

To determine the physical volume of water saved, the baseline water requirement for existing turf was compared against the supplemental water needs of the newly installed landscape types.

- **The Baseline (Turf):** Kentucky Bluegrass in a high-desert climate requires approximately **25 gallons per square foot annually** to maintain health during the growing season.
- **Native Meadow & Low-Water Planting Beds:** These deep-rooted, drought-tolerant adaptations rely heavily on natural precipitation. According to local experts at Plant and Seed in Flagstaff, native conversions yield an average water savings of 60–80%. A conservative estimate of 76% was utilized, bringing the supplemental requirement to **6 gallons per square foot** (a net savings of 19 gal/sq. ft.).
- **Low-Grow / Alternative Lawn:** Utilizing fine fescues, this hybrid approach requires approximately **15.5 gallons per square foot**. This represents a 38% reduction from standard turf (a net savings of 9.5 gal/sq. ft.).

- **Inert Material (Gravel/Rip-Rap/Crusher Fines):** Hardscaping requires zero irrigation, yielding a **100% reduction** (a net savings of 25 gal/sq. ft.).

Irrigation requirements fluctuate heavily by season. To account for this, 2025 monthly water logs were analyzed to determine the exact distribution of landscape watering throughout the year. Identifying this distribution is critical for accurate cost modeling, as municipal water rates change month-to-month based on total usage tiers.

By applying the water savings to the monthly usage percentages, we can find the most accurate cost per square foot converted by the different types of conversion.

Note: The Calsense water usage data came from the individual expansion sites and was extrapolated back to the original baseline using the efficiency factor of .62. There was no water usage data for the specific sites before the Calsense Expansion. The efficiency factor was found through an average of the following studies done in similar climates to the Flagstaff campus.