

# FORT COLLINS ADDITIONAL TARGETED BEST PRACTICES REPORT

Revised Draft  
May 2022



Soils, Xeriscape, Tree  
Protection, Tree Canopy

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# Fort Collins: Nature in the City

## *Additional Targeted Best Practices Report*

*May 2022*

### Background

Since 2020, Clarion Associates has been assisting the City of Fort Collins to implement its Nature in the City (NIC) initiative. To date, that support has included:

- Preparation of a Land Development Code Audit to identify barriers to implementing different components of the initiative;
- Finalizing definitions of several key terms that are often used loosely, but which need to be defined objectively in order to be used in regulatory documents like the Land Development Code; and
- Preparation of draft text amendments to the Land Development Code to implement the following aspects of the NIC initiative:
  - Requirements for inclusion of common open space;
  - Limits on impervious surfaces in new development; and
  - Requirements that certain types of development earn at least a minimum number of points in a new Nature in the City Score system, which provides numerous flexible options related to site and building design.

Before the proposed regulatory changes were included in the Land Development Code, however, the City asked that Clarion Associates prepare additional research on Best Practices to promote the NIC goals in four discrete areas:

1. Soil amendments to ensure that new vegetation survives, thrives, and provides maximum environmental and experiential benefits;
2. Xeriscape practices to reduce outdoor water consumption without compromising the public experience of being in nature or the environmental benefits that healthy vegetation provides;
3. Tree protection during site work and construction phases and during the creation of landscaping and planting plans for the proposed development and redevelopment; and
4. Tree canopy enhancement in order to increase public perception of nature, increase shading, and reduce the impacts of urban heat islands over time.

To identify these best practices, Clarion Associates agreed with the City staff to:

- Focus on regulations or incentives suitable for inclusion in a Land Development Code or related regulations – rather than advisory policy statements or plans that do not have regulatory effect;
- Identify up to 20 communities across the United States for detailed web-based research on these four topics;
- Focus the research on soil amendment and xeriscape on communities in the Rocky Mountain west, because of the unique dry climate and soil conditions in this region;
- Make initial contact with each community to confirm the accuracy of published regulations and incentives, as well as the continued enforcement and effectiveness of those regulations.
- Refine the list of research communities to eliminate those where initial contacts suggest that further research would not be fruitful, and if possible, replace them with other communities where regulation and incentives appear to be more effective.

After this additional research program was initiated in late 2021, initial contacts revealed that several communities have integrated or overlapping regulations for tree protection and tree canopy protection. In order to reflect these Best Practices accurately, we combined these two topics into a single inquiry and agreed to research a larger number of target communities in that combined category.

After contacting, eliminating, and substituting communities as described above, our initial research and interviews focused our Best Practices research on the following communities:

- **Soil Amendments:** Denver, CO; Thornton, CO; Castle Rock, CO; Brighton, CO; and Greeley, CO.
- **Xeriscape:** Aurora, CO; Castle Rock, CO; Las Vegas, NV; San Antonio, TX; and Tucson, AZ.
- **Tree Protection and Canopy Enhancement:** Boulder, CO; Bloomington, IN; Fort Wayne, IN; Lake Forest Park, WA; Madison, WI; Portland, OR; Reno, NV; San Antonio, TX; and Seattle, WA.

This document includes Clarion Associates’ recommended Best Practices in each of these areas, subject to internal discussion with the City as to which of the recommended practices would best “fit” with the City’s goals and administrative systems. “Best Practices” is, of course, a subjective term, and professionals often differ about what is “best” and why. For this report, we focused on the following factors to identify those regulations that we think are worthy of additional consideration by Fort Collins:

- The clarity and understandability of the regulations to both staff and citizens;
- The administrability of the regulation—i.e., whether the regulation can be efficiently implemented, monitored, and enforced with reasonable levels of effort by City staff; and

- The host community’s comments on the effectiveness of the regulation in achieving its purpose.

Within each topic area, we single out a few communities with regulations that we think best meet these criteria. We also identify additional cities whose regulations or incentives include a provision, incentive, or approach that is worthy of additional consideration. We have termed the first group “Best Practices” and the second group “Additional Valuable Practices.” In several cases, even those communities that meet these criteria stated that their regulations, procedures, and enforcement mechanisms were imperfect and provided suggestions for improvements that would make them mor effective.

## Soil Amendments

This section summarizes information from communities that require soil amendments to be added to new landscaping to ensure the proper growth and survival of vegetation. Soil amendments also help conserve water, because newly installed landscaping typically needs to be irrigated more than established landscaping. By increasing the probability that newly planted material survives, the use of soil amendments can help reduce long-term water demand.

### Best Practices

#### Thornton, CO

Thornton’s development code (Chapter 18 of its City Code) establishes basic soil amendment requirements. All landscape areas, except for side yards not visible from public areas and rear yards of singe-family dwellings, are required to be amended with at least four cubic yards of organic amendment per 1,000 square feet of ground, and the amendments must be tilled at least six inches into the soil. [Sec. 19-538\(a\)\(4\)](#).

The code references [Section 800, Landscape Improvements](#), of the Thornton Standards and Specifications document, which imposes additional obligations on developers. Prior to the addition of soil amendments, applicants are required to remove all construction debris from the soil, including large rocks, concrete, asphalt, and soil clods; all building materials such as boards, insulation, shingles, rebar, wire, and grading stakes. Applicants must then rip the soil to a minimum depth of 12 inches if it has been compacted by heavy machinery or by working it while wet, in rows no greater than 18 inches apart. Ripping operations must be timed to commence when soil moisture is adequate enough to allow penetration but is not wet or muddy.

The soil amendments are required to be incorporated throughout the landscape areas, not just around areas where trees and shrubs are planted. At least four cubic yards must be distributed across the soil surface in a uniform 1½ inch depth and incorporated into the top eight inches of

soil with a rototiller capable of tilling to eight inches in depth.<sup>1</sup> Additional soil amendments are required for City-maintained landscapes and metropolitan district parks (six cubic yards per 1,000 square feet, distributed to two-inch depth) and for landscaped medians (27 cubic yards, distributed to a 36 inch depth).

Compliance with the regulations is assessed at three inspections performed during the landscape installation process:

- The first inspection takes place prior to soil amendment and tilling and looks for the presence of weeds, especially noxious weeds.
- The second inspection involves a review of the soil amendment before it is tilled into the soil.
- Finally, after tilling and fine grading, the third inspection reviews the prepared soil to ensure it was tilled to the required eight inches, and for overall quality and absence of construction debris.

In addition, the developer/applicant may be required to provide City staff soil amendment load tickets and affidavits that confirm soil amendments have been installed for a set of dwellings before the construction of the next phase of dwellings is authorized.

### Primary Contacts

Grant Penland, Planning Director, [gpenland@ci.thornton.co.us](mailto:gpenland@ci.thornton.co.us); Warren Campbell, Current Planning Manager, [wcampbell@ci.thornton.co.us](mailto:wcampbell@ci.thornton.co.us).

## Denver Water

### Soil Amendment Program

The requirements of Denver Water's Soil Amendment Program are clearly identified on its [website](#).

- The reasons for amending soil are explained in plain language understandable by the public and contractors.
- Areas larger than 300 square feet must incorporate soil amendments before landscaping is installed.
- The standards encourage (but do not require) that organic compost meeting at least Class II standards be installed, lists Class II compost suppliers, and includes a table listing the chemical requirements for Class I and Class II compost (shown below):

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<sup>1</sup> While the City's development code requires tilling down to six inches, the Standards and Specification document, which is incorporated into the code by reference, states that tilling is required down to eight inches.

Minimum Stability Indicator	CLASS I Stable – Very Stable	CLASS II Stable
pH	6.0 – 8.0	6.0 – 8.2
Ag Index (Nutrients/Na+Cl)	Must report	Must report
Soluble Salts	Maximum 5 mmhos/cm	Maximum 10 mmhos/cm
Carbon/Nitrogen Ratio	< 12	< 18
Ammonia-N/Nitrate-N	< 4	< 6
Bulk Density (lbs/CY)	Must report	Must report
Primary, Secondary, Trace Elements	Must report	Must report
Organic Matter; Moisture Content (% / CY)	Must report	Must report

- Four cubic yards of compost per 1,000 square feet of permeable areas (including tree lawns and permeable portions of rights-of-way adjacent to the property, which are often owned by the City rather than individual property owners) roto-tilled to a depth of four to six inches, except in the following situations:
  - Two cubic yards of compost per 1,000 square feet of permeable area are required for native grass areas (subject to Denver Water confirmation of seed mix); and
  - Twelve cubic yards per 1,000 square feet are required for amended topsoil.
- The contractor must supply an invoice or load ticket showing that a specific soil amendment product was being delivered to the subject property address, as well as a map showing the square footages of areas required to be amended, and if native grasses are to be installed, a sample of the seed mix. Denver Water can then confirm that the amount of soil amendment was adequate for the area required to be amended and can provide phone or e-mail confirmation that the requirement had been met.
- Water service to the property can be withheld until Denver Water has confirmed that adequate amendment product had been delivered to the property.
- Site inspections are not required, but contractors are warned that spot inspections might occur.
- Although the requirements are publicized as a cost-saving measure for property owners, who would experience higher rates of plant survival, its primary interest is the associated water savings through more effective water absorption and reduced runoff.

As a regional water utility, Denver Water has regulatory authority to enforce the requirements against property owners only when water service is being installed, and even then its capability to do so is limited. The various jurisdictions served by Denver Water have a broad range of landscaping requirements, and many of the governments' land use and other regulations incorporate only limited water conservation controls and few if any soil amendment requirements. Denver Water works with local governments to encourage landscape regulations

similar to those included in the agency’s soil amendment program, and staff is hopeful more consistent regulations will be adopted by local governments over the next several years.

To the (limited) extent that they are enforced, Denver Water’s actions to enforce the soil amendment requirements are taken against the landscape contractors who install the landscaping materials. This is similar to the approach used by many cities to enforce sign regulations (i.e., require licensing of sign contractors and make them responsible for compliance with the regulation with the knowledge that violating the regulation could result in suspension or revocation of their license to install signs).

Although the soil amendment program indicates that spot site inspections may take place, Denver Water staff reported that inspections generally have not occurred for the past six years. Previously, when spot inspections did take place, inspectors found that around 95 percent of contractors complied with the requirements. Compliance with the requirement to provide receipts is generally high, although new development projects are more likely to comply than redevelopment projects, and compliance is higher from large developers than from smaller contractors who redevelop individual single-family properties. Overall, the resources devoted to administration of the soil amendment program occupy about 0.5 FTE of staff time.

In an effort to encourage compliance, Denver Water does not charge fees for participation in its soil amendment program.

### **Primary Contact**

Austin Kcmarik, Water Conservation Specialist, [Austin.Krcmarik@denverwater.org](mailto:Austin.Krcmarik@denverwater.org)

### **Other Valuable Practices**

#### **Castle Rock, CO**

The Town of Castle Rock landscaping and irrigation standards are contained in its [Landscape and Irrigation Criteria Manual](#), which is adopted by reference into the [Municipal Code](#). Sec. 1.13 of the Manual defines Soil Amendment as “Organic material added to the soil to improve texture, moisture holding capacity, nutrient capacity, water and air infiltration.” Sections 4.4.1 through 4.4.3 of the Manual includes specific provisions for how to amend soil that are mandatory for all new developments and changes to landscaping. The provisions require that:

- A soil analysis to be conducted by professional soil scientist to evaluate texture, exchange capacity, conductivity, organic matter, and acidity along with nitrogen, potassium, phosphorus, zinc, iron, copper, manganese, and lime content in the soil.
- Stripping and stockpiling of indigenous topsoil during construction for successful plant material establishment
- At least four cubic meters of amended soil added per 1,000 square feet planting areas for turf, trees, shrubs, perennials, and annuals.

- Soil amendments material to be compost, which is defined as a “fully finished, stabilized, and mature product, derived from organic materials such as leaves, grass clippings, wood chips, and other yard wastes. Finished compost is dark and crumbly, does not resemble the original contents, and has an earthy smell. Acceptable compost will not contain any human or animal waste.” Staff emphasized that the inclusion of any amount of “hot compost” (compost that has not fully broken down) is prohibited, and that on occasion they have required contractors to remove inappropriate soil amendment from the surface and install replacement amendments that meet Town standards.
- As an exception to the requirement of compost as defined above, soil amendments for native seed areas to be consistent with detail #17 in the Castle Rock [Temporary Erosion and Sediment Control Manual](#). The Town may require written documentation of the types and amounts of soil amendments installed.
- Where soil amendments are required, soil that is roto-tilled to a minimum depth of six inches, and rocks, debris, and clods greater than ¾-inch diameter must be removed (except that dry land seed areas may include clods up to two inch diameter).

Castle Rock pairs these requirements with a robust inspection regime. Single-family detached and attached, duplex, triplex, and fourplex residential properties) are inspected once, after the soil amendment has been added, the soil tilled, and the site graded. Multifamily and nonresidential properties are inspected twice. The first inspection takes place after the soil amendment has been added to ensure that an adequate amount has been used. The second inspection takes place after tilling and grading.

Staff believes compliance with the requirement for adding soil amendment is high, particularly for nonresidential buildings, since the compost is relatively inexpensive and providing the required amount (or even a little more) is less expensive than pausing construction while fixing the work and awaiting reinspection. The high compliance rate is also attributed to Castle Rock’s consistent inspection process and withholding certificates of occupancy until inspections have been completed.

The Town’s water conservation programs are managed by a four-person team, including the water efficiency supervisor, a technician who handles the rebate programs and inspections, an inspector, and an office assistant who manages administration, scheduling, and customer contact. Currently, the site inspections are conducted by an inspector who is a seasonal employee who works four days per week (0.8 FTE), generally from May through October or November. Three other members manage the administration of the programs, including potential updates to the regulations to address any necessary changes. This staff has been managing about 1,000 residential inspections and 50-60 permits per year.

Residential projects pay a \$45 inspection fee. For each required reinspection, the fee doubles, which discourages landscape contractors from scheduling inspections before they are ready.

For commercial projects, compliance with the soil amendment regulations is confirmed through the irrigation permit inspection process. The permit inspection fee is \$610, with a reinspection fee of \$110 if necessary.

### **Primary Contact**

Rick Schultz, Water Efficiency Supervisor, 720-733-6027

## **Greeley, CO**

[Section 24-804, Plant Specifications](#), of the Greeley Development Code includes non-regulatory Xeric Guidelines and offers a reduction in raw water requirements for applicants whose landscaping plans include these elements.

- Guideline (d)4 states: “Incorporate soil amendments and use of organic mulches that reduce water loss and limit erosion. All plant areas should receive soil amendments of at least 3 cubic yards per 1,000 square feet.”
- Guideline 5(e) provides that: “Prior to the installation of turf-grass and/or other plant materials in areas that have been compacted or disturbed by construction activity, such areas shall follow soil amendment procedures pursuant to Title 20 and the Water and Sewer lawn installation specifications.”

[Section 14, Vegetation and Irrigation](#), of the City’s Construction Standards for water detention areas provides detailed standards that could be applied to mandatory soil amendment ordinances.

- Compost is defined as: 100% humus rich organic matter. The compost shall be a well decomposed, stable, weed free organic matter derived from agricultural, food, or industrial residuals; biosolids (treated sewage sludge); yard trimmings, or source-separated or mixed solid waste.
  - Product must be certified as fully composted at a permitted solid waste processing facility.
  - Product must be registered with the Colorado Department of Agriculture and approved for use on Colorado Certified Organic Farms by the Division of Plant Industry of the State of Colorado.
  - Product shall contain no solid particle greater than one-half inch in length or diameter and be free from un-composted or non-stabilized wood bulking agents.
  - Product shall contain no substances toxic to plants and shall be reasonably free (<1% by dry weight) of man-made foreign matter.
  - The compost shall possess no objectionable odors and shall not resemble the raw material from which it was derived.

- In addition, the applicant shall provide the City a signed statement that the compost has been tested and meets the following standards:
  - Organic Matter Content: 30 - 70% (dry basis)
  - Soluble Salt Concentration (EC paste test): 5 dS (mmhols/cm) or less (as received)
  - PH range: 5.5 to 8.0 (as received)
  - Final carbon to nitrogen ratio: 20:1 or less.
  - Nutrient Content (dry weight basis): N 1% or above, P 1% or above, K 0.5% or above.
  - Bulk Density: 800 - 1,000 pounds/cubic yard
  - Moisture Content: 35% - 55%

**Primary Contact**

Sean Chambers, Director of Water & Sewer, [sean.chambers@greeleygov.com](mailto:sean.chambers@greeleygov.com); Paul Trombino, Public Works/Construction Standards, [Paul.Trombino@Greeleygov.com](mailto:Paul.Trombino@Greeleygov.com).

**Brighton, CO**

[Article 8, Landscape and Site Design](#), of Brighton’s Land Use and Development Code establishes requirements for water-conserving landscaping:

- All landscape plans are required to incorporate soil amendments and use organic mulches that reduce water loss and limit erosion.
- Plant areas are encouraged to receive soil amendments of at least three cubic yards per 1,000 square feet.

City staff reported that though these soil amendment provisions are included in the city’s development regulations and apply to all development projects, they are typically not enforced. There are no provisions in the code requiring an applicant to demonstrate that soil amendments have been acquired or installed. Most site inspections take place after the soil has been prepared and sod and other landscaping materials installed, and evaluations for compliance are limited to whether the landscaping is consistent with the regulatory requirements, not the specifics of soil amendment installation.

**Primary Contact**

Louis Morris, Project Coordinator, 303-655-2243, [lamorris@brightonco.gov](mailto:lamorris@brightonco.gov).

## Other Communities

In addition to the programs listed above, we reviewed development codes, landscaping and engineering criteria, and related manuals and regulations for Westminster and Greenwood Village but did not identify regulatory approaches or standards of sufficient detail or difference from those described above to justify inclusion in this report. While a number of Front Range communities' land development codes, engineering standards, or park and recreation manuals refer to requirements for including soil amendments in the design and construction of detention areas, we view these as public works standards rather than regulations intended to apply to general landscaping.

## Xeriscaping

### Best Practices

This section identifies three communities that incorporate low-water-use landscaping requirements in their land use regulations and that offer robust turf rebate programs to reduce the number of water-intensive grasses and plants used in residential yards and commercial spaces the City will want to consider. Five other valuable practices are included for further consideration.

## Castle Rock, CO

### Background

The Town of Castle Rock has taken aggressive steps to promote and require water conservation. Its landscaping regulations limit the types of turf that can be incorporated in new development, and also operates two key programs that offer financial rebates to existing residential and commercial property owners who implement specific low-water-use landscaping techniques.

### Landscaping Regulations

Castle Rock's [landscaping regulations](#) limit the amount of high-water-use landscaping material that may be installed. High-water-use grasses such as Kentucky bluegrass and similar turf are prohibited, and other types of turf are also restricted. Single-family and two-family lots that are 7,000 square feet or less in area are allowed to have turf over no more than 30 percent of the lot. Lots larger than 7,000 square feet in area up to 17,000 square feet may have turf over no more than 20 percent of the lot. Lots larger than 17,000 square feet in area may have turf over no more than 20 percent of the lot, up to a maximum of 5,000 square feet of turf.

Staff reports that they are developing updated regulations for new development that would prohibit turf in front yards and limit the turf area in the back yard to a maximum of 500 square feet. These proposed changes are part of the Town's continuing efforts to reduce its water consumption from an average gallons per capita per day (GPCD) of 118 today to 100.

## Coloradoscape Renovation Program

Castle Rock's [Coloradoscape Renovation](#) water-wise landscaping program is an effort to encourage property owners to convert water-intensive landscaping into water-wise landscapes. It provides incentives to current landowners to redesign their landscaping to be more water-efficient in ways that are similar to the Town's regulations for new development. The program uses a variety of tools to encourage participation, including rebates, educational classes, and the opportunity to water landscaping on days that would otherwise not be permitted. The details of this program include:

- A rebate of \$1.20 per square foot of turf removed on any existing development (not new construction) that use Castle Rock water services. The City's water service area extends beyond City limits in some cases, so some unincorporated properties are also able to participate.
- For residential customers, a minimum of 400 square feet (or the entire area of the yard, if smaller) must be removed to qualify for a rebate. The City sets a maximum rebate payment of \$1,800, which translates to an eligible turf area of 1,500 square feet.
- Nonresidential customers are also limited to a maximum rebate amount of \$1,800 for removal of 1,500 square feet of turf.
- The replacement landscaping may be zero-water use or require a small amount of water, consistent with the multiple landscaping options available through the *Coloradoscape* program.
- To qualify for the rebate, nonresidential properties are required to have at least 50 percent of the landscaped area be made up of healthy, irrigated turf. Areas with dead or unhealthy turf are deducted from the eligible square footage. The purpose of this provision is to ensure the program is effective in reducing water usage, and not for beautifying unirrigated landscaping.
- In addition to the rebate incentives, applicants are required to participate in a Water-Wiser workshop to learn how to maintain a low-water yard effectively. Those who complete the workshop are exempt from complying with the City's regulations that restrict watering to once every three days.
- Following the final inspection, compliance with the xeriscape standards is maintained by adjustments to the property's water irrigation budget. Like many communities, Castle Rock Water uses a tiered structure, Tier 1 is the lowest fee schedule, Tier 3 the highest, and Castle Rock Water imposes a surcharge for water use in excess of the Tier 3 cap. Tier 1 rates are charged for indoor uses, and Tier 2 rates are charged for irrigation. The water budget for Tier 2 is established by reference to the monthly water needs of the irrigated plant material on the site. Typically, when a turf lawn is replaced with xeriscape, the water needed for landscaping declines substantially, and the Tier 2 water budget is reduced accordingly. If water is used for irrigation in excess of the water budget, the higher Tier 3 rates or surcharge fees are imposed.

In 2021, the City noted that participation was modest. There were 48 residential properties that participated in *Coloradoscape*; 38 additional properties received an initial inspection but did not qualify for the program or did not complete the sod replacement process. Four nonresidential properties participated in *Coloradoscape*, with four additional properties not qualifying for or completing the process.

City staff also noted that the *Coloradoscape* program is labor-intensive because it requires two site visits by City staff in order to complete the rebate process. One visit occurs before turf removal to demonstrate compliance with the terms of qualification. The second visit occurs after turf removal and new landscaping installation in order to ensure the final result meets City standards. Staff noted that accommodating property owner schedules and providing enough Water-Wiser workshop sessions has been a challenge. In addition, some applicants who are not eligible for the program (generally because they do not have existing high-water-use landscaping) apply anyway, increasing administrative burden required to inspect the property and confirm that the non-eligibility. The program also has a modest budget and available funds can be quickly exhausted.

The residential application can be found [here](#); the nonresidential application be found [here](#).

### **Smart Irrigation Controller System**

Castle Rock's second incentive program is a rebate program for updating irrigation system controllers to Smart Evapotranspiration (ET) irrigation controllers. Smart controllers automate watering by adjusting the watering schedule based on the current moisture content of the soil and local weather. This results in reduced run off and creates money-saving water efficiency benefits to landowners.

Residential and nonresidential development are eligible to receive a rebate for installing Smart ET irrigation controllers through the voluntary [Smart Irrigation Controller Rebate](#) program. Participation in a Water-Wiser workshop is required to be eligible for these rebates.

Residential property owners can receive a rebate to cover 50 percent of the price of a Smart controller, up to \$200, while nonresidential property owners qualify for rebates to cover 50 percent of the cost of up to five controllers.

### **Primary Contact**

Rick Schultz, Town of Castle Rock Water Efficiency Supervisor, 720-733-6027

## Aurora, CO

Aurora has decided that lush, green lawns of Kentucky bluegrass require levels of that the City cannot continue to serve over the long run. Aurora has adopted regulations and financial incentive programs that act as “carrots and sticks” to encourage implementation of xeriscape principles and the use of other water-conservation techniques on landscaping throughout the community.

### Landscaping Regulations

Aurora’s Unified Development Ordinance (UDO) includes extensive water-conservation measures, a fact that is emphasized by the title of a key chapter of the UDO, “Landscape, Water Conservation, Storm Water Management.”

Section 4.7.3, General Landscaping Standards, integrates water-conservation measures throughout all required site landscaping. All shrubs, perennials, groundcovers, and ornamental grasses, and 75 percent of all annuals and trees, are required to be selected from the city’s Water-wise Plant List, a xeriscaping fact sheet maintained by the Colorado State University Cooperative Extension, or other Water-wise or xeriscape plant material references. The list of eligible materials is currently being updated. Except for playfields and golf courses, cool-season grass sod and seed is limited to 33 percent of a site’s landscaped area, and all cool-season grasses must generally be contiguous. Separate irrigation hydrasone areas are required for water-conserving areas versus non-water-conserving areas.

Section 4.7.4 prohibits private covenants that purport to invalidate the xeriscaping provisions in the UDO.

Section 4.7.5 incorporates additional specific landscaping requirements relating to water conservation. Single-family detached and duplex dwellings on lots 4,500 square feet or larger may install no turf at all, or may install between 400 and the lesser of 40 percent or 1,000 square feet of turf, provided that the turf areas are continuous. Homeowners can choose to follow Water-wise options that allow additional landscaping flexibility. Rock or inorganic mulches may be used in the front yard if a Water-wise option is chosen, and permeable pavers such as brick and natural stone can be used on up to 40 percent of the landscape area if a xeric or no-turf option is used. In all cases, rear yards on single-family and duplex lots with no public view may include no more than 45 percent turf. If the rear yards are visible to the public (for example, in a through lot), the front-yard standards apply.

An image from the UDO of a suggested front-yard landscaping configuration is included below.



Compliance with the landscaping regulations is verified during zoning inspections. Irrigation systems are also inspected and are required to comply with regulations in the Aurora Engineering Standards Manual.

Staff is proposing amendments to the UDO to further limit the use of high-water grasses. This summer, the City Council is anticipated to consider a proposal to prohibit the use of cool-season turf in the front yards of all new houses, as well as in tree lawns or curbside landscaped areas.

**Water-Wise Landscaping Program**

To incentivize residents to retrofit their properties to avoid water-intensive landscaping, Aurora Water created the [Water-Wise Landscaping Rebate Program](#), which includes detailed manuals on compliance for both residential and commercial properties. The program pays residents to eliminate water-intensive varieties of turf such as Kentucky bluegrass and fescue and promotes the exclusive use of xeric landscaping for all plants included in the landscape design.

Aurora offers a rebate up to \$3,000 for residential lawns from which at least 500 square feet of water-intensive grass is removed. The proposal for removal must include at least 60 percent of the water-intensive grass located in a front or side yard and visible to the public. The rebate is calculated using pre-tax material (not labor) costs, verified by inspection of receipts for materials purchased, as well as the amount by which the water bill is reduced after one growing season. Unlike other communities that determine rebate amounts based on the square footage of converted landscaping, Aurora’s program reimburses property owners for documented money spent on the plants and materials purchased to be installed in their place.

Sixty-five percent of the rebate is paid after final installation, and the remaining 35 percent is paid following one growing season if the property owner demonstrates that actual water use is less than 110 percent of the recommended xeric water use amount.

As part of the program, applicants are required to enroll in the “Know Your Flow” program which educates about the appropriate levels of indoor and outdoor water use.

The landowner establishes eligibility for the rebate by providing photographs of the existing healthy turf, which also must be visible to the public, and by submitting a proposed alternative landscape design. Previously, the City also reviewed the landowner’s existing water use to ensure the project would result in a reduction of water use, but it stopped doing so because the water use could reflect underwatering of areas of landscape other than the turf.

The program provides [free design services](#) for property owners and offers optional virtual and in-person Water-wise landscaping classes on how to tend to low-water landscaping and how to save water and money. Staff noted that Aurora would be moving to a new program in which applicants take a design class and work with instructors to develop a design for their own site, with the goal of making the design process a little more efficient.

A separate rebate program is offered for large and commercial properties. The commercial rebate covers all documented material (not labor) costs for the approved project, based on a schedule of item-by-item rebate amounts, up to a maximum of \$15,000. Half of the rebate is paid upon final installation and approval of the system, and the remaining half in two equal installments after each of the next two growing seasons documenting water use less than 110 percent of the xeric recommended water use amounts. All approved participants are required to participate in the Large Property Variance Program, which provides monthly emails that evaluate the site’s actual water usage based on recommended water consumption. This information is designed to help participants monitor their water efficiency and may identify any scheduling adjustments required to ensure receipt of the remaining rebate payments.

Previously, under both the residential and commercial programs, two inspections were required. The first inspection took place after plants and irrigation had been installed to confirm everything had been installed according to plans. The second and final inspection was performed after issues identified in the initial inspection are addressed and the mulch is installed. However, the City recently eliminated the second inspection, as being generally not necessary or helpful to ensure compliance with the program.

The City reports that the program has been successful with commercial properties. By contrast, it has underperformed in residential neighborhoods, with fewer than 25 rebates issued to single-family residences in the last year, a low level of participation even on a per-capita basis. Staff suggested that the low participation rate is a function of the complexity of the program, the high cost of re-landscaping even with the Water-Wise rebate, and the fact that the rebate covers only material costs (and not labor costs).

### **Xeric Landscaping Credit Program**

To incentivize the implementation of xeric landscaping, Aurora also created a Xeric Landscaping Credit program. The program is designed to encourage the use of xeric landscaping that does

not require irrigation in so-called “[z-zones](#).” Implementation of zero-water landscaping includes the installation of an irrigation meter that is used only while the native xeric plants are acclimating to their new environment. After the plants have matured and no longer require watering, the irrigation meter is removed from the z-zone. Other portions of the landscaping may continue to be irrigated and permanent irrigation meters remain in place for those areas. This allows savings in initial landscaping installation costs for developers and encourages them to install native, low-water landscapes in common areas watered by irrigation meters. This program is only available to new irrigation-only connections. Existing residential and commercial meters that measure indoor and outdoor use are not eligible. Irrigation meters can be installed in both new residential and commercial properties, and the cost of the connection charges varies based on the type of landscape on the property:

- Irrigation systems for non-water conserving landscapes can be connected at a rate of \$3.05/sq. ft. (or \$30,500 for 10,000 square feet of landscaped area).
- Irrigation systems for water-conserving landscapes can be connected at a rate of \$1.63/sq. ft. (or, \$16,300 for 10,000 square feet of landscaped area).
- In a z-zone, the irrigation system can be connected for no cost, subject to a \$20,000 deposit that is refunded after the three-year establishment period has run and the irrigation system is removed.

The following conditions must be met to establish a z-zone and qualify for the irrigation refund:

- The developer must express interest early on in the building process.
- The developer must submit a hydrozone map as part of the landscaping plan that delineates no-water, low-water, and high-water areas. If there are multiple irrigation meters, each must be clearly indicated on this map.
- The hydrozone map is paired with a [water budget](#) that applies during the xeric plants’ three year establishment period. The budget allows for a maximum amount of water that should be used to establish the xeric landscaping. It also employs a reduced assessment for the gallons of water used. However, if the number of gallons used surpasses the maximum allowed amount of water, the assessment rate will be higher.
- After three years, Aurora Water will use the irrigation meter readings to determine whether the xeric landscaping was watered according to the water budget.
- If successful in complying with the water budget and establishing xeric landscaping, the irrigation meter is removed and the \$20,000 deposit refunded.

If landscape development is occurring in phases, the responsible parties must contact Water Conservation and submit a phasing map.

Staff stated that the program was paired with significant increases in the City’s tap fee for outdoor-only use and that it has been highly successful, with a significant reduction in high-water-use grasses on new development and an increase in native grasses.

## **Administrative Support**

Overall, water conservation staff—part of the City’s Water Department, which is funded separate from the City’s general fund—consists of nine full-time employees and up to 15 seasonal employees. One person is responsible for managing the City’s rebate programs. Several staff perform inspections, in addition to other duties.

## **Primary Contact**

Tim York, Water Conservation Supervisor, City of Aurora, [tyork@auroragov.org](mailto:tyork@auroragov.org) 303-326-8819

## **Albuquerque, NM**

### **Landscaping Regulations**

The City’s water conservation measures relating to landscaping are not located in its Integrated Development Ordinance, but in [City Code Sec. 6-1-1, Water Conservation Landscaping and Water Waste](#). These regulations limit the amount of landscaping that can use high-water-use turf. Non-city owned properties other than golf courses and single-family residences may cover only 20 percent of the landscaped area with high-water-use turf and other restricted plants, with a minimum of 300 square feet and a maximum of 3,000 square feet allowed. In addition, the ordinance voids homeowners’ association restrictions or covenants that restrict the use of xeriscape.

According to staff, while existing single-family dwellings are excluded from the landscaping regulations, new single-family home developments must comply, so a developer who is preparing a 60-lot single-family subdivision is subject to the high-water-use turf restrictions. Staff also reports that existing single-family dwellings have made great strides in reducing overall water usage, measured by both external irrigation use and internal water use, so updating the turf regulations to include existing single-family development has not been a priority.

### **Rebate Administration**

The Albuquerque Bernalillo County Water Utility Authority (“Water Authority”) has a variety of incentive programs. These programs are operated by a staff including six full-time employees and four seasonal employees. Staff includes an administrator who processes applications, answers customer calls, and answers questions; a xeriscape inspector whose full-time job is to inspect sites applying for xeriscape rebates (about three to four inspections per day), and conservation specialists who focus on overall water conservation measures with homeowners’ associations and multifamily developments. The Water Authority also uses a contractor who provides leak audits, inspections, and water management tools to their large users.

## Xeriscape Rebate Program

The Water Authority has a [Xeriscape Rebate program](#) that provides a rebate on a water utility bill if the customer replaces traditional landscaping with low-water use xeriscaping. The program has existed for almost 20 years and has resulted in the conversion of 4,700 single-family residential and 600 commercial properties to low-water landscaping. In total, 10 million square feet of turf have been replaced with xeric landscaping. Currently, about 400,000 square feet of landscaping is converted to xeriscaping each year, and staff hopes a recent increase in payments from \$1 to \$2 per square foot of high-water-use turf removed and replaced will increase participation to 1,000,000 square feet per year.

There is no minimum removal requirement, as the goal to replace as much aging, water-intensive landscaping with xeric landscaping as possible. While applicants sometimes do not understand that they are required to have healthy living turf to qualify for the rebate, staff try to interpret the requirement leniently to encourage removal of turf and implementation of higher-quality xeric landscaping. In addition, large turf removal projects may be done in phases.

Eligibility for the rebate is confirmed through two inspections:

- The first inspection can occur before an application is filed and involves a site visit from a Water Authority staff member who measures the area, provides landscaping tips, and estimates a potential rebate amount. Alternatively, the first inspection can occur after the application is submitted, with staff visiting the site to ensure that the current landscaping proposed to be removed consists of healthy, spray-irrigated turf.
- The second inspection occurs after the xeric landscaping is installed. During this inspection, staff verifies that the plants included in the landscaping plan are installed on the property. The required number of plants is determined by reference to a point system that assigns a certain number of points to each plant, and the final landscaping must meet a certain number of points. (For example, to convert 1,000 sf of turf, the applicant must install 500 points of plants, and a low-water-use tree might be worth 50 points). The inspector also confirms that at least 50 percent of the area for which a grass removal rebate is awarded is covered with xeric plants, and that only drip irrigation (if any) is installed.

Water Authority staff noted that the approved xeric plant list is flexible and that it is easy to satisfy the plant requirements because the plant list includes 270 plants that are native to New Mexico. In addition, Water Authority staff contact participants one year following the final inspection to offer a consultation by an irrigation specialist. Participants who later are suspected of overwatering may be contacted, but no other enforcement actions are taken following final approval.

This program is notable for its relatively high reimbursement rate compared to other systems and its successful track record. Staff said they expect that the recent increase in reimbursement rates will incentivize more participation in the program.

### **Tree-Bate Program**

The Water Authority also offers a Tree-Bate Program that offers customers 25 percent off the cost of professional tree care services or for the purchase of a new low- or medium-water use tree from the [Water Authority Xeriscape Plant/Tree List Guide](#). The maximum rebate for residential customers is \$100 per year while nonresidential customers are eligible for up to \$500 per year in rebates.

### **Rainwater Harvesting Rebate**

Under this program, the Water Authority provides rebates to property owners that acquire barrels and cisterns to capture rainwater for use in irrigation or other purposes. The rebate amount increases with the capacity of the barrel or cistern:

- \$25 for 50–149 gallons in rain barrel or cistern capacity
- \$50 for 150–299 gallons
- \$75 for 300–499 gallons
- \$100 for 500–999 gallons
- \$125 for 1000–1499 gallons
- \$150 for more than 1500 gallons

### **Efficient Irrigation Rebate Programs**

The Water Authority offers five [Efficient Irrigation Rebates](#) for the installation of water-saving irrigation controllers, sensors, pressure regulators, and sprinkler bodies and nozzles. These rebate programs were just instituted in 2020, and represent a change from the Water Authority's prior focus on incentivizing indoor efficiency. About 150 households take advantage of the program each year.

- The WaterSense Smart Irrigation Controller Rebate offers 25 percent of the cost of irrigation controllers (up to \$100 for residential and \$500 for nonresidential customers)
- The Smart Flow Sensors Rebate offers 25 percent of the cost of smart flow sensors (up to \$100 for residential and \$500 for nonresidential customers). These sensors communicate the flow rate of water to the WaterSense irrigation controller to help with leak detection.
- The Smart Pressure Regulators Rebate offers 25 percent of the cost of smart pressure regulators (up to \$100 for residential and \$500 for nonresidential customers). Smart Pressure Regulators (from a specific list of qualified products) are important for optimizing delivery of water via sprinkler or drip irrigation to landscaping. This allows for consistent water distribution throughout the irrigated area.

- The WaterSense Pressure Spray Sprinkler Bodies Rebate offers a \$4.00 rebate per sprinkler body with no annual limit. These WaterSense sprinkler bodies reduce water waste by optimizing the rate of water expenditure to efficiently cover the landscape.
- The Smart High Efficiency Rotating Sprinkler Nozzle Rebate offers a \$2.00 rebate per nozzle with no annual limit. These smart nozzles apply the water stream at a lower rate which allows the water and nutrients to better penetrate the soil.

### **Water Smart CPR Program**

The Water Authority also offers a [Water Smart Customized Performance Rebate \(CPR\) Program](#) to commercial customers. This program incentivizes landowners to update and improve existing irrigation systems with smart irrigation systems that can save as much as 100,000 gallons of water per year. This rebate program is performance-based to incentivize greater water savings. A customer qualifies for \$10 in rebates for every 748 gallons of water saved per year. The maximum rebate is \$50,000 or 50 percent of project costs, whichever is lower, and may include costs such as materials, hardware, and software.

Landowners who apply for the program and whose applications are approved are assigned a “CPR concierge” to guide them through the process of acquiring and installation the irrigation system. The smart irrigation system must be installed within six months after the application is approved, and the applicant must submit receipts for the cost of implementing the upgrades. Within 30 days of completion, the property owner must schedule the post-installation inspection where project cost estimates are revised based on inspection findings. The final rebate amount is determined after 12 billing cycles (one year) after project completion, and the rebate is then applied to the water bill. The property owner must commit to sustaining the project for five years or until the property title is transferred, whichever occurs first. About 150 landowners participate in the program annually.

### **Customer Outreach**

To target areas where significant water savings may be possible, the Water Authority does targeted outreach to the top five percent of water users within each ZIP code. This outreach includes offers for a free consultation to determine ways to save water, such as changes to the landscaping, changes to the irrigation schedule (over-watering is a common problem), and simple changes to the irrigation system such as replacing spray bodies. Of the approximately 5,000 landowners contacted each year, about 100 reach out to the Water Authority for water-saving advice, while others reduce water usage on their own. About 100,000 email addresses are subscribed to the Water Authority’s newsletter, called “505 Outside,” and the Water Authority does other advertising such as outdoor billboards and television ads.

### **Primary Contact**

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## Other Valuable Practices

### Tucson, AZ

Due to its location in the Sonoran Desert, the City of Tucson has implemented a host of water conservation measures, including several relating to landscaping. The City's Unified Development Code (UDC) includes restrictions on the types of plants that may be used in landscaping ([Section 7.6.4, Landscape Standards](#)), and those regulations have been effective in replacing existing water-intensive vegetation with more drought-tolerant varieties.

In general, all plants must be chosen from the Arizona Department of Water Resources' [low water use/drought tolerant plant list](#), which includes only those plants that can survive in the Sonoran Desert without using significant water resources. Areas that have been graded and seeded must use Native Seed List approved species listed in the City's [technical standards](#). The landscaped area must also be designed to take advantage of storm-water runoff and/or include a water-conserving irrigation system.

Other plants may be installed only in defined "oasis areas" that will return maximum benefit in terms of cooling, aesthetic pleasure, and exposure to people, or for special uses such as public parks and botanical gardens. In multifamily residential developments, only five percent of the site, 100 square feet per dwelling unit, or eight percent of the open space (whichever is greater) may be a designated oasis area. For all other uses, no more than 2.5 percent of the site may be an oasis area. Oasis areas are encouraged to be located near main buildings, active use areas, pedestrian areas, and outdoor seating and gathering areas.

Although the City's restrictions limiting the use of turf to oasis areas and other water-conservation landscaping requirements do not apply to single-family dwellings, staff reports that the conservation ethos in Tucson is strong and that turf is rarely found in the front yards of single-family homes.

City staff noted that this program requires fairly intensive administration due to the need for regular inspection and enforcement. When applicants have trouble complying with the detailed specifications of the code, staff work to ensure that the landscaping meets the intent and purpose of the ordinance. Tucson Water has spearheaded public outreach to educate property owners on the requirements. Staffing continues to be a challenge both for public outreach and enforcement of the regulations. There is only one staff member who reviews landscape plans for compliance with regulations (although the City plans to hire more) and only three inspectors. The final constructed landscaping and trees are not always installed or maintained consistent with the approved plans, and the City is not aggressive about enforcing compliance.

A [Green Storm Water Infrastructure](#) fee of \$0.13/100 cubic feet (748 gallons) of water, first assessed in 2020, raises about \$3 million per year to help divert and harvest storm drainage from public streets and parking lots to vegetated water harvesting areas. The City has also

recently instituted a requirement that captured rainwater supply 50 percent of landscaping irrigation needs.

Staff reports that the overall program has been successful and that Tucson ranks high in water conservation among Arizona municipalities.

### **Primary Contact**

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## **Scottsdale, AZ**

### **Land Use Regulations**

[Section 49-245](#) of the Scottsdale Code of Ordinances sets forth limitations on water intensive landscaping and turf areas for new schools, churches, resorts, hotels, motels, and cemeteries, and [Section 49-246](#) does the same for new multi-family residential, commercial/industrial, and nonresidential uses.

- Section 49-245 requires that all new facilities limit water intensive landscaping and turf areas, with the majority of landscaping required to be from the [Arizona Department of Water Resources' Low Water Use Plant List](#). Churches and schools are required to limit water-intensive landscaping to 15 percent of the total lot area, while resorts (including hotels and motels) are limited to between five and 10 percent of the total lot area.
- Sec. 49-246 requires that all new commercial and industrial sites limit the use water intensive landscaping and turf areas to 10 percent of the lot area for sites 9,000 square feet or less. For larger sites, the first 9,000 square feet are limited to 10 percent water-intensive plants and the remainder of the site is limited to five percent water-intensive plants. For these uses, all plants installed must comply with the Low-Water Use Plant List.

Notwithstanding the lack of regulations prohibiting turf use on single-family residential property, staff generally does not see excessive turf installed on new single-family residential development. In addition, the northern part of the City (which is where much recent development has occurred) includes land designated as Natural Area Open Space which cannot be developed or irrigated. Most turf is found in South Scottsdale, which has long been developed and where the incentive programs are the approach used to encourage a transition to more water-conserving landscaping.

### **Rebate Programs**

The City also offers a variety of rebate programs that are codified in [Section 49-243](#) of the City's ordinances. A single-family residential property can receive \$1 per square foot of turf removed, with a maximum rebate of \$5,000 and a minimum turf removal requirement of 500 square feet.

The turf must be replaced with City approved low-water-use plants and other compatible landscaping material, and the City's Water Conservation Staff are required to verify eligibility before turf is removed. Rebates are not paid until the replacement landscaping is installed. The current rules require that the first 1,000 square feet of replacement landscaping is the homeowner's choice, but the second 1,000 square feet has to be a xeriscape landscape with 25 percent mature plant coverage. Existing plants, including high-water plants but excluding turf, can be used to meet the plant coverage standard. While the program terms and conditions state that the landscaping may be inspected in the future for continued compliance, in practice those have not occurred.

New rules scheduled to be implemented July 1, 2022, will change some of the rebate program rules. The 500 square foot minimum will be eliminated and the rebate amount will increase to \$2 per square foot, although the maximum rebate will remain \$5,000. The revised rules may include a requirement that sprinkler heads be decommissioned for the second 1,000 square feet of landscaping as well.

Three staff members have been performing inspections, and the City has recently hired two additional inspectors. At times, the pre-inspection is performed using photography provided by the applicant, but other times an inspector visits the site. There is at least one in-person inspection for each rebate.

Staff reports that about one-third of those who enter the program are awarded a rebate. Some enter the process but never complete it or do not comply with the program terms (e.g., they want to install more artificial turf than the program allows). About 150 are awarded rebates each year, although staff is hopeful the increase in rebate and the removal of the minimum turf requirement will increase participation.

Multi-family residential and commercial properties can receive rebates for a minimum of 2,000 square feet of turf removal. Properties with up to 10,000 square feet are eligible for up to \$10,000 in rebates (limit one per year and two per lifetime), and properties with more than 20,000 square feet of turf are eligible for up to \$20,000 in rebates and one per lifetime. Staff reported that fewer than 10 landowners participated in the program in 2021. However, with an increase in water bills scheduled to take place in November, staff expects increased interest in the program. While only six homeowners' associations reached out to participate in water-saving programs in fiscal 2021, in the first six months of the current fiscal year 40 homeowners' associations have contacted the City.

Incentives are also offered for removal of pool and spas. While not often used, staff reports that it is often cost-effective for homeowners with aging pools who would have to pay as much or more to repair or remodel the old pool. The City offers \$200 plus \$1 per square foot of pool removed.

Rebates for installation of a WaterSense irrigation controller are also offered. For single-family residential properties, the maximum is \$250 per controller or the cost of the controller, if less; multi-family and commercial properties, as well as nonresidential common areas, are eligible for rebates for up to 50 irrigation controllers, at a maximum rebate of \$400 per controller.

### **Primary Contact**

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### **San Antonio, TX**

The City of San Antonio uses a combination of techniques to preserve water in landscaping. In 2021, the City's Gallons per Capita per Day (GPCD) water consumption rate was 111 gallons, which was lower than average due in part to a wet summer. San Antonio's goal is to reduce the GPCD to less than 100 gallons.

### **Landscaping Regulations**

The City requires all plants in the city to be chosen from a list of drought-resistant plants in [Appendix E](#) of the City's Unified Development Code. The recommended plant list is specifically tailored to xeriscape planting methods, and all are water-friendly. City staff noted that this plant list is limited and could include additional drought-tolerant species. However, applicants are permitted to propose the use of other shrubs or plants, provided they are native or near-native and the applicant can demonstrate they can survive in the area with limited or no irrigation. The City enforces compliance with the regulations through site visits performed by a team of five inspectors.

### **Drought Ordinance**

Water conservation is also emphasized through the City's [drought ordinance](#), enacted in 2014, which is tied to existing conditions in the Edwards Aquifer that provides much of the water for the city. Once aquifer levels fall below 665 feet (measured as elevation above mean sea level), the City begins preparation for drought restrictions. These restrictions are "staged" in four levels based on the level of the aquifer and are enforced by the City. During all stages, irrigation of commercial and residential properties is staggered based on the property's address.

- In Stage I, which is implemented when the aquifer has dropped to 660 feet, irrigation with a soaker hose, hose-end sprinkler, or in-ground irrigation system is only permitted between 7:00 p.m. and 11:00 a.m. on weekdays specified by address.
- In Stage II, which is triggered when the aquifer has dropped to 650 feet, the irrigation methods allowed in Stage I may only take place from 7:00 a.m. to 11:00 a.m. and 7:00 p.m. to 11:00 p.m. Irrigation with a drip irrigation system or five-gallon bucket is allowed during Stage II at any hour of the day, as is irrigation with a handheld hose.
- In Stage III, which is triggered once the aquifer has dropped to 640 feet, irrigation is only allowed every other week on the designated days beginning on the second Monday

after Stage III has been declared, between 7:00 a.m. and 11:00 a.m. and between 7:00 p.m. and 11:00 p.m. Irrigation with a drip irrigation system or five-gallon bucket is allowed on every Monday, Wednesday and Friday, and irrigation with a handheld hose is allowed at any time on any day.

- In Stage IV, which is triggered at the City Manager’s discretion following a 30-day monitoring period once Stage III has been declared, the Stage III irrigation requirements remain in effect, but a surcharge is assessed on nonresidential San Antonio Water Service accounts whose consumption exceeds 5,236 gallons per month and residential accounts whose consumption exceeds 12,717 gallons in a billing cycle.

### **Rebate Programs**

The City also offers a variety of rebate programs through its wholly owned public utility, the [San Antonio Water System \(SAWS\)](#). For residential clients, SAWS offers [landscaping coupons](#) that provide \$100 coupons for landowners planning to remove grass. A landowner can receive one \$100 coupon for each 200 square feet of grass and sprinklers proposed to be removed, and can redeem coupons at participating plant vendors. Once the plants are installed, the landowner is required to send a photograph back to SAWS and, if approved, the landowner can participate in additional SAWS rebate programs.

Water conservation staff reported that the coupon program was implemented in 2014 and replaced an earlier program that involved pre-rebate and post-rebate inspections and more extensive requirements to update landscaping. SAWS has found that the rebate program is more popular, and in particular was used much more by lower-income households who were less likely to engage in more holistic landscape makeovers. While staff noted that the biggest water savings come from instituting xeriscaping on higher-income households, which generally have larger landscapes and are willing to spend more on water, they believe it is important to reach the entire community. However, staff also noted that a separate “Outdoor Living” program will be implemented on June 1, 2022, which will be an inspection-based program that encourages households to revise their landscaping to contain no more than 1/3 turf, 1/3 planting area, and 1/3 pervious living area such as pavers.

An [irrigation rebate program](#) allows residential homeowners to earn up to \$5,000 for removing their irrigation system or making it more efficient. The largest rewards are offered for removal of active irrigation systems, and smaller rewards are offered for removal of non-functional irrigation system, removal of an irrigation zone, conversion from spray to drip irrigation, and other conservation-friendly efforts. SAWS also offers a [separate irrigation consultation program](#) at no cost to homeowners that provides recommendations for revising an irrigation schedule. These efforts, according to staff, are generally effective in reducing water usage.<sup>2</sup> Staff has

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<sup>2</sup> Staff reported that it can be tricky to evaluate the effectiveness of individual programs due the variability of weather and other extrinsic factors that may affect water usage. For some projects they try to do a randomized

found that many households over-irrigate their landscapes, and that by providing a consultation that involves modifications to the irrigation schedule, along with less wasteful irrigation equipment, these households use significantly less water.

For commercial water users, SAWS has implemented a [custom rebate program](#) that offers payments for the implementation of a variety of water-conservation techniques. The amount of the rebate depends on the amount of water saved, and eligible options can include installation of smart irrigation systems, upgrades to irrigation systems to include water-saving technology, replacement of irrigated landscaping with xeriscape landscape, and other actions. SAWS also offers a commercial irrigation rebate program similar to the program offered to residential homeowners. Savings are based on the acre-feet of water use that the modifications are projected to eliminate, based on estimates that staff has developed over time. However, it is a complex program, and staff is investigating whether more straightforward, menu-based options would increase participation.

### **Rewards Program**

SAWS also encourages water-conserving landscaping through a points-based WaterSavers Rewards program. Participants can earn points by attending [events relating to water-efficient landscaping](#). These events are sponsored by third-party organizations (some of which are under contract with SAWS) and approved by SAWS. With the points earned, participants receive coupons at local retailers that can be used towards water-conserving materials such as plants, mulch, compost, and rain barrels. Staff reports the program attracts between 100,000 and 200,000 attendees at events each year and has attracted a committed following.

### **Customer Outreach**

The centerpiece of SAWS' public outreach efforts is the [Garden Style San Antonio](#) website, which provides water-conservation advice, as well as evapotranspiration-based accurate watering advice and information about any current watering restrictions due to drought. More than 20,000 people subscribe to the Garden Style newsletter, which provides watering advice and information about other programs offered by SAWS.

### **Primary Contact**

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control trial by matching the participants in a rebate program with non-participants with similar household income and pre-intervention water usage, but that it is complicated and difficult to implement.

# Tree Protection and Tree Canopy Enhancement

## Best Practices

### Lake Forest Park, WA

#### Background

The City of Lake Forest Park, Washington is a small suburb of Seattle with a population approaching 14,000 across approximately four square miles. The City has had one part-time arborist since 2018, which was the first year the City hired an in-house employee dedicated to forestry. The City previously relied on a resident that was an arborist and expensive consulting services follow the retirement of the resident arborist to implement its tree protection and canopy enhancement program.

#### Tree Protection

[Chapter 16.14](#) of the Lake Forest Park Municipal Code is focused on tree canopy preservation and enhancement.

- The City uses a two-tiered permit structure that prioritizes protection of “significant” trees, trees in environmentally critical areas or buffers, and native tree species. A Minor Tree Permit, which can be obtained without City Arborist review, generally requires replacement of any trees removed from a development site (at a one tree to one tree ratio as long as canopy coverage is equal to or greater than before). If 1:1 replacement will not result in equal or greater tree canopy coverage, a Major Tree Permit based on arborist review will be required.
- Any application for a Major Tree Permit requires approval of a tree replacement plan that maintains canopy coverage or meets the canopy coverage goal for the property (depending on the project type).
- The City offers a Proactive Forest Management Permits for property owners as a method of expediting projects in exchange for increased collaboration with the City on tree maintenance and management and following an arborist plan to maintain canopy coverage. A similar Utility Forest Management Permit offers utility providers an opportunity to work with the City on a plan to balance the needs of utility providers and community goals for canopy coverage.
- Tree removal is generally not permitted in areas that the City has identified as Environmentally Critical Areas and Buffers—regulated by [Chapter 16.16](#)—which includes floodplain, stream buffers, wetlands, steep slopes, landslide hazard areas, erosion hazard areas, and seismic hazard areas. However, trees that present a risk (based on defined standards), are causing damage to buildings and infrastructure, or are invasive species, may be removed.

- The City Arborist notes that standards for protection of trees during construction are vital but not something addressed in the Code. Current uncodified practice is to require that the critical root zone be protect to a distance equal to one foot of radial distance from the tree trunk for every one inch in tree Diameter at Breast Height (DBH). The City often negotiates for an even wider protection area.
- Historically, the City has required chain link fencing on pier blocks to protect the critical root zone, but the City Arborist has found that pier blocks tend to be shifted around, so the City is starting to require that fencing be attached to posts driven into the ground.

Lake Forest Park highlighted the following successes and challenges with enforcement of tree protection regulations:

- The City is generally unable to do proactive code enforcement due to limited staff. Because it is a small city, Lake Forest Park relies on a small number of highly active residents that will report tree removal when they see it. Sometimes reports are made related to removal of trees for which valid Tree Permits have been issued, but false alarms are better than not knowing about the illegal removals for which permits have not been issued.
- The City has a Tree Account for payment of fees and fines for tree removal, which is an effective way to ensure a direct link between funds and tree programs. The process for determining a fine is generally as follows:
  - The City addresses violations of the Code by hiring an appraiser to determine the value of the removed tree(s) and notifying the property owner (and sometimes tree removal company) of the value to be paid. Local tree removal companies have become well aware of the costs of removing a tree without a Tree Permit, which has reduced the number of violations.
  - The City Arborist highlighted the ability of a resident to provide the City with information on the circumstances of the tree removal and to outline financial hardship before paying the fine.
  - Sometimes the City Attorney and an attorney for the Code violators meet to agree on the final fee amount.
  - In practice, the City Arborist noted that although the process of appraisal, fine, appeal, and reaching agreement on the fine amount is generally effective, it is also time consuming. To reduce this time commitment, the City has been assessing a fine for unpermitted tree removals that is essentially double the cost of the Tree Permit fee that should have been paid before removal, but only in circumstances where the City Arborists agrees that the removed tree was one for which removal would have been approved following the Code process.

## Urban Canopy Management

Lake Forest Park has more tree canopy than most surrounding communities and generally prioritizes protecting and expanding tree canopy more than neighboring communities. Existing regulations have been successful in the following ways:

- The City has a clear understanding of parcel-by-parcel tree canopy coverage (see [Canopy Coverage Maps](#)) and clear goals for canopy coverage by zoning district and lot size (see [Community Forest Management Plan](#)). This information is used in determining tree replacement requirements.
- The Code has clear definitions, which make it easier for staff to implement the Code and for community members to understand what is expected. Valuable terms that are defined by Code include:
  - “Canopy coverage” means the area covered by the canopy of trees on the lot. When a tree trunk straddles a property line, 50 percent of the canopy shall be counted towards each property’s canopy coverage. The canopy coverage of the immature trees and newly planted trees is determined using the projected canopy areas in the Lake Forest Park general tree list.
  - “Landmark tree” means a significant tree that is at least 24 inches in diameter (DBH).
  - “Significant tree” means a tree six inches or greater in diameter (DBH) or a required replacement tree of any size. Dead trees shall not be considered significant trees.
  - “Exceptional tree” means a viable tree, which because of its unique combination of size and species, age, location, and health is worthy of long-term retention, as determined by the city’s qualified arborist. To be considered exceptional, a tree must meet the following criteria:
    - The tree must be included in and have a diameter at breast height (DBH) that is equal to or greater than the threshold diameters listed in an adopted table;
    - The tree shall exhibit healthful vigor for its age and species;
    - The tree shall not be considered a significant risk in regard to existing utilities and structures as evaluated per the tree risk assessment defined in LFPMC 16.14.080(A)(1);
    - The tree shall have no visual structural defects that cannot be mitigated by one or more measures outlined in the International Society of Arboriculture Best Management Practices; and
    - If retained under current tree growth conditions, the tree can be expected to remain viable with reasonable and prudent management and care.

- “Viable (tree)” means a significant tree that a qualified arborist has determined to be in good health with a low risk of failure, is relatively windfirm if isolated or exposed, is a species that is suitable for its location, and is therefore worthy of long-term retention
- Although residents often expect that the City is responsible for maintenance of trees in the public right-of-way, the Code makes it clear that the property owner is responsible for those in the tree lawn along property frontages, even if they are located in the public right-of-way.
- The City maintains a detailed [Tree List](#) that include information on the expected canopy area of each species, typical characteristics, drought tolerance, and preferred soil type.

Lake Forest Park has also identified the following improvements that they would like to see in the future:

- The City Arborist would like to see the Code have stronger standards for retaining trees before allowing replacement. Currently, standards allow a tree to be replaced by a tree that will mature into a tree with equal or greater canopy, but replacement trees take years to mature and provide the same benefits as the original, removed tree.
- The City Arborist is concerned about recent changes to the Code that allow accessory dwelling units (ADUs) more broadly and future efforts that could rezone areas to allow for higher density housing, both of which could potentially result in the loss of tree canopy. Historically, the City has not seen much development or redevelopment on its generally large residential lots, so the Code may need to be updated to prevent canopy loss due to more intensive development.
- The City Arborist would like to increase education of new and existing property owners to prevent accidental and unpermitted tree removal.

### Primary Contact

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## Portland, OR

### Tree Permits

Trees on private property and in City of Portland rights-of-way are regulated by [Title 11 of City Code, Trees](#), which is focused on implementation of the City’s [Urban Forest Management Plan](#) (2004) and [Urban Forest Action Plan](#) (2007) and tracking progress on those initiatives. Title 11 establishes the Urban Forestry Program, including appointed supervisory boards and regulations and procedures for tree permits, tree preservation, tree planting, and enforcement of these regulations.

[Chapter 11.30, Tree Permit Procedures](#) outlines a highly nuanced approach to tree protection with permits and standards varying based on ownership and location (private property or public property/street) and the type of activities proposed. Trees that are designated as “Heritage Trees” per [Section 11.20.060](#) (“trees that because of their age, size, type, historical association or horticultural value, are of special importance to the City”) earn the strongest level of protection and regulation, and require approval by the Urban Forestry Commission (UFC) to remove the designation (and subsequent removal of the tree). In other cases, the code requires City Forester approval for any tree removal or maintenance.

[Chapter 11.40, Tree Permit Requirements \(No Associated Development\)](#), details the permit requirements and review criteria when tree removal or maintenance is not associated with development activity. This chapter generally applies to all street trees, City trees three inches or greater in diameter, and private trees 12 or more inches in diameter (among other, more specific situations). Permit standards and review criteria are organized into two categories: City and Street Trees ([Section 10.40.040](#)) and Private Trees ([Section 10.40.050](#)).

City and Street Trees require a Type A tree permit, which requires City Forester review with no public notice period or opportunity for the public to appeal, for the following:

- Tree planting;
- Pruning branches (greater than ½ inch) and roots (greater than ¼ inch);
- Removal of dead, dying, or dangerous trees (with one replacement tree required per removed tree); or
- Removal of up to four healthy trees (per year) that are less than three inches in diameter (with one replacement tree required per removed tree).

City and Street Trees require a Type B permit, which may result in a public notice period and opportunity for public appeal of a pending City Forester decision, for removal of trees that are greater than three inches in diameter if either of the following conditions apply:

- Tree for tree replacement of removed trees is required for trees less than 20 inches in diameter (only if less than four healthy trees are removed per year). If any tree is 20 inches or larger in diameter or more than four healthy trees larger than 12 inches in diameter are removed, trees replacement must be “inch for inch,” which means that trees of an equivalent total diameter are required to be planted.
- Similarly, if any tree is 20 inches or larger in diameter or more than four healthy trees larger than 12 inches in diameter are removed, public notice and opportunity for public appeal of the City Forester approval is required.

Private Trees require a Type A permit for pruning native trees in specified overlay districts, removal of a tree that is dead, dying, dangerous, a nuisance species, located within 10 feet of a building, or no more than four healthy trees smaller than 20 inches in diameter are removed.

Any tree removal under a Type A permit requires tree for tree replacement. Removal of up to four trees that are 20 inches in diameter or larger or removal of more than four trees larger than 12 inches in diameter require a Type B permit, inch for inch replacement, and public notice and opportunity for public appeal.

[Chapter 11.50, \*Trees in Development Situations\*](#), details the permit requirements and review criteria when tree removal or maintenance proposed as part of a development activity. A Tree Plan is generally required for all development projects, unless:

- There are no private trees 12 inches or larger in diameter;
- There are no city trees six inches or larger in diameter;
- There are no street trees three inches or larger in diameter;
- The site or activity is exempt from on-site tree density standards; and
- The site or activity is exempt from street tree planning standards.

Sites larger than one acre (or where all work is occurring in the public right-of-way) may establish a Development Impact Area that provides some flexibility for tree preservation and planting. It also includes a requirement that one street tree be planted or retained for each full increment of 25 linear feet of street frontage with the option of paying a fee-in-lieu if the required number of trees cannot be provided.

[Section 11.50.040, \*Tree Preservation Standards\*](#), details the standards for retention of trees and mitigation of trees not preserved, both on-site and in the public right-of-way. Mitigation is based on payment into the Tree Planting and Preservation Fund with the cost depending on the size of tree(s) to be removed.

[Chapter 11.45, \*Programmatic Tree Permits\*](#), outlines a program to avoid going through individual Tree Permit applications for regular or continuing work by utilities and other public agencies. Although the City Code does not generally apply to State and Federal lands or highways), this permit establishes a method for the City to engage with these agencies to ensure that City regulations are understood and followed while allowing less oversight of day-to-day operations that could result in maintenance or removal of certain trees less than six inches in diameter. Programmatic Tree Permits may be approved by the City Forester for up to five years.

### **Tree Protection**

[Section 11.60.030, \*Tree Protection Specifications\*](#), offers both prescriptive and performance-based option for protection of both privately- and publicly owned trees. Importantly, the prescriptive path does not require any knowledge of trees or plants and is therefore frequently used by homeowners and small developers. It has been adjusted over time and seems to work well, based on the following standards:

- The root protection zone is one foot for each one inch in tree diameter;
- To provide flexibility for *existing* encroachments, provided the encroachment does not affect more than 25 percent of the root protection zone and does not penetrate the inner half of the zone radius;
- Six-foot chain link protection fencing on eight foot metal posts are required at the edge of the root protection zone; and
- The same standards apply to protection of street trees unless the City Forester requires more or less protection.

The performance path is most often used for larger projects and by larger developers because it allows a professional arborist to create a plan for tree preservation that reflects any unique circumstances of the project or site. The performance plan is reviewed for adequacy by City staff.

### **Urban Canopy Management**

To support the goals of the Urban Forest Action Plan to increase tree canopy coverage to 35-40 percent in residential areas, 15 percent in commercial/industrial areas, 30 percent in parks and open spaces, and 35 percent in rights-of-way, [Section 11.50.050](#) includes on-site tree density standards that specify a minimum required tree area based on the size of the site and the type and size of proposed and existing development. All new development and exterior alteration to existing development above a certain valuation are generally required to comply with these requirements, with a few exceptions. Applicant are provided with two options as follows:

- Option A requires the following minimum tree area:
  - One- and two family residential: 40 percent of site or development impact area;
  - Multi dwelling residential: 20 percent of site or development impact area;
  - Commercial and mixed-use: 15 percent of site or development impact area;
  - Industrial: 10 percent of site or development impact area;
  - Institutional: 25 percent of site or development impact area; and
  - Other: 25 percent of site or development impact area.
- Option B requires that the entire site area, minus existing and proposed building coverage be designated as part of the tree canopy area.

This section also requires that the required tree area be planted with some combination of canopy trees that meets specific standards for number of trees required per size of tree area and the minimum required planting area per tree. The Code provides tree density credits towards any required tree density for trees planted to meet required stormwater or

landscaping requirements, existing healthy trees that are retained on-site, payments in-lieu of planting, and flexibility for small sites where existing trees are retained.

[Section 11.60.030, \*Tree Protection Specifications\*](#), outlines the minimum size and species diversity for all trees required by this Code. Standards include the following:

- Broadleaf trees must be 1.5 inches in caliper for one- and two-family residential development (on-site or on street) or on-site for all other development types.
- Broadleaf street trees are required to be a minimum of two inches caliper for multi-dwelling residential and 2.5 inches caliper for all other types of development types.
- Coniferous trees are required to be at least five feet in height.
- Native trees are permitted to be ½ inch caliper less than required.
- When more than eight but fewer than 24 trees are required, no more than 40 percent of trees may be of one species. When more than 24 trees are required, no more than 24 percent may be of one species. In some overlay districts all trees provided are required to be native species.

Portland also uses some unique approaches to enforcement of tree planting, maintenance, and removal requirements, including the following:

- Street trees are included in the warranty period for infrastructure (e.g., sidewalks and streets) that require a Public Works permit, which generally lasts two years. This means that any required street trees that are damaged, poorly maintained, or die during the warranty period are required to be replaced by the applicant. Staff noted that this has worked well and does not require a separate process for enforcement.
- Penalties for failure to comply with the Code standard for trees and landscaping is based on an internal document that is informed by the Technical Specifications of Chapter 11.60. The City's current approach is not to make it more expensive to follow the Code, which may disincentivize people from coming into conformance. This approach still allows the City to require planting of three to seven trees when a tree is illegally removed. City staff hopes to eventually establish an administrative manual outside of the Code that clarifies penalties for noncompliance that can be easily updated if those penalties change in the future).
- The City Forester is permitted to require payment (based on an adopted fee schedule) into the Tree Planting and Preservation Fund instead of requiring replacement trees if the Forester finds there is insufficient or unsuitable area to accommodate some or all of the replacement trees within the street planting area or site.

Although not a complete success, City staff mentioned that they recently completed a study showing that compliance with various landscaping standards varied from 50 to 75 percent. The City currently enforces landscaping and tree regulations based on complaints by neighbors and

concerned citizens, which can make it difficult to ensure that required landscaping on private property is provided and maintained with limited resources.

Additional Portland tree-related regulations are documented in [Title 33, Planning and Zoning](#).

### Primary Contact

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### Other Valuable Practices

#### San Antonio, TX

The San Antonio Unified Development Code (UDC) was amended in 2010 to include [Section 35-523, Tree Preservation](#). The regulations are based on a required minimum canopy coverage, which is 38 percent for single-family residential properties, 25 percent for multi-family and nonresidential properties, and 15 percent in the [Community Revitalization Action Group \(CRAG\) area](#), which generally encompasses central San Antonio. Based on these final tree canopy coverage requirements, the applicant may use one of two methods for determining tree preservation. The tree survey method establishes a minimum percentage of all diameter inches of significant or heritage trees, or canopy area, which must be preserved or mitigated (e.g., 35 percent of six inch caliper trees are to be preserved on a single-family dwelling lot). The tree stand delineation method requires a minimum percentage of tree canopy coverage (not including floodplains and environmentally sensitive areas) to be preserved (e.g., 35 percent of non-heritage tree canopy for any project that requires any permit after the master development plan stage or 30 percent with a master development plan). San Antonio allows various alternatives when trees that are required for preservation are removed, including a fee-in-lieu payment into the Tree Mitigation Fund and protection and maintenance of natural areas within the surveyed area.

The City also offers tree preservation incentives, which include:

- Reduction of one required parking space for every four diameter inches of trees protected or mitigated on-site, up to a maximum of 15 percent of required parking spaces (or 30 percent with approval of the Planning Director). Preservation of woodlands and significant tree stands may qualify the site for a 50 percent reduction in parking spaces;
- Reduction in sidewalk width or elimination of a sidewalk requirement;
- Additional tree protection credits for preservation of tree clusters;
- Credit for trees provided to meet required landscape buffers and on-site landscaping (see [Sec. 25-511, Landscaping](#));
- Credit for preservation of native understory plants alongside trees;

- Reduction of lot size and setback requirements for exceeding tree protection requirements.
- Exemption from City tree protection requirements for projects certified under the Texas Parks and Wildlife (TPW) Texas Wildscape Program;
- Credit for planting trees on the south and west sides of habitable buildings (to benefit energy conservation);
- Additional credit for preservation of woodlands, significant trees, and heritage trees;
- Reduction of required tree canopy for athletic fields; and
- Additional credit for incorporation of Low Impact Development (LID) to aid in stormwater management.

San Antonio defines the root protection zone as being one linear foot of radial distance for each one inch in tree diameter, which allows construction within five feet on one side of the tree. Alternatively, the City allows applicants for multi-family and nonresidential development to warranty the trees for five years to ensure trees are otherwise protected and maintained.

City staff noted that the codified list of approved plants and trees should be expanded and also highlighted the need for more detailed direction in the Code and clearer definition of terms. The San Antonio tree protection program is complex, but offers a variety of possible methods, alternatives, and incentives for the City of Fort Collins to consider.

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### **Bloomington, IN**

The City of Bloomington recently adopted an updated Unified Development Ordinance (UDO) that includes a unique approach to preserving urban canopy during land-disturbance activities. [Section 20.04.030\(i\), Tree and Forest Protection](#) establishes a minimum required canopy cover based on how much of the property is currently covered with tree canopy as shown below:

- 80-100 percent baseline canopy cover requires 50 percent of that coverage to be retained;
- 60-79 percent baseline canopy cover requires 60 percent of that coverage to be retained;
- 40-59 percent baseline canopy cover requires 70 percent of that coverage to be retained;
- 20-39 percent baseline canopy cover requires 80 percent of that coverage to be retained; and
- 0-19 percent baseline canopy cover requires 90 percent of that coverage to be retained.

This approach requires that more of the canopy be preserved when there is less canopy available. City staff indicated that this approach is somewhat complicated because it requires calculation and sometimes on-site review, but general found that the approach is fair to developers and seems to work well. [Section 20.04.080, Landscaping, Buffering, and Fences](#), also establishes standards for landscaping on private property (including single-family dwelling development) and in the public right-of-way, which includes regulations for species diversity, minimum tree sizes, and protection of existing trees.

The City notes the following improvements to the UDO that could help with clarity and implementation of the [Bloomington Urban Tree Canopy Assessment Summary Report](#) (2019):

- A clearer definition of “closed canopy,” or an alternative method of determining what constitutes tree canopy.
- A requirement that trees located in boxes include suitable soils.
- A fee-in-lieu option, especially for sites where there are conflicts between existing and potential planting areas and utility infrastructure).
- Coordination of tree-related regulations between [Chapter 12.24, Trees and Flora](#), which applies to street trees in the public right-of-way, and Title 20 of the Unified Development Code, which governs private development.

City staff highlighted several enforcement challenges and potential solutions or alternatives.

The City needs:

- Clearer standards for tree-protective fencing during construction and better enforcement of the required 10 foot setback beyond the dripline, which tends to be encroached upon;
- Clearer direction on who determines when a tree is a “heritage tree,” which is defined as “a tree that is unique and important to the community because of its species, age, size, location, or historic significance;”
- An escrow payment program to ensure street tree maintenance. Currently, the City is responsible for street tree replacement, and poor private maintenance of street trees leads to higher costs to the City for tree replacement.
- Potentially updating UDO standards to require a minimum 10 foot wide tree lawn (where possible) and greater emphasis on planting and protecting native trees.
- A [bond funded program](#) (2022) for tree planting with emphasis on creating a more equitable urban canopy.

### Primary Contacts

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## Boulder, CO

The City of Boulder Code adopted an [Urban Forest Strategic Plan](#) in 2018 to establish a policy framework for urban canopy management. Today, the City offers limited protection for trees on private property (see [Chapter 9-9, Development Standards](#)). During the development process the applicant is required to identify all trees greater than four inches caliper and have a qualified arborist conduct an inventory of the trees worthy of preservation. The City reviews this inventory and works with the applicant on a tree protection plan, including identifying the trees to be preserved and the fencing and measures required to ensure protection during development of the property (see drawings [3.01, 3.02, 3.03, and 3.04](#)). Trees required to be preserved can be removed with payment of a mitigation fee.

Although the City does not currently have a permit process for removal of street trees, the City Forester noted that the City would like to formalize the process with a permit (see [Chapter 6-6, Protection of Trees and Plants](#)). Currently, the City Forester determines what trees are required to be preserved and the mitigation payment to compensate the City for any removed trees. Boulder uses the [trunk formula method](#), which determines the value of trees to be removed based on the value of similar sized trees in a local nursery, the cost of installation, and other factors. Any tree that is illegally removed during the development process results in a mitigation fee to be paid before other permits are issued. Otherwise, the City documents the illegal tree removal and issues a fine (almost always) or requires replacement (rare because of the large share of development that takes place on infill sites that are too small to accommodate additional trees). Tree mitigation fees and fines go towards Capital Improvement Projects in the Parks and Recreation Budget. The City Forester supports the use of mitigation fees instead of tree replacement because it is easier to administer and because funds can be carried forward from year-to-year so that mitigation fees collected late in the year aren't lost when trees cannot be planted during the winter. Boulder has an [Approved Tree List](#) to guide tree planting in the right-of-way and on other municipal property, including information on tree spacing, hardiness zone, water needs, canopy size, and soil preferences.

The City Forester did note the following challenges and potential improvements to Boulder's current Code and practices:

- Standards for mulching and irrigation of trees are only identified during the permitting process and are otherwise difficult to enforce.
- The City could better educate property owners about when they are responsible for care and maintenance of street trees. The City generally manages street trees adjacent to residential properties and businesses manage those adjacent to their property. Alternatively, the City could explore taking over responsibility for all street trees.

- The City should consider alternative arrangements to ensuring required trees are maintained, including having developers prepay for cost of maintenance when the City is required to provide maintenance. An escrow payment program has been considered before, but it is not always clear which party should pay, or be responsible, or receive any funds required to be rebated if not used within a specific period of time.

### Primary Contact

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## Madison, WI

The City of Madison requires private development (except for one- and two-family dwellings) to provide trees and landscaping through a menu of options in [Section 28.142, Landscaping and Screening Requirements](#). These regulations establish a point value for distinct types of vegetation, which encourages the installation of higher quality (and larger) trees and requires a greater number of “points” for larger lots. Higher points are also provided for protection of “existing significant specimen trees” (those greater than 2.5 inches caliper) to prioritize preservation of large trees over removal and replacement with smaller trees that take longer to provide similar benefits. This section also requires any development that provides five or more trees to provide a specified diversity of tree species (with greater diversity required when more than 50 trees are provided) and at least three different street tree species per block. Once landscaping is installed, however, the City does not require or enforce tree protection on private property.

Trees in the right-of-way, however, are highly protected, primarily through [Section 10.101, Regulation of Tree Trimming, Pruning and Removal within the Public Right-of-Way of Any Street, Alley or Highway](#). These standards require permits for tree trimming, pruning, and removal of trees in the public right-of-way, which include requirements for tree inventories and/or street tree report prepared by a certified arborist for any request to remove, prune, or perform most construction activities. The reports are typically triggered by a proposal to do any work that could impact the urban canopy or impact a tree that is six inches or greater in caliper. The City noted that tree protection regulations are relatively cumbersome, but that developers view the street tree report as a way to expedite the process because they can hire a certified arborist to conduct the review.

Madison is unique for codifying detailed standards for how the City and any contractors must protect trees in the right-of-way. [Section 107.13](#) of the City’s Standard Specifications for Public Works projects require that a five-foot area around each tree remain undisturbed, provide information on what City Forester markings indicate, describe methods of root cutting to limit damage to trees, lists best practices for trimming, pruning, and avoiding soil compaction, and establishes penalties for damage to trees. The City Forester noted that current practice has

been to collect a deposit of \$125 per trunk diameter inch (measured 4.5 feet above the ground) prior to any work being done near trees. This ensures that the City is able to collect any damages without hassle.

The City noted that they will be reviewing the City Code in the next year to ensure implementation of the [Urban Forestry Task Force Final Report](#) (2019) and had the following suggestions to improve the effectiveness of current standards.

- Codify standards for soil volumes and require a third-party review and approval for the City to evaluate during the development review process.
- Modify parking lot landscaping requirements to require different parking lot tree arrangements.
- Assess development regulations in urban neighborhoods where the required setbacks are less than five feet, because it can prevent the full, healthy growth of trees if the sidewalk width is also narrow.
- Explore recommendations from the Tree Board for improving maintenance of public and private trees.

### Primary Contacts

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### Seattle, WA

The City of Seattle's 2020 [Draft Urban Forest Management Plan](#) has established a goal of increasing tree canopy coverage to 30 percent by 2037. Currently, [Chapter 25.11, Tree Protection](#) focus on preserving "exceptional trees" as opposed to thinking about the overall urban canopy. This reflects an increase in interest in tree protection from citizens and elected officials due to rapid development the past several years. Generally, Seattle has very few standards related to the planting, preservation, or maintenance of trees on private property (no tree removal permits, no tree planning requirements, no standards for tree size, no required species diversity, etc.). Street trees have more protections (removal requires permit approval), but standards for maintenance and replacement are minimal. Although Seattle takes a more hands-off approach to tree preservation, they are in the process of updating some regulations. Fort Collins may consider some of the following existing valuable practices:

- The City has developed an [interactive tree list \(using Tableau\)](#) to allow residents to tailor any new tree plantings to site conditions (sun exposure, width of planting strip for street trees, presence of overhead wires) and desired tree characteristics (drought tolerance, size, native/non-native, and flower and fall colors). Voluntary planning does not require any specific tree type or size to be provided.

- Removal of a street tree without City approval results in a fine that is triple the cost of the permit that should have been obtained prior to tree removal. The City is considering alternative penalty structures (including charging a dollar value per caliper inch of the removed tree), but staff notes that City officials are weary of fines that could disproportionately impact underserved communities.

### Primary Contacts

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## Fort Wayne, IN

Fort Wayne has struggled with the loss of large trees and clear-cutting of trees on private property prior to or during the development review process, partly because existing regulations are very permissive about tree removal (see [Section 157.408, Landscape Standards](#)). Over the past decade, the City found that they have lost about six percent of existing tree canopy coverage. The City is in the early stages of looking at solutions (and assessing community support) for addressing the issue with new regulations and further implementing the City's [Urban Forest Management Plan](#) (2014), but does have the following regulations and practices that have proven successful or provide lessons learned from current practice:

- To limit conflicts with trees and infrastructure in utility easements, the City recently adopted provisions that allow landscaping to be provided elsewhere without requiring a waiver of standards. This is not yet reflected in the Code.
- Instead of requiring that trees be replaced at one-tree-to-one-tree ratio, the City is considering requiring tree replacement at a ratio of one-inch of tree caliper for every one-inch of tree caliper being removed. The current standard is not resulting in quality replacement trees.
- The City has been actively protecting about 1,000 of the highest value Ash trees (along key corridors, in parks, etc.) with TREE-age Insecticide Treatment and has removed about 10,000 other Ash trees to manage Emerald Ash Borer damage. Any removed tree is replaced with guidance from the Parks Department to ensure species diversity. Otherwise, there is no species diversity requirement for new trees.

### Primary Contact

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## Reno, NV

The City of Reno is [in the process of updating standards](#) for tree protection, installation, and maintenance. Although this example does not offer an analysis of existing standards, it reflects

related discussion with City staff about what is working well or proving to be challenging, this community does offer an opportunity to see what another Western community is trying based on best practices. The [draft ordinance language](#) (as of 3/28/22) is set for review and recommendation by the Planning Commission, which has already been recommended to City Council for adoption by the Urban Forestry Commission. The draft ordinance focuses on many of the issues identified by the City of Fort Collins, including soil standards, tree protection regulations, enforcement mechanisms, and updated definitions—all with the goal of improving and expanding tree canopy. New standards in [Chapter 8.32, Trees and Shrubs](#), and [Title 18, Land Development Code](#):

- Establish a landmark tree designation for tree protection on private property;
- Establish a process for removal of a public tree by an adjacent property owner;
- Establish a methodology for tree appraisal and financial assurances in public trees are not adequately protected during construction;
- Clarify minimum soil volume and quality standards based on tree size;
- Increase quality standards for street trees and parking lot trees;
- Enhance standards for tree maintenance and replacement if required trees are damaged or removed;
- Establish procedures for landscape permits if required landscaping is removed or negatively impacted; and
- Expand penalties to apply based on number of trees impacted instead of applying the penalty based on a particular property not following regulations.

### **Primary Contacts**

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