City of Aspen
Water Efficient Landscaping Ordinance Implementation

Prepared for:
Colorado Water Conservation Board

Prepared By:
City of Aspen

With Support from:
ELEMENT Water Consulting, Inc.

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CITY OF **ASPEN**

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Introduction

CITY OF ASPEN

The City of Aspen, Colorado ("Aspen" or "the City") is a home-rule municipality that owns and operates its water utilities, providing treated (potable) water to all customers in the service area and raw water for hydroelectric production as well as for irrigation and snowmaking purposes to a small subset of customers. Aspen meets the statutory definition of a "covered entity" under §37-60-126 C.R.S. and updated its Municipal Water Efficiency Plan ("Aspen WEP") in 2015[1].

On May 21, 2018, Aspen was awarded a Water Efficiency Public Education & Outreach Grant ("Project Grant") in the amount of $48,923 by the Colorado Water Conservation Board ("CWCB"). This grant is in support of the Water Efficient Landscaping Ordinance implementation efforts for Aspen. Prior grants awarded by the CWCB for the development of Aspen's WEP and the development of a Regional Water Efficiency Plan[2], as well as Aspen's Water Efficient Landscaping Standards ("Landscaping Standards"), all construct the foundation for the programs implemented through this effort. Through this support, the CWCB has played an important contributing role in the advancement of Aspen's conservation and efficiency efforts and Aspen truly values the partnership.

[1] Aspen's final updated plan as approved by the Colorado Water Conservation Board ("CWCB") is dated October 21, 2015.

[2] Aspen's WEP and the Roaring Fork Regional WEP were funded through a grant awarded to the Ruedi Water & Power Authority.

1. BACKGROUND

The Roaring Fork Watershed Plan ("Watershed Plan"), published in May of 2012 and sponsored by the Ruedi Water & Power Authority, brought together groups throughout the Roaring Fork Watershed in an effort to "plan for and work toward an environmentally and economically healthy watershed that benefits all who have a stake it in". Through this collaborative effort, the Watershed Plan identified the benefits from municipal water conservation and a need for a Regional Water Efficiency Plan.

Shortly after the publication of the Watershed Plan, Aspen began efforts to develop its Municipal Water Efficiency Plan ("Aspen WEP") and actively participated in developing the Regional Water Efficiency Plan for the Roaring Fork Watershed ("RF Regional WEP"). These efforts progressed in parallel and both were published in 2015. One program specifically identified in both WEPs to focus on outdoor water use efficiency is 'efficient landscape regulations'. Prior to applying for the Project Grant, Aspen's implementation of this program included an update to Aspen's existing Water Efficient Landscaping Ordinance ("Landscaping Ordinance") to initiate a Pilot Program and development of Water Efficient Landscaping Standards ("Landscaping Standards") that provide details of the requirements under the Pilot Program. The Landscaping Standards focus on landscaping water budgets, efficient irrigation system design and installation, and field audits. The Landscaping Standards promote water conservation, prevent water waste, and protect water quality. Through this focused, multi-year program, the Watershed Plan, RF Regional WEP, and Aspen WEP have built upon each other to target outdoor water use reductions.

With the Landscaping Standards complete, Aspen has moved into the Pilot Program implementation stage. Two specific areas within the Landscaping Standards have been supported by this Project Grant:

1. **Certified Third-Party Landscaping Audits.** Aspen adopted the Qualified Water Efficient Landscaper ("QWEL") Certification Program in early 2018 to directly support and implement the requirement for a certified third-party landscaping audit as defined in the Landscaping Standards. This Project Grant supported efforts to develop local content and host the first certification training session.

2. **Irrigated Landscape Water Budget.** As part of the Landscaping Standards, Aspen developed a set of Water Budget guidelines and requirements for qualified properties[3]. In 2018, twelve properties applied for approval of landscaping plans subject to the terms defined in the Landscaping Standards. This grant supported efforts to evaluate those properties to allow Aspen to track site-specific water use changes over time from pre- to post-construction.

3. Qualified Properties are defined under the standards as: "Landscaping, grading, installing or disturbing hardscapes, additions to structures, etc. that has a disturbance area greater than 1,000 square feet and greater than 25% of the entire site. All new construction with internal work only that demolishes greater than 50% of the existing structure (based on the entire square footage of rooms where floors, ceilings, or walls are exposed over the square footage of the structure)."

Aspen completed the work under the Project Grant with the assistance of the following contractors and partnerships:

- ELEMENT Water Consulting Inc. ("ELEMENT") assisted with the QWEL training implementation, water budget analysis, and grant administration. ELEMENT previously provided support in developing the RF Regional WEP, Aspen WEP, and the Landscaping Standards.

- WaterNow Alliance ("WaterNow") assisted with the QWEL training implementation. WaterNow is a non-profit organization based out of San Francisco, CA that provides support for public water providers on a variety of projects, including QWEL certification support.

- Roaring Fork Conservancy ("RFC"), a watershed organization serving residents and visitors throughout the Roaring Fork Valley, partnered with Aspen in the QWEL training implementation and previously played leading roles in developing the Watershed Plan and RF Regional WEP.

While not an explicit driver in the development of the above described efforts and programs, the Colorado River Basin Implementation Plan recommends land-use planning that focuses on water conservation and water-efficient land-use development. Additionally, the Colorado Water Plan ("CWP") explicitly identifies water efficient landscaping professional certification programs and related education as an identified call to action[4]. The efforts completed under the Project Grant directly respond to this call and will benefit not only Aspen, but other areas throughout the Roaring Fork Valley as QWEL-certified professionals help to increase the efficiency of outdoor water use throughout the valley.

[4] Chapter 6 of CWP, "Actions" item number 7: "Support local water smart ordinances".

2. QWEL TRAINING IMPLEMENTATION

Adoption and implementation of the QWEL certification program directly supports Aspen's Landscaping Standards by supporting the professional landscaping certification requirement and the Aspen WEP as an outdoor efficiency program. Professional Certification was also an identified program under the RF Regional WEP.

Aspen's Landscaping Standards require a post-installation site audit and report prepared by a third party certified landscape irrigation auditor. As currently defined in the Standards, a certified landscape irrigation auditor is "a person certified to perform landscape irrigation audits by an accredited academic institution, a professional trade organization or other program labeled by U.S. Environmental Protection Agency's WaterSense program". Additionally, the RF Regional WEP includes a certification program targeted at property managers and landscaping professionals to encourage creation and maintenance of water efficient landscapes. To satisfy these requirements, an existing certification such as Irrigation Association ("IA") or QWEL[5] certification program could be utilized, or a locally managed certification program could be developed.

Aspen is now the first, and currently only, QWEL Professional Certifying Organization in the State of Colorado.

QWEL was selected over other certification program options due to the ability to modify an existing curriculum to provide a greater overview of local water supply and demand details, the broad perspective of how landscape and irrigation techniques work together to optimize efficiencies, and practical training and application of irrigation installation audits. The program aims to educate landscape professionals on local water conditions and efficient landscape and irrigation practices and to support Aspen's Landscaping Ordinance by producing certified landscape professionals that are available to provide third-party audits of new landscapes installed under the City's' Pilot Program. Based on Aspen's collaboration with other water providers, it is anticipated that the QWEL program will soon be implemented by others throughout the state.

2.1 TECHNICAL AND LOCAL REVISIONS TO CONTENT

Prior to submittal of the application for the Project Grant, the QWEL program's presentation materials for the first curriculum module, "Where Your Water Comes From", was modified and submitted for approval to the QWEL Parent Professional Certifying Organization ("PCO") Board by the City of Aspen with support from ELEMENT. Additionally, QWEL curriculum Module 4 "Landscape Water" was investigated and preliminary content recommendations were identified.

[5] https://www.qwel.net/about

As part of the effort under the Project Grant, QWEL PCO-approved modifications to the Module 1 presentation were incorporated into the program's Reference Manual, which is provided to landscaping professionals attending the training. Modifications to Module 4 were further reviewed, updated, and incorporated into the presentation materials and Reference Manual through this effort. These content revisions directly supported the initial Certification Training Session that was also conducted with support from the Project Grant. Local modifications included:

1. State, basin, and local hydrologic conditions
2. Colorado Water Rights
3. Colorado and local regulations
4. Colorado Water Plan overview
5. Local evapotranspiration conditions
6. Background on Aspen Landscape Ordinance and Standards

2.2 INITIAL TRAINING PREPARATION

The City of Aspen worked with WaterNow, RFC, and ELEMENT to prepare for and conduct the initial QWEL Certification training session. The following preparation steps and approach were taking in supporting the initial training session:

1. Target audience was identified
2. Training session logistics (date, location, structure) were identified and reserved
3. Outreach materials and strategy were developed and published/sent
4. Classroom materials were finalized, printed, and acquired (agendas, Reference Manuals, exams, sample irrigation and metering equipment)

One of the only challenges experienced through this effort was the timing of the QWEL certification training. Training was held during the peak season for landscaping professionals and attending a training session for three days competed with their ability to complete projects on time. To help mitigate this, Aspen made the training and certification free of cost with help from the Project Grant. Collaboration with other providers may make sessions available in more locations through the year, making attendance more appealing to professionals that may have travel requirements to attend.

2.3 INITIAL TRAINING SESSION

The City of Aspen worked with WaterNow, RFC, and ELEMENT to host and conduct the initial QWEL Certification training session. The training was held on July 9, 10, and 11 of 2018 from 9:00 to 5:00 each day at the Truscott Property Management Office in Aspen, CO. These sessions included an on-site irrigation system audit and a half-day exam to complete the certification. A certified QWEL trainer based out of California was contracted through WaterNow to conduct most of the training, however local content was also presented by Aspen, RFC, and ELEMENT.

Eighteen (18) professionals were in attendance:

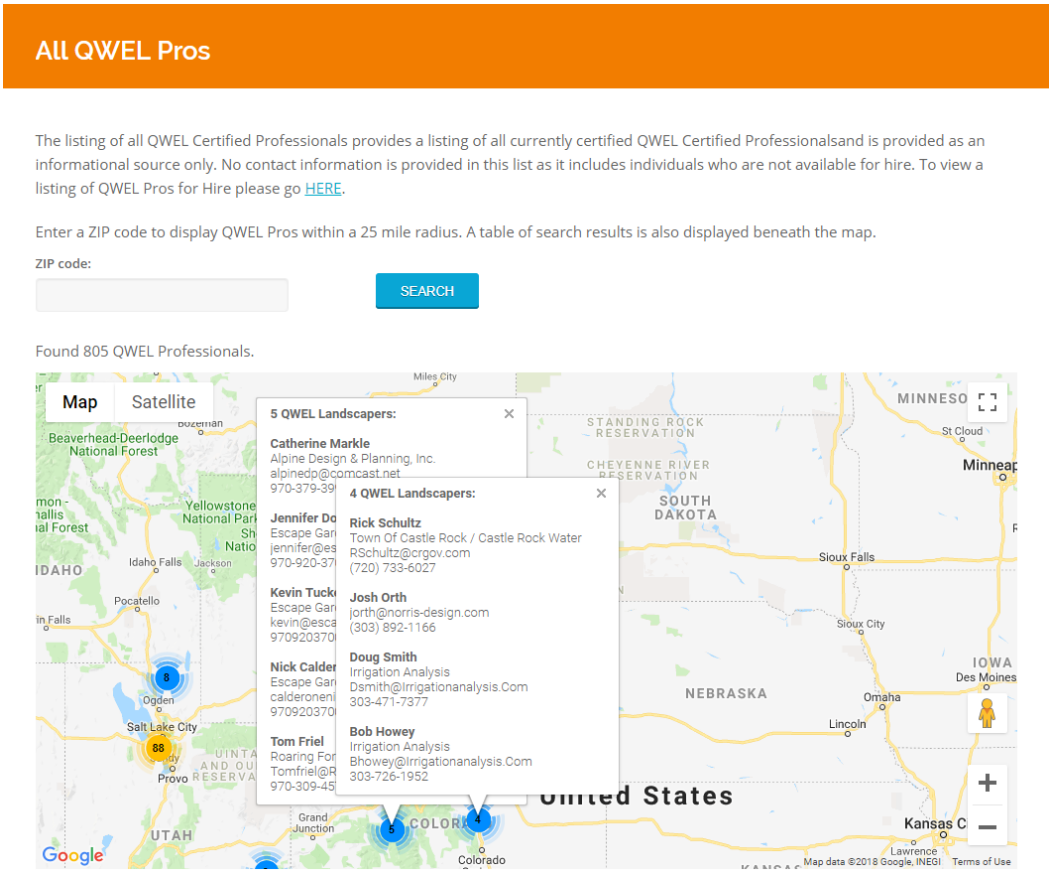
1. Nine (9) landscape industry professionals
2. Four (4) City of Aspen staff
3. Five (5) other municipal-use representative professionals
    a. Northern Colorado Water Conservancy District
    b. South Metro Water Supply Authority
    c. Eagle River Water and Sanitation District

2.4 INITIAL TRAINING SESSION FOLLOW-UP

Following the initial training, WaterNow graded the exams and all attendees received a passing score, approving all attendees to be registered certified QWEL Professionals. Attendees were notified of their passing status and were mailed passing certificates, and records were updated and posted through QWEL's online database (**Figure 1**). Attendees were provided a questionnaire and opportunity to provide feedback and recommendations for ongoing training sessions. Feedback was overall very positive, and the most common recommendation was to train and hire a local trainer for ongoing sessions. This was consistent with the project team recommendations, and to date, three professionals certified through this training have expressed interest in becoming local trainers to support Aspen's program. Aspen is further investigating the opportunity to provide an online session for training these professionals to become QWEL Trainers. It was also recommended by both attendees and the project team that all program materials be reviewed and updated to reflect local conditions. This is being considered and investigated by Aspen for implementation prior to subsequent trainings.

Aspen has been working with WaterNow to prepare quarterly QWEL newsletters, design a local informational webpage, and to develop a "lunch and learn" in early 2019 targeting stakeholders and local landscape professionals.

Figure 1: QWEL Certified Professionals Published Map



3. WATER BUDGET ANALYSES

Evaluation of outdoor water demands on existing properties within Aspen's service area directly supports Aspen's Landscaping Standards by improving the understanding of how these properties currently compare with the defined Water Budget and, ultimately, how their water use is anticipated to change following landscaping modifications compliant with the Water Budget. Aspen is using water budget analyses to improve estimates of water savings projections from the landscaping regulation and other outdoor water savings programs.

3.1 APPROACH AND FINDINGS

Metered residential water use data were analyzed to evaluate recent outdoor water usage trends as compared to planning numbers included in the Landscaping Standards. In 2017, a similar analysis prepared by ELEMENT evaluated outdoor water use on fourteen (14) residential properties that were selected by City staff and were believed to be representative of typical conditions throughout the City. The analysis completed with support from the Project Grant was based on metered water use data for twelve (12) additional residential[6] parcels ("2018 Properties") that have submitted building permit applications involving disturbance areas large enough to trigger compliance with the water budget requirements in the Landscaping Standards. Monthly water consumption data for the 2018 Properties were summarized for the period from January 2010 through December 2017, which includes a range of weather conditions that are comparable to the long-term temperature and precipitation averages (**Table 1**). Estimated irrigated acreage was delineated using aerial imagery and parcel boundaries, which posed a challenge in accurately representing each property's irrigated area.

Table 1: Study Period versus Long-Term Averages for May - October

Weather Statistic	2010 – 2017 Study Period	1980 – 2017 Long-Term Avg.
Total Precipitation (in)	11.5	11.1
Average Temperature (°F)	54.5	54.5

The results of the analysis show that water usage per unit of landscaped area varies considerably across the twenty-six ("26") total properties analyzed to date. While the evaluated parcel dataset to date does not include enough accounts to draw overarching conclusions, the following general observations and recommendations can be made:

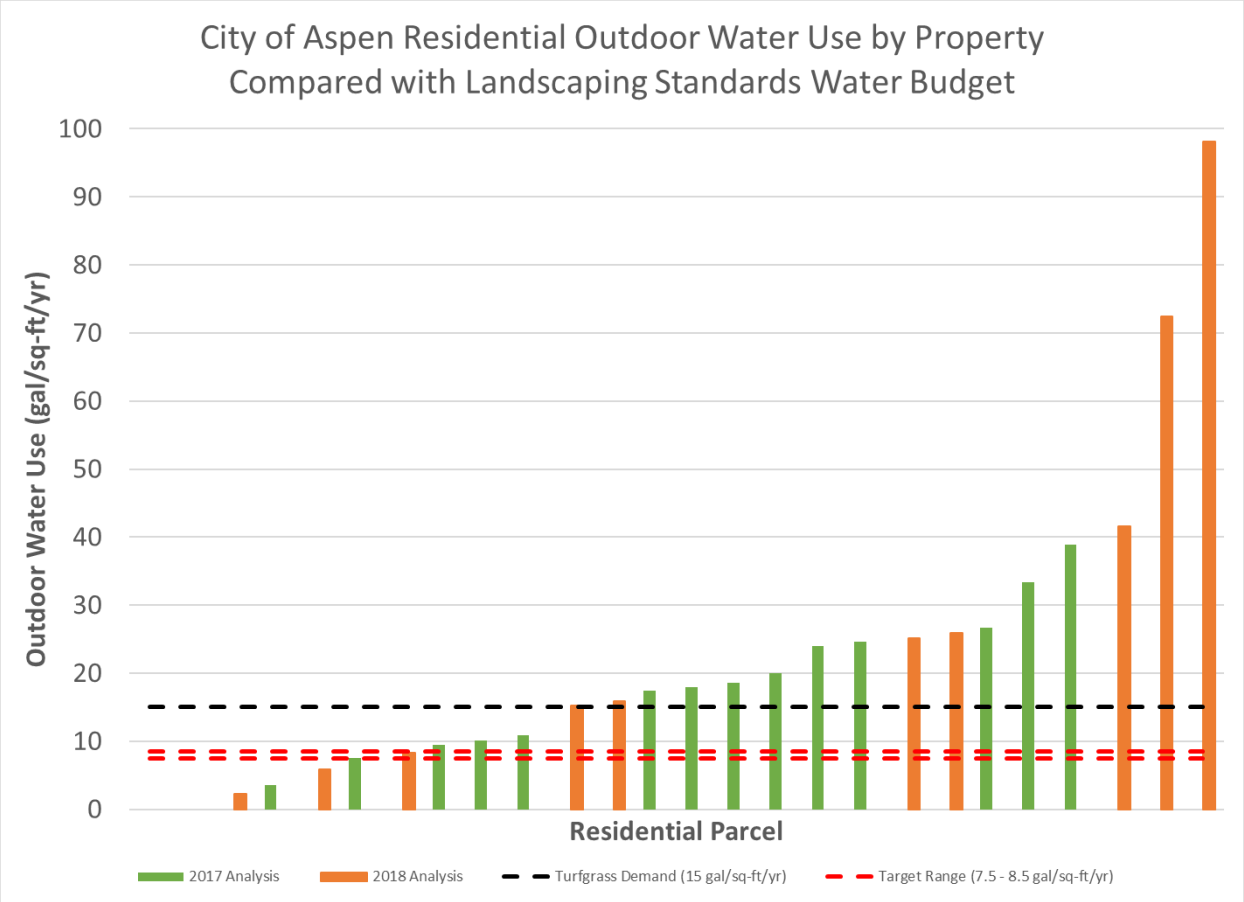
- Fifteen (15) parcels had average outdoor water use that exceeded 15 gal/sq-ft/yr (**Figure 2**). This indicates that most of the properties analyzed are applying more irrigation water than necessary to provide a full water supply for a landscape comprised entirely of irrigated turf, even though the delineated landscapes included low and moderate use plantings. This finding also supports the need for improved irrigation efficiency and management practices coupled with education, which will be aided through the QWEL program as well as other education and outreach program efforts implemented through Aspen and the RF Regional WEPs.

[6] Note that 14 accounts were evaluated in the analysis under the Project Grant, including one duplex (with 2 separate accounts) and 2 adjacent properties with unclear landscaped boundaries. Each pair was treated as one property for this analysis.

- If all evaluated properties met the Water Budget as required through the Landscaping Standard, approximately 5 acre-feet of savings per year would be realized. This includes the potential effect of an increase in use from properties that are currently using less than the Water Budget.

Ongoing evaluations of properties with permit applications that are required to comply with the Landscaping Standards will help to monitor and evaluate historical water usage and water usage after compliance to track real savings.

Figure 2: City of Aspen Residential Outdoor Water Use by Property



4. CONCLUSIONS

If the Landscaping Ordinance is successful, Aspen anticipates a savings of over 50 AF annually by 2035 as estimated in the Aspen WEP through the implementation of the Landscaping Standards, including both the Professional Certification (QWEL) and enforcement of the Water Budget.

Certification of landscape professionals generally raises the level of awareness of the importance of water management and best management practices not only for Aspen, but also for landscape professionals working throughout the Roaring Fork Valley. While it is difficult to quantify and measure specific water use savings for education-based programs like QWEL, Aspen does anticipate savings to occur as a direct result of this program through a more educated collection of landscaping professionals, resulting in increased efficiency in design and installation of irrigated landscaped areas as well as through ongoing maintenance and management of those irrigated landscaped areas. Aspen plans to continue the operation of ongoing QWEL certification training sessions and will continue to improve and advance the program.

Aspen estimates that there will be over 2,000 new and reinstalled landscapes in its service area by the year 2035. Using the water budget aspect of the Water Efficient Landscaping Standards that are currently being implemented under the pilot program, Aspen estimates that there could be up to a 14% reduction in outdoor water use relative to recently submitted landscaping plans prior to the pilot program.[7] When compared to typical existing homes, there is a potential landscape water use savings of up to 60% when these properties refresh their landscaping and irrigation systems. These savings put the City on target to achieve the 2015 WEP projection of 50 acre-feet per year of water savings by 2035 under Aspen's Water Efficient Landscape Ordinance. However, there is the potential for more significant savings beyond just the amount achievable through the water budget. These savings are likely to occur through irrigating landscaping more efficiently, reducing runoff, and other improved management practices as the result of an increase in certified landscape professionals working in the Aspen area and throughout the Roaring Fork Valley.

As landscaping plans are submitted under the pilot program, the City has and will continue to evaluate potential water savings through the water budget aspect of the Water Efficient Landscaping Standards. Additional information and perspective on the savings potential will also become available as audits of new landscapes and irrigation systems become available through the independent, certified third-party audits which are supported by the QWEL certification program. Through the continued implementation of the Landscaping Standards, outdoor efficiency will increase over time, reducing the City's outdoor per-capita use.

Aspen values the ongoing collaboration and support of the CWCB in implementing programs and efforts that support the City's water efficiency and water savings goals.

[7] Aspen's estimates of long-term irrigation water demand and potential savings are based on water use patterns in today's climate. Assessing the impact of climate change is beyond the scope of this report.