Greeley, Colorado

Colorado Large-Scale Nonresidential Turf Replacements

Case Study at a Glance

Overview

Utility/Community Name:
City of Greeley

Population served:
149,709

Location:
Greeley, Colorado

Service area:
48 square miles

Challenges

- Drought
- Population Growth
- Climate Change
- Water Affordability

BACKGROUND

The City of Greeley (Greeley) is situated on the High Plains of northern Colorado approximately 49 miles northeast of Denver. In 2023, Greeley had a population of 112,609 people and its water system served about 149,709 people. Greeley's water supply comes from multiple sources, including the Cache la Poudre River Basin, Big Thompson River Basin, Laramie River Basin, and Colorado River Basin. Greeley is experiencing high rates of population growth, with up to 311,000 people projected to reside in Greeley by 2070 under the city's high-growth scenario.[1]

According to Greeley's 2022 Water Efficiency Plan,[2] during peak irrigation season from June through September, outdoor water use makes up approximately 70% of total city water use. In 2021, commercial, industrial, and institutional (CII) and irrigation-only accounts accounted for 41% of total city water use. Under average conditions, about 50% of total annual water used by Greeley's customers is for outdoor irrigation, including non-potable supplies used for parks, schools, and other large areas. In 2021, Greeley's total water demand, including non-potable, was 27,234 acre-feet (AF). While Greeley's population has grown, potable water demand per capita has declined due to decreases in single-family residential water use; the installation of newer, lower water use fixtures and appliances; and switching to non-potable supplies to irrigate some larger parcels.

CHALLENGES

Facing climate change, drought, and rapid population growth, Greeley's water supply and reliability is a top concern, as with other Front Range communities in Colorado. Greeley's 2023 Integrated Water Resource Plan identified 55 risks to its water supply system, including: climate change, hydrology, Colorado River Basin issues, demand, infrastructure and operations, and water rights. Annual water demand in Greeley is projected to be between 35,400 AF and 70,000 AF by 2070, requiring a significant increase in water supply to meet future demands.

Greeley's Water Efficiency Plan states that securing "safe and sufficient" water for the future is a major challenge. The Water Efficiency Plan was designed to identify programs that could reduce systemwide water demand by 2,034 AF by 2030. Included in the list of water efficiency activities outlined in the plan are irrigation and landscape audits, and rebates to reduce outdoor water consumption.

Western Resources Advocates (WRA) and WaterNow Alliance (WaterNow) worked with Greeley and the University of Northern Colorado (UNC) to help develop and fund a large-scale turf conversion pilot project to save water and educate the community on the benefits of non-essential turf conversion and waterwise landscaping. The project team, which includes Honey Creek Resources, also developed an economic analysis tool to evaluate the costs and benefits of turf conversion in medians and street rights-of-way in the community.

Reducing **outdoor water consumption** will help Greeley reach its Water Efficiency Master Plan Goal of **reducing systemwide demand** by **2,034 AF by 2030.**

1. Greeley Integrated Water Resource Plan (2023) https://greeleygov.com/docs/default-source/water/water-plans/iwrp_report_final-reduced.pdf
2. Greeley Water Efficiency Plan (2022) https://greeleygov.com/docs/default-source/water/conservation/2022-water-efficiency-plan-final998ce5ff-11d1-48ed-b340-8369a867c933.pdf?Status=Master

UNC North Lawn

Colorado Large-Scale Nonresidential Turf Replacements Pilot Project

Pilot Project at a Glance

Project Overview

Name: UNC North Lawn

Description: Replace non-essential turf with a waterwise landscape containing native grasses, low water use plantings, signage, water path, outdoor education/event patio area, seating and hammocking areas, and student and public art installations.

Area: 148,975 square feet. (3.4 acres)

Project Goals

- Provide community leadership and education on waterwise landscapes
- Reduce water demand
- Establish a collaborative partnership
- Provide landscaping with multiple benefits
- Increase community resilience

Project Benefits

- Estimated Annual Water Savings: **1,955,000 gallons (6 AF)**
- Estimated Annual Water Cost Savings: **$27,557**
- Other Expected Savings: Reduced chemical herbicide and fertilizer use, reduced carbon emissions from mowing

Pilot Project Costs & Funding Sources

- Estimated Total Cost: **$981,761**
- Funding Source(s): Greeley grant, UNC operating funds, Greeley Life After Lawn Program funds and Water Conservation Program funds, Northern Water - Water Efficiency Landscape Grant (pending).

GREELEY'S TURF REPLACEMENT PILOT PROJECT

With the support from the project team, Greeley's Water Conservation program, in partnership with UNC, developed a pilot turf replacement project for UNC's North Lawn, which is considered the front porch of the campus. Greeley and representatives from UNC's faculty, staff, and student body identified 3.4 acres of primarily underutilized cool-season turf adjacent to the University Center (See Figure 1: UNC North Lawn Existing Turf Landscaping with the University Center in Background; and Figure 2: UNC North Lawn Existing Turf Landscaping) near UNC's iconic Bear statue as a good example of non-essential turf. The space is not currently designated for specific purposes, has poor access, and does not provide good connectivity between the university and surrounding neighborhoods.

The existing turf in the pilot parcel is estimated to require approximately 7 AF of supplemental irrigation water each year. Once established, the new landscaping is estimated to use 1 AF per year. This landscape transformation and irrigation system replacement will save approximately 6 AF annually (1.96 million gallons), reducing water use by 86%, increasing water efficiency, and improving water supply security and drought resilience. For details on how the water savings for the pilot parcel were calculated, see the Full Project Case Study.

The UNC North Lawn project will showcase the benefits of non-essential turf conversion by transforming the parcel's landscaping from an expanse of nonfunctional, non-native Kentucky bluegrass into an accessible low-water landscape, which includes an irrigation system upgrade to better optimize water savings. WaterNow and WRA worked with Greeley and UNC to support the university's North Lawn project, assisting in pilot project planning meetings, estimating water savings, helping with the drafting of a Memorandum of Understanding (MOU) between Greeley and UNC, and supporting applications for funding to pay for the pilot project.

This landscape transformation and irrigation system replacement will save approximately **6 AF annually**, reducing water use by **86%**.

The pilot design effort kicked off with several planning sessions involving UNC faculty, students, and staff to solicit and explore potential ideas for the site. Key concepts explored include:

- Diverse and attainable landscaping with year-round color through wildflowers and pollinator gardens
- Educational and recreational areas including new seating and hammocking areas
- Improve equity in park access and green space for nearby underserved neighborhoods
- Student art displays
- Walkways for enhanced connectivity
- Interpretive signs for educational engagement
- Low maintenance design features

***Figure 1**: UNC North Lawn Existing Turf Landscaping with the University Center in Background*

***Figure 2**: UNC North Lawn Existing Turf Landscaping*

UNC hired Norris Design to produce technical landscape and irrigation design plans that maintain existing trees and include native grasses, regionally appropriate perennial planting beds, new shrubs and trees, a connector path, walking path, seating, outdoor education/ event patio area, a hammocking area, and a small area of functional turf for activities (Figure 3: Norris Design's UNC North Lawn Pilot Parcel Design; Figure 4: Artist rendering of the University Center landscape project courtesy of Norris Design; and Table 1: UNC North Lawn Pilot Parcel Landscaping). In addition to saving water, the project will also substantially increase student and public access and use of the site. It will also integrate student and public art. Educational opportunities will be abundant throughout the site, including signage identifying plants, trees, and turf types, with uses and care tips. UNC's North Lawn project will provide a vibrant recreational area for the university and adjacent neighbors that showcases best practices for turf conversion and waterwise landscaping.

Table 1: UNC North Lawn Pilot Parcel Landscaping

Landscape Type	**Area (acres)***
Existing Landscape	
Cool-season turf	3.30
Planting bed	0.12
New Landscape	
Cool-season turf	0.12
Planting bed	0.18
Native wildflower	0.73
Native grass	2.17
Non-irrigated/hardscape	0.23

*Note: There is a slight discrepancy (0.01 acre) between existing and new landscape acreage due to an existing side-walk stub (not included under existing landscape) that will be removed and replaced with landscaping.

Figure 3: *Norris Design's UNC North Lawn Pilot Parcel Design*

Figure 4: *Artist rendering of the University Center landscape project courtesy of Norris Design*

Pilot Project Costs and Funding

The pilot project is estimated to cost approximately $982,000 (Table 2: UNC North Lawn Pilot Parcel Project Costs). Turf replacement projects costs can vary significantly and it's important to note that UNC's project goals are not only to save water but also to provide other co-benefits such as new access points, recreational amenities, enhanced aesthetics, educational plantings, and native grass areas – all of which come with additional costs but also greatly increase community benefits. The updated landscape will serve as an inspiring space for water conservation education, public and student art, and community gathering.

Table 2: UNC North Lawn Pilot Parcel Project Costs

Item	Cost Estimate
Mobilization & Site Conditions	$77,050
Earthwork	$23,946
Hardscape	$50,880
Site Furnishings	$56,100
Planting (trees, plants, grasses, soil/amendments)	$167,645
Irrigation	$121,295
Site Lighting & Electrical	$66,700
Contractor Overhead/Profit, Escalation & Contingencies	$167,957
UNC Construction Services, Design Fees & Contingencies	$160,946
Facilities and Administration Indirect Costs	$89,242
TOTAL ESTIMATED PROJECT COSTS	**$981,761**

UNC will pay for the project through a mix of funding sources, including a grant from the Greeley, UNC operating funds, Greeley's Life After Lawn Turf Replacement Program funds and Water Conservation Program funds, and potentially a Northern Water - Water Efficiency Landscape Grant. The UNC North Lawn Pilot Parcel project kicked off in late 2024 and will be completed in 2025.

Evaluating the Economics of Different Grasses for Street Rights-of-Way

In addition to the pilot parcel, the project team worked with Greeley to consider the impacts of non-essential turf citywide. Due to a lack of existing irrigated turf spatial data, a GIS analysis of irrigated turf for Greeley wasn't feasible at the time of the project. Instead, the city opted to evaluate the potential water savings, benefits, and costs of using different grasses in medians and street rights-of-way. The project team developed a modified communitywide economic analysis tool, which was provided to Greeley. This allows the city to compare the costs and benefits of replacing roadway median landscape areas, currently consisting of rock or water-intensive turf, with native and waterwise landscaping. As Greeley develops new streetscape standards, this analysis will promote the use of water-efficient landscapes.

KEY TAKEAWAYS

By engaging stakeholders, including UNC students, faculty, staff, city personnel, and community members early and consistently throughout the project, the team incorporated diverse perspectives to enhance the design and functionality of the new landscapes and amenities. This collaborative approach ensured the project aligned with the community's needs and preferences. The success of the UNC pilot project has already inspired further action, leading UNC to secure a Colorado Water Plan grant for a 10-year, campuswide landscape water resiliency comprehensive plan. This expansion highlights the pilot project's effectiveness in promoting long-term sustainability.

Leveraging federal, state, and local funding opportunities, while treating turf replacement projects as capital projects, could significantly bolster the financial feasibility of large-scale initiatives. Additionally, fostering collaboration between the city and large property owners, like UNC, is crucial for scaling up the removal of non-essential turf. Moreover, designing multi-benefit projects not only achieves water savings and cost-effectiveness but also enriches community well-being by creating new recreational spaces and educational opportunities. By integrating these strategies into future planning and implementation, Greeley can further advance its water conservation goals while fostering community engagement and delivering broader environmental benefits.