

PROJECT MEMO



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DATE: October 26, 2018

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PROJECT NO.: 2180571.30

PROJECT NAME: IWAC Model Landscape Ordinance

SUBJECT: Efficient Irrigation and Landscape Design Standards Literature Review

The purpose of this literature review is to explore approaches to regulating water efficient irrigation and landscaping across the United States, with a specific emphasis on methods that may more appropriately apply to the Spokane Valley Rathdrum Prairie Aquifer and the Spokane River region. The *Model Efficient Irrigation and Landscape Design Standards*, once developed, will aid municipalities and water purveyors to promote efficient water use and irrigation practices.

The first portion of this literature review will summarize the literature reviewed, and the major findings and conclusions. The second portion of this literature review will then answer several research questions, as developed by the Idaho Washington Aquifer Collaborative (IWAC).

For municipal clients throughout Washington and California, AHBL’s planning and landscape architecture staff has considerable experience with the preparation of landscape codes, the design of landscape plans, and the review of landscape plans prepared by others. The following document is a literature review only. We will be providing our recommendations based on our experience as practitioners with our submittal of the first draft of the landscape code.

Review of Literature

In order to perform this literature review, sources were reviewed including guidance documents on water efficient landscapes, model water efficient landscaping ordinances, and ordinances adopted by several municipalities. The sources reviewed include the following:

- EPA Water Sense, Water –Smart Landscapes, 2013.
- DRAFT Model Landscape Irrigation Efficiency Ordinance, Proposed Design Guidelines, Arizona Department of Water Resources Tucson Active Management Area, Adapted from the California State Model Water Efficient Landscape Ordinance to meet the needs of the Tucson Metropolitan Area, 2002.
- West Valley City, Utah Municipal Code, Chapter 7-16, WATER EFFICIENT LANDSCAPE.
- Water-Efficient Landscape Design, A model landscape ordinance for Colorado’s communities utilizing a water conservation-oriented planning approach, Colorado Department of Local Affairs, Office of Smart Growth, 2004.
- Guidelines for Model Ordinance Language for Protection of Water Quality and Quantity using Florida Friendly Lawns and Landscapes, 2003.
- Water Efficient Landscape Ordinance, City of Hayward, California.
- Landscape and Irrigation Design Standards, City of Lancaster, California, 2016
- City of San Bruno Water Efficient Landscape and Irrigation Guidelines, City of San Bruno, California



- St Johns River Water Management District, Landscape Water Conservation Ordinance Guidelines
- DRAFT Model Water Efficient Irrigation and Landscape Ordinance, Tampa Bay Water Member Governments, 2001
- DRAFT Irrigation Standards Ordinance and Procedures for the Tucson Metropolitan Area, Executive Summary, 2003
- DRAFT Utah Water Efficient Landscape Ordinance for Commercial Business, 2001
- REVISED FINAL DRAFT Standards for Landscape Irrigation in Florida, 2006
- Model Water Efficient Landscape Ordinance, California Department of Water Resources, 2010
- Water Efficient Landscaping Standards, City of Aspen, Colorado, n.d.

Background

The average American uses 100 gallons of water per day, the average family uses 320 gallons of water per day. The amount of water used outdoor, especially in the summer can exceed the amount used for all other purposes in the entire year. This is especially true in hot, dry climates.¹

According to the Environmental Protection Agency (EPA) “of the estimated 29 billion gallons of water used daily by households in the United States, more than 8.5 billion, or 30 percent, is devoted to outdoor water use. In dry climates, a household’s outdoor water use can be as high as 60 percent. The majority of this is used for landscaping. In fact, it is estimated that the average American home consumes 58,000 gallons of water outdoors each year, mostly for irrigation.”

Some of the key ways to reduce outdoor water consumption include:

- Planting native plants. Native and low-water plants require little to no irrigation beyond normal rainfall.
- Group plants according to their water needs. Grouping plants into “hydrozones” allows you to water based on each zones specific needs.
- Maintain healthy soils. Healthy soils effectively cycle nutrients, minimize runoff and retain water.
- Reduce turf areas. Turf requires the highest amount of irrigation in traditional landscaping.
- Water wisely. Watering in the morning or evening can avoid the evaporation and wind that occur during the heat of the day.
- Incorporate mulch around shrubs and plants. Mulch aids in a greater retention of water by inhibiting weed growth, regulating soil temperature, and preventing erosion.
- Maintain mulch and remove weeds.

The type of irrigation system also plays a big role in water use. Manual watering with a handheld hose is the most efficient method. In-ground sprinkler systems and drop systems use up to 47 percent more water. In-ground sprinkler systems and drip irrigation systems must be operated properly to be water efficient. Rain sensors and soil moisture sensors also help prevent waste by ensuring the sprinkler does not turn on during and immediately after rainfall or when soil moisture levels are above preprogrammed levels.

¹ EPA Water Sense, Water–Smart Landscapes, 2013.



Research Questions

IWAC staff identified several research questions in their preparation of a draft Model Efficient Irrigation and Landscape Design Standards that our literature review sought to answer. These questions will help guide the development of a model ordinance and standards that can be applied within the Spokane Valley Rathdrum Prairie Aquifer and the Spokane River region.

1. What are some other goals of the Model Efficient Irrigation and Landscape Design Standards?

The Water-Smart Landscapes publication by the Environmental Protection Agency may be a good source of inspiration for purpose statements for the model ordinance:

- Reducing outdoor irrigation which can account for up to 60 percent of a household's water use.
- Replacing eye-catching landscapes, which require extensive watering, fertilization, and pesticide application, with drought-tolerant and water-smart landscaping. These landscapes can be designed to be aesthetically pleasing, save water, and protect the environment.

The California MWELo provides several goal statements that may be of use:

- Creating the conditions to support life in the soil by reducing compaction, incorporating organic matter that increases water retention, and promoting productive plant growth that leads to more carbon storage, oxygen production, shade, habitat, and esthetic benefits.
- Minimizing energy use by reducing irrigation water requirements, reducing reliance on petroleum based fertilizers and pesticides, and planting climate appropriate shade trees in urban areas.
- Conserving water by capturing and reusing rainwater and graywater wherever possible and selecting climate appropriate plants that need minimal supplemental water after establishment.
- Protecting air and water quality by reducing power equipment use and landfill disposal trips, selecting recycled and locally sourced materials, and using compost, mulch and efficient irrigation equipment to prevent erosion.
- Protecting existing habitat and creating new habitat by choosing local native plants, climate adapted non-natives and avoiding invasive plants. Utilizing integrated pest management with least toxic methods as the first course of action.

The City of Hayward, CA, has similar goal statements to the California MWELo:

- Encouraging the use of a watershed approach and reducing compaction, incorporating organic matter that increases water retention, and promoting productive plant growth that leads to more carbon storage, oxygen production, shade, habitat and esthetic benefits.
- Establishing provisions for water management practices and water waste prevention for existing landscapes.
- Setting a Maximum Applied Water Allowance as an upper limit for water use and reducing water use to the lowest practical amount.

2. Incorporate the use of reclaimed water into the design standards?

Most of the model and adopted ordinances do not require or discuss the use of reclaimed water or rainwater harvesting. The California Model Water Efficient Landscape Ordinance (MWELo), which many communities in California have adopted, provides provisions for encouraging the use of graywater systems for on-site landscape



irrigation. In addition, provisions within the WELO provide exemptions for landscape areas with less than 2,500 square feet that meet their Estimated Total Water Use entirely through the use of graywater.

3. Where should the ordinance apply and are there any exemptions that the model ordinance should include? Consider single-family, commercial, industrial and publicly owned facilities, common areas in multifamily developments, master planned communities, parks, schools, cemeteries, athletic fields and private sports facilities.

The California MWELO applies to all new landscapes 500sf or larger requiring a building or landscape permit, plan check, or design review, as well as rehabilitated landscape projects 2,500sf or larger requiring a permit or review. The Colorado model ordinance does not specify a threshold but simply states that it will apply to all new or renovated landscapes that require development review permits. This provides some flexibility for municipalities to adopt their own threshold, within the framework of their existing development review process.

The California MWELO exempts existing landscapes, and cemeteries. However, agreements may also be entered into with other agencies such as water purveyors, to implement portions of the ordinance for existing landscapes, such as irrigation water use analyses, irrigation surveys, and irrigation audits to evaluate water use and provide recommendations to prevent water waste. West Valley City, Utah's Water Efficient Landscape chapter applies the ordinance only to single-family residential projects that require a separate review process.

4. Should there be a threshold for a minimum size of a landscape area that the ordinance applies to?

Several of the ordinances specify a minimum size of the landscape area for when the ordinance applies. As a practical matter, this size threshold would only apply generally when development permits or review is required. This means that activities that would not require a development permit are not reviewed under the landscape provisions in many instances. The Utah model ordinance exempts any landscape area less than 2,500sf. In Arizona, landscapes under one-half acre are exempted.

5. Should the ordinance apply to all new development and expansions only? Or include major renovations?

The City of Tucson has a provision for when the ordinance applies to expansions and whether the renovations require the entire site to conform to the landscape and water use standards. If the expansion is less than 25% of the floor area, lot coverage or vehicular use area for buildings greater than 10,000sf and 50% for buildings less than 10,000sf, the existing development of the site is subject to the zoning standards in effect at the time they were developed. If the expansion is greater than 25% for buildings greater than 10,000sf or 50% for buildings less than 10,000sf, then the new standards apply to the entire site.

The California MWELO and California city adopted ordinances, Colorado model ordinance, and Utah model ordinance apply to just new or rehabilitated landscapes.

6. Who is qualified to perform an irrigation audit post installation?

Most of the ordinances (including the California MWELO and the Colorado Water-Efficient Landscape Design model ordinance) specify that a person who is qualified to perform an irrigation audit must be certified by an accredited academic institution, professional trade organization, or other program such as the EPA WaterSense Irrigation Auditor certification program and the Irrigation Association's Certified Landscape Irrigation Auditor program.

7. Should City staff conduct the final inspection and provide the certificate of substantial completion or should the applicant be required to contract a third party inspector?

The California MWELO and the Colorado Water-Efficient Landscape Design model ordinance specify that the inspection may be conducted by a local City/County inspector, or third party certified inspector. However, many of



the locally adopted versions of these ordinances specify that the applicant is required to contract a third party inspector.

8. Should there be requirements for plants within street medians or public rights-of-ways to be drought tolerant/low-water use?

The California MWELo outright prohibits high-water use plants and irrigation within the median. Colorado's model ordinance allows plants of any water need, provided that the annual water use does not exceed the water allowance. Strips that are less than 8' in width, must be landscaped with low or very low water plants, though public street right-of-way plantings are exempt. West Valley City, Utah requires parking strips or landscape areas less than 8' in width to be landscaped with drought tolerant plants. Drip emitters or a bubbler are required to be provided for each tree. The City of Hayward, California, prohibits high water use plants as characterized by a plant factor of 0.7 to 1.0.

9. What is the minimum amount of mulch that is required to be applied?

The typical mulch requirement ranges from 3 to 4 inches. The City of Lancaster, California, requires only 2 inches of mulch for all landscaping outside of landscape maintenance districts and public rights-of-way, which require organic mulch at a three inch minimum depth.

10. Who is qualified to prepare a landscape plan?

Every model or adopted ordinance requires that a landscape plan be prepared by a registered landscape architect who holds a license in the state of which they are practicing.

11. Who is qualified to design the irrigation system?

Most of the ordinances require that the irrigation designer be a person certified to design irrigation systems by an accredited academic institution, professional trade organization (such as the EPA's WaterSense irrigation designer certification program or the Irrigation Association's Certified Landscape Irrigation Designer program), or another educational organization. The Utah Model Water-Efficient Landscape Ordinance for Commercial Businesses defines an irrigation designer as being a person certified by the Irrigation Association and/or a landscape architect.

12. How are sight distance triangles defined, if they are defined?

The Colorado Water-Efficient Landscape Design model ordinance defines a sight triangle as:

"the area on each side of a street or driveway intersection, measured from the intersecting point of the extended flow lines of the streets or street and driveway, to the points 50 feet back from that intersecting point, that is intended to remain free of obstructions that may impair a drivers safe sight distance to oncoming traffic."

Landscaping shall be no more than 30 inches high when located within the sight distance of street intersections. Tucson's Landscape and Screening code also requires vegetation to be less than 30 inches in height within the sight distance triangle.

None of the California ordinances define a sight-distance triangle. These standards do not define the plantings that can be placed within sight distance areas. Sight distance restrictions are established in local public works design standards.



13. Are fixed spray styles of in-ground sprinkler systems permitted? Is there a landscape area where spray irrigation is not permitted?

Fixed spray styles are commonly permitted but their locations are restricted (such as not being permitted within 24" of non-permeable surfaces). Fixed spray heads are also permitted around the perimeter of the turf areas directing spray into the turf area (in the City of Lancaster, CA), but must be installed at least 2 inches from hard surface edges and lawn edges.

Tucson, Arizona, however does limit the use of spray styles of sprinklers to only the "oasis area" of the landscape for turf.

14. Is sprinkler spacing specified? Or is spacing per manufacturer specification?

The adopted and model ordinances typically specify sprinkler spacing based on the manufacturer's specification. The City of Hayward, California's adopted ordinance and the Colorado model ordinance recommend head to head coverage.

15. When is ETO measured?

ETO is typically measured as the average annual rainfall. The California and Colorado model ordinances use an adopted ET rate to calculate a water budget based on the region you are located in.

16. Are there provisions for slopes where irrigation may not be installed?

No, there are no provisions that prohibit the installation of irrigation on steep slopes, Typically, irrigation is permitted on slopes greater than 25%-33%, however, it is limited to an application rate of 0.75-0.85 inches per hour.

17. Is there a threshold for when rain sensors and soil moisture sensors are required/recommended?

Most of the ordinances specify that rain sensors and soil moisture sensors are recommended, but there is no threshold for when they are required. The Utah model ordinance, however, requires irrigation systems that include an electric automatic controller to be equipped with an automatic rain shut-off device.

18. Are materials for drip irrigation lines specified?

The City of Lancaster specifies design standards for drip irrigation lateral lines to be PVC schedule 40 or class 200 pipe. The majority of the other design standards reviewed are silent as to the material of drip irrigation lines and whether they may be constructed of polytube.

19. Is an irrigation plan required before certificate of occupancy can be issued?

Yes, nearly all of the model ordinances and adopted ordinances specify that an irrigation plan is required to be submitted as part of the building permit process. The irrigation plan is typically included as part of the required landscape documentation package, which must be approved prior to the issuance of a certificate of occupancy.

20. Are there restrictions for irrigation based on the time of day? What are these restrictions? Are there provisions for the municipality to restrict watering to every other day when there is a declared drought?

Most of the ordinances do include restrictions for irrigation based on the time of the day. The California MWEL, West Valley City ordinance, Lancaster, CA ordinance, and Utah model ordinance all restrict this for overhead spray types only. The Colorado model ordinance and the Tucson ordinance do not specify whether the restriction only applies to overhead spray irrigation. The City of Tucson has an ordinance that allows the municipality to institute restrictions on



outdoor irrigation during a water emergency, which may include a schedule designating certain outdoor watering days.

21. What is the typical plant establishment period?

The model ordinances and adopted ordinances range from 120 days to a year as the required plant establishment period. The City of Hayward, CA, requires the plant establishment period to be two years if irrigation will be terminated after establishment. The City of Lancaster, CA, specifies that the establishment period may be three to five years for native habitat management areas and trees.

22. What types of maintenance assurances are required for subdivisions/plats?

The Colorado model ordinance requires that all landscape improvements are installed prior to issuance of Certificate of Occupancy. If weather conditions prevent installation, a financial guarantee will be required and released once the landscaping is installed, however, assurances for ongoing maintenance are not discussed. The California MWELO and the City of Hayward, CA require that landscapes are maintained, and that a maintenance schedule be submitted with the Certificate of Completion.

23. Is a soil analysis required? What is the threshold for when this is required?

The City of West Valley, CA, requires a soils report where a site's irrigated landscape areas exceed 2,500sf. The Utah model ordinance has the same threshold. The City of Hayward, CA, requires a soils analysis for all projects; however, it is due at different times depending on whether mass grading is proposed. If mass grading is proposed, the soil analysis report submittal can be delayed until the Certificate of Completion.