CITY OF ASPEN

# Municipal Water Efficiency Plan

City of Aspen, Colorado

**ELEMENT Water Consulting**

**MAY 2023**

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# MUNICIPAL WATER EFFICIENCY PLAN

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| | |
|---|---|
| ACSD | Aspen Consolidated Sanitation District |
| AF | acre-feet |
| AF/yr | acre-feet per year |
| AIM | Aspen Intelligent Metering |
| AMI | automated metering infrastructure |
| Aspen | City of Aspen |
| AWC | average winter consumption |
| AWWA | American Water Works Association |
| cfs | cubic feet per second |
| CDPHE | Colorado Department of Public Health and Environment |
| City | City of Aspen |
| CWCB | Colorado Water Conservation Board |
| DMRP | Drought Mitigation and Response Plan |
| ECU | equivalent capacity units |
| IRP | Integrated Resources Plan |
| MG | million gallons |
| MGD | million gallons per day |
| NRW | non-revenue water |
| QWEL | Qualified Water Efficient Landscaper |
| UGB | Urban Growth Boundary |
| USBR | United States Bureau of Reclamation |
| WELS | Water Efficient Landscape Standards |
| WEP | Water Efficiency Plan |
| WSO | Water Systems Optimization, Inc. |
| WTP | Water Treatment Plant |

*Report cover photograph provided by City of Aspen staff.*

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# INTRODUCTION

The City of Aspen (City or Aspen) owns and operates its water supply system, providing potable, i.e., treated, water to customers and non-potable, i.e., untreated raw, water for irrigation and snowmaking purposes to a small subset of customers. The City is committed to sustainability and providing a quality potable water supply to the community. The 2022 Water Efficiency Plan (2022 WEP) was developed to build upon the City's existing robust water efficiency program and is intended to work in concert with the City's other planning efforts, specifically its recently completed Integrated Water Resource Plan (IRP) and its Drought Mitigation and Response Plan (DMRP). Work completed for the City's IRP, including water demand projections, was heavily relied upon in this WEP to capitalize on the extensive analyses completed for that effort, maintain consistency between planning efforts, and support the implementation of the IRP.

The City's 2015 Municipal Water Efficiency Plan (2015 WEP) evaluated the City's potable water demands for the years 2009 through 2013, based primarily upon metered water use data. The data were used to represent the then-current "baseline" water demands which was the basis for water demand projections through the year 2035. One of the demand projections reflected the reduction in demand that could be achieved through implementing the 2015 WEP. At the same time, the City partnered with other local water providers within the Roaring Fork watershed to develop the Roaring Fork Watershed Regional WEP (Regional WEP) which was published in 2015. The Regional WEP was developed to implement municipal water efficiency programs on a regional scale to achieve higher and more effective benefits compared to implementing the same programs individually. Since that time, the City has implemented many of the recommended water efficiency programs from both the 2015 WEP and the Regional WEP and has been monitoring its customer water use data. This 2022 WEP provides an update regarding new water data trends and the water efficiency activities that Aspen will implement moving forward.

# 1. PROFILE OF EXISTING WATER SUPPLY SYSTEM

Aspen's water supplies are heavily dependent on weather conditions and present unique operational challenges for the City, as further described below.

## 1.1 OVERVIEW

Aspen obtains its water supply primarily from the surface water sources of Castle Creek and Maroon Creek which are tributaries to the Roaring Fork River. Aspen's water supply is highly dependent upon snowpack and snowmelt runoff patterns. The City's water system does not currently include a significant water storage component that would allow it to store water supplies when they are available and release stored water when it is needed, retiming deliveries of water supplies to match the timing of water demands. Without storage, the City is largely dependent upon streamflow availability at its diversion points.

The City provides potable water service to all customers and raw water for irrigation and snowmaking purposes to a small subset of customers. This 2022 WEP primarily focuses on the efficient use of Aspen's potable water supplies.

## 1.2 WATER SUPPLY AND RELIABILITY

Aspen owns and operates its own potable water treatment and delivery infrastructure. Aspen currently uses two sources of water supply for its potable water system. At this time, the primary supply intake for water delivered to the Aspen water campus is located on Castle Creek and another intake, located on Maroon Creek, is generally used as a supplemental supply. Intake diversions are conveyed to the Leonard Thomas reservoir[1] located on the Aspen water campus before being treated at the water treatment plants (WTPs). City staff maintain raw water deliveries to the WTPs and perform operations and maintenance functions for the WTPs. This includes booster stations, pump stations, vaults, storage tanks, and the Thomas Reservoir located adjacent to the WTPs. Crews perform routine laboratory testing and reporting per the Colorado Department of Public Health and Environment (CDPHE) guidelines and requirements.

In 1980, Aspen entered into an agreement with the Colorado Water Conservation Board (CWCB) to allow the City's senior 15 cubic feet per second (cfs) Hunter Creek Flume and Pipeline water right to be used for instream flows on Hunter Creek and the water court approved that use. Then in 1993, City Council adopted water management policies intended to provide for current and future municipal water needs while at the same time maintaining streamflow in the creeks downstream of its diversion structures at flow rates that are at or above the CWCB's decreed instream flow rights for the protection of the fishery and the associated aquatic habitats in those streams. This is reflected in the objectives and operating principles described in Aspen's Drought Mitigation and Response Plan (DMRP) that was completed in 2020.

Aspen has an intergovernmental agreement with the CWCB to protect the natural environment of Castle Creek by operating the City's water rights on Castle Creek in a manner that will allow the decreed minimum streamflow of 12 cfs to be maintained unless needed for municipal purposes under circumstances such as extraordinary drought conditions or for emergencies. An additional 1.3 cfs flowrate is maintained below the Marolt Ditch headgate which is not decreed but has been accepted as a rate that

[1] The capacity of Leonard Thomas reservoir is 13 acre-feet or about 4.2 million gallons.

will help maintain and protect habitat along this reach. Although Aspen does not have a similar agreement regarding Maroon Creek, Aspen also operates its senior Maroon Creek water rights in a way that protects the decreed instream flow at 14.0 cfs immediately downstream of its Maroon Creek intake. In 2016, following several years of pilot programs, Aspen entered into a 10-year Forbearance Agreement with the Colorado Water Trust, under which Aspen agrees to not divert a portion of its senior Wheeler Ditch water right during the irrigation season when the CWCB's decreed instream flow in the Aspen reach of the Roaring Fork River is not being satisfied. In connection with the Forbearance Agreement, the Wheeler Ditch water right has been enrolled in a Conservation Plan approved by the Colorado River Water Conservation District.

Although the City does not divert water to help maintain these instream flows in the same manner that it diverts water to meet potable and non-potable water demands, the instream flows are a priority for the City and directly affect the City's water system operations. At times, Aspen limits its diversions and hydroelectric production at Maroon Creek to prioritize the protection of decreed instream flows.

The City's IRP was prepared in 2021 to develop a plan for implementing projects and developing infrastructure to reliably meet future water demands. The IRP presents water demand and supply forecasts and analyzes existing and potential new water supply sources for the City's water service billing area[2] through 2070. The City chose this planning period to reflect the long-lasting implications of water resources decisions and acknowledge the need for a long-range outlook with a phased implementation schedule to meet the community's needs over time. It is the City's foundational planning document, designed to guide the City to achieve long-term supply reliability.

While the IRP drives long-term reliability, the City's DMRP provides the framework to meet short-term demand needs under water shortage conditions. Streamflow is susceptible to variation and changing conditions, including diurnal streamflow fluctuations, as well as catastrophic events such as landslides, fires, avalanches, drought, and other events that can prevent river diversions for some period. The DMRP specifies demand-side response strategies that provide ways the City and its customers can reduce water use to manage water supplies to support short-term supply reliability under shortage conditions.

# 2. HISTORICAL WATER USE AND DEMAND MANAGEMENT

Thorough analyses of historical water use and water production data were conducted and used to prepare water demand projections for the IRP. Data were analyzed through 2019, which was the most recent calendar year for which data were available at the time of the analyses. A summary of the data and analyses prepared for the IRP is provided below and additional information can be found in the IRP.

## 2.1 WATER SERVICE BILLING AREA CHARACTERISTICS

As of 2021, Aspen provides potable water service to a total of approximately 4,100 customer connections within the City's water service billing area. The City's current water service billing area is shown in **Figure 1,** which includes the City of Aspen and some areas outside of the municipal boundary that are within the Urban Growth Boundary (UGB).

[2] Title 25 defines the following: "*Water service billing area*, billing area or area of water service billing means an area established by the City Water Department for purposes of calculating and assessing tap and/or other water service fees. The designation of a water service billing area as provided for in this Title shall not be construed as an offer, obligation, exclusive right, willingness, or ability to serve any customer, prospective customer or geographical area with municipal water or water services."

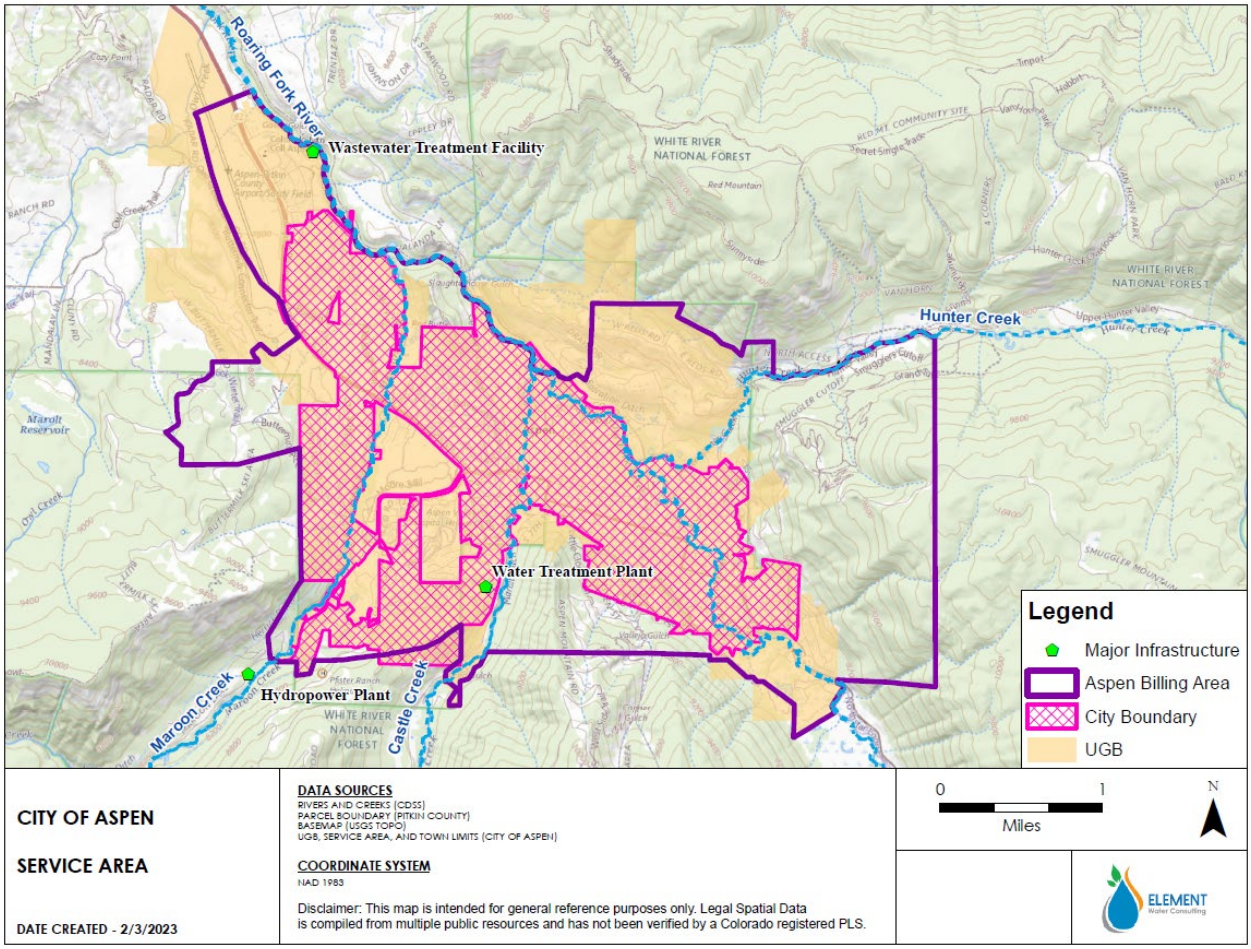



*Figure 1. Aspen Municipal Boundary and Water Service Billing Area.*

Population is a major driver of municipal potable water demands and is one of the most common factors upon which to base future water demand projections. Aspen's demands are strongly influenced by the population of its full-time residents. Aspen also experiences highly variable demands from other categories of water use including:

- Second homes that are not occupied year-round;
- Visitors who come to Aspen for seasonal attractions including skiing and summer festivals and may be renting residential units or staying in hotels; and
- Commuters working in Aspen but living outside of the water service billing area.

The 2015 WEP projection methodology accounted for population increasing into the future and assumed that similar occupancy levels would continue, along with a similar proportion of permanent-to-seasonal population that existed at that time.

At the time the IRP was prepared, the Colorado Department of Local Affairs State Demography Office (SDO) had historical full-time population data tabulated by county and municipality through 2018. Using this data and a historical annual growth rate of 1.2%, Aspen's 2020 full-time population was estimated to be around 7,500 people within the City boundary and about 11,300 people within the Urban Growth Boundary (UGB) (see Figure 1). The 2015 WEP estimated 2013 full-time population at 10,381, showing an increase of around 1,000 full-time residents.

The City uses the following customer category assignments for most of its potable water service accounts that are metered and billed (referred to herein as "Metered Customer Accounts"):

- Single-family residential[3]
- Multi-family residential[4] with 2-4 units
- Multi-family residential with 5 or more units
- Commercial[5] (split into small and large commercial starting in 2020)
- City facilities[6] (category retired in 2020)
- Irrigation Only[7]

Approximately 14% of the potable water that Aspen produced in 2019 was provided for "Other" purposes, as described below:

- Snowmaking – The City provides potable water to Aspen Skiing Company for snowmaking at Aspen Mountain through a bulk treated water agreement[8]. Water for snowmaking is delivered from the City's potable water pipelines. Water delivery is measured at the Aspen Skiing Company Primary Pump Station.
- Buttermilk Metro District – The City provides potable water through a Bulk Water Service Agreement to Buttermilk Metro District, which is metered in bulk by the City. Water is delivered by Buttermilk Metro District through individual meter connections to 77 residential customers plus two commercial taps. Some of these accounts have individual septic systems.
- Billed Unmetered – The City has unmetered customers who are billed at a flat, rather than tiered, rate. This usage typically involves service to construction projects before a permanent meter is installed. The amount of water is estimated monthly by City staff based on the number of active construction permits.

[3] Defined in Aspen's municipal code as "a single dwelling which is occupied by a single family and is supplied by a separate service line or a single dwelling comprised of multiple living units where each living unit is supplied by a separate service line".
[4] Defined in Aspen's municipal code as "a single residential connection to the City water system's distribution system from which two (2) or more separate dwelling units are supplied water".
[5] All accounts that are not defined as residential or irrigation-only uses.
[6] This category has historically included water uses associated with a variety of properties owned by the City, which include but are not limited to employee housing, municipal buildings, and parks. In the future, Aspen plans to reassign these uses into the other major sub-categories of the Metered Customer Accounts.
[7] Water accounts that only have outdoor uses and are operated during the irrigation season.
[8] The City also provides raw water to Aspen Skiing Company for snowmaking at Aspen Highlands Ski Area that is delivered via pressurized pipeline.

- Unbilled Unmetered Authorized – This category is estimated to account for less than 1% of the "Other" uses and includes the following types of uses:
    - Hydrant draw permits[9].
    - Commercial fire system testing.
    - Maintenance and construction system flushing.
    - Water quality flushing.
    - Fire hydrant usage by Aspen Fire Department.

## 2.2 HISTORICAL WATER USE

The City Utilities Department regularly evaluates its potable water usage using an Excel-based tracking tool referred to as the "AWWA M36 Tracker", which was developed as part of the City's potable water audits and loss control program. [10] This tool was first prepared in 2018 and has become the City's primary potable water use data repository, supporting consistency in water data reporting. City staff enter and review water production and use data each month and annually conduct a full review before submitting to the CWCB certain data that are required by the statute that was created from House Bill 10-1051.[11] The AWWA M36 Tracker contains monthly data starting in 2012 that were incorporated to provide historical water use information.

To maintain consistency with the IRP, water use data for the period of 2012 through 2019 was used to prepare the 2022 WEP.[12] The total potable water use for Aspen's system, including potable water supplies for the "Other" accounts, has averaged approximately 3,026 acre-feet per year (AF/yr) over this period, as shown in **Table 1** below. Total potable water use has remained relatively constant over the past eight years even though there has been some growth through redevelopment and new development. The total potable water use for 2020 and 2021, which are not included in the baseline period used to prepare the water demand projections for the IRP and this 2022 WEP update, were similar to the average use for the period shown in Table 1. The short and long-term influences from changes in occupancy during the COVID pandemic, if any, are still being considered.

[9] The City historically issued a small number of hydrant draw permits each year under bulk sale agreements, typically related to construction. These uses were estimated by City staff through 2018. A fill station was installed and uses began being metered and billed starting in 2019. For this 2012 through 2019 analysis, the uses are included in the "Other - Unbilled Authorized" category for consistency with historical data categories. Future construction water use will be billed and reported under the Metered Customer Accounts.

[10] The City updated some of the historical data after the 2015 WEP was prepared. The City has reviewed all data in the AWWA M36 Tracker and has concluded that it provides the most accurate representation of historical potable water uses.

[11] C.R.S. Section 37-60-126(4.5).

[12] The City updated the snowmaking values after the IRP was prepared. The update reduces the average total potable water use for 2012 through 2019 from the value of 3,027 AF described in the IRP to 3,026 AF shown in Table 1. The update is not significant enough to change the demand projections. The City has reviewed all data in the AWWA M36 Tracker and has concluded that it provides the most accurate representation of historical potable water uses, which are reflected in Table 1 and throughout this report.

*Table 1. Potable Water Use, 2012–2019 Annual for Metered Customer Accounts and Other Categories.*

| Year | Metered Customer Accounts (AF/yr) | | | | | | | Other (AF/yr) | | | | Total (AF/yr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Single-Family Residential | Multi-Family (2-4 Units) | Multi-Family (5+ Units) | Commercial | City Facilities | Irrigation Only | Total Metered | Snow-making | Buttermilk Metro District | Billed Unmetered | Unbilled Unmetered Authorized | |
| **2012** | 1,391 | 101 | 387 | 650 | 124 | 85 | **2,739** | 113 | 79 | 208 | 47 | **3,185** |
| **2013** | 1,217 | 99 | 380 | 623 | 124 | 72 | **2,514** | 169 | 73 | 92 | 42 | **2,891** |
| **2014** | 1,267 | 98 | 365 | 646 | 99 | 80 | **2,555** | 212 | 68 | 92 | 50 | **2,977** |
| **2015** | 1,180 | 94 | 362 | 666 | 107 | 79 | **2,489** | 181 | 66 | 92 | 55 | **2,882** |
| **2016** | 1,257 | 97 | 352 | 639 | 112 | 84 | **2,541** | 227 | 70 | 92 | 62 | **2,992** |
| **2017** | 1,307 | 130 | 354 | 650 | 124 | 92 | **2,658** | 127 | 93 | 92 | 210 | **3,179** |
| **2018** | 1,397 | 98 | 341 | 664 | 113 | 84 | **2,697** | 262 | 75 | 92 | 117 | **3,243** |
| **2019** | 1,263 | 93 | 328 | 647 | 118 | 63 | **2,513** | 168 | 68 | 92 | 21 | **2,861** |
| **Average** | **1,285** | **101** | **359** | **648** | **115** | **80** | 2,588 | **182** | **74** | **107** | **76** | 3,026 |

On average for the period of 2012 through 2019, single-family and multi-family residential water use accounted for approximately 57% of the annual potable water use and commercial use accounted for approximately 21% of the potable use. A pie chart showing the average distribution of water usage from 2012 through 2019, including the "Other" water sales, is presented in **Figure 2** below.

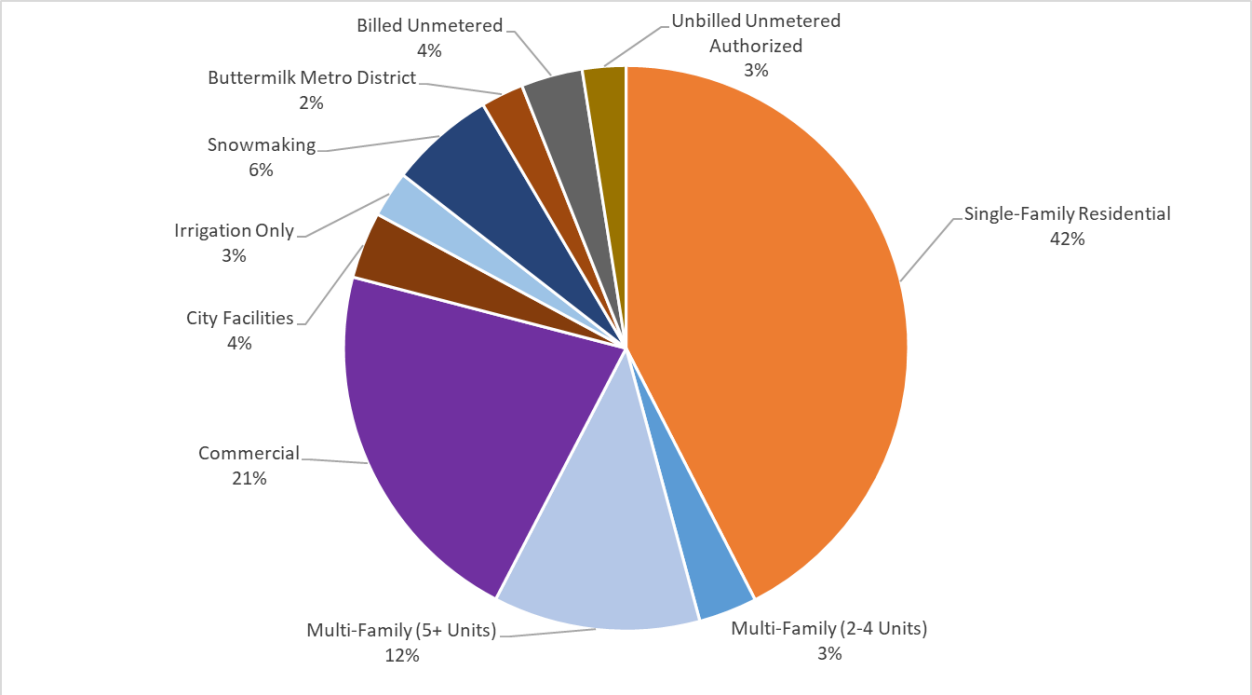



*Figure 2. Potable Water Use, 2012 -- 2019 Average Annual Customer Category Distribution.*

### 2.2.1 Metered Customer Account Use

The City's municipal water efficiency program has historically focused on the major customer categories within the Metered Customer Accounts, which represent approximately 86% of the potable water use and are further described in this section. An estimate of indoor versus outdoor potable water use for the Metered Customer Accounts, based on monthly data from the City's AWWA M36 Tracker, is shown in **Table 2** below. Indoor and outdoor uses were estimated using a standard average winter consumption (AWC) methodology where indoor use from the winter months (January, February, and December) when there is typically no outdoor irrigation occurring, is used to estimate monthly indoor use for the entire year. Estimated indoor use is then deducted from the total annual use to estimate the outdoor use. There are some challenges in using this method for Aspen, considering that the population fluctuates throughout the year with non-permanent residents, visitors, and commuters. The results were validated using average daily influent flow data from the Aspen Consolidated Sanitation District (ACSD)[13] wastewater treatment plant (WWTP), which represents the waste flows from indoor uses. The 2012 through 2019 average calculated indoor use using these two methodologies matched within about 1%. The AWC method was used so that it could also be applied on a customer category scale. Without having separate indoor and outdoor meters to measure actual usage, this is a reasonable method for planning purposes. Since the 2015 WEP was prepared, the average total water use for the Metered Customer Accounts has decreased while the estimated average outdoor percentage has increased slightly, from 43% in the 2015 WEP to 45% over the period 2012 through 2019.

[13] The City's wastewater is treated at a WWTP that is owned and operated by the ACSD.

*Table 2. Potable Water Use, 2012 – 2019 Annual Indoor and Outdoor Systemwide.*

| Year | Estimated Indoor Use Using WWTP Influent Data Method (AF/yr) | Estimated Use Using AWC Method[14] | | | |
|---|---|---|---|---|---|
| | | Indoor Use (AF/yr) | Outdoor (AF/yr) | % Indoor | % Outdoor |
| **2012** | 1,382 | 1,522 | 1,217 | 56% | 44% |
| **2013** | 1,364 | 1,407 | 1,107 | 56% | 44% |
| **2014** | 1,379 | 1,424 | 1,131 | 56% | 44% |
| **2015** | 1,398 | 1,432 | 1,057 | 58% | 42% |
| **2016** | 1,471 | 1,388 | 1,153 | 55% | 45% |
| **2017** | 1,515 | 1,434 | 1,223 | 54% | 46% |
| **2018** | 1,437 | 1,490 | 1,207 | 55% | 45% |
| **2019** | 1,457 | 1,386 | 1,127 | 55% | 45% |
| **Average** | **1,425** | **1,435** | **1,153** | **55%** | **45%** |

Aspen's potable water use data were further disaggregated for each Metered Customer Account category as shown in **Table 3**. The total outdoor use for Metered Customer Accounts averages around 45%, yet the single-family residential customer account outdoor use averaged around 64% and has increased from 62% in 2012 to as high as 67% in 2017 and 2019. Outdoor uses are generally consumptive whereas most of the water used indoors returns to the Roaring Fork River after being treated at the ACSD WWTP.

[14] The same data were used to prepare Table 1 and Table 2. Any differences are due to rounding for reporting purposes.

*Table 3. Potable Water Use, 2012–2019 Annual Indoor and Outdoor for Metered Customer Accounts.* [15]

| Year | Single-Family Residential (AF/yr) | | Multi-Family (2-4 Units) (AF/yr) | | Multi-Family (5+ Units) (AF/yr) | | Commercial (AF/yr) | | City Facilities (AF/yr) | | Irrigation Only (AF/yr) | Total (AF/yr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Indoor | Outdoor | Indoor | Outdoor | Indoor | Outdoor | Indoor | Outdoor | Indoor | Outdoor | Outdoor | |
| **2012** | 522 | 869 | 63 | 38 | 312 | 75 | 557 | 94 | 69 | 56 | 85 | **2,739** |
| **2013** | 448 | 768 | 59 | 40 | 290 | 90 | 545 | 79 | 65 | 59 | 72 | **2,514** |
| **2014** | 469 | 798 | 62 | 36 | 289 | 77 | 543 | 103 | 62 | 37 | 80 | **2,555** |
| **2015** | 432 | 748 | 61 | 32 | 286 | 76 | 587 | 79 | 65 | 42 | 79 | **2,489** |
| **2016** | 441 | 817 | 63 | 34 | 273 | 79 | 546 | 94 | 66 | 46 | 84 | **2,541** |
| **2017** | 437 | 871 | 92 | 38 | 273 | 82 | 562 | 89 | 72 | 53 | 92 | **2,658** |
| **2018** | 518 | 880 | 59 | 39 | 277 | 64 | 563 | 102 | 75 | 39 | 84 | **2,697** |
| **2019** | 421 | 843 | 56 | 37 | 261 | 67 | 586 | 62 | 63 | 55 | 63 | **2,513** |
| **Average** | **461** | **824** | **64** | **37** | **283** | **76** | **561** | **88** | **67** | **48** | **80** | **2,588** |

[15] The same data were used to prepare Tables 1, 2, and 3. Any differences are due to rounding for reporting purposes.

Aspen's potable water uses are higher during the summer months due to outdoor water use. **Figure 3** below shows the average monthly metered potable water use from 2012 through 2019 for the City's Metered Customer Accounts. Like the pattern shown in the 2015 WEP, water use typically peaks in July. Water usage increases during the summer months for all categories, with single-family residential usage increasing at a higher scale than all other categories as compared to winter water usage. The distribution of potable water uses between the Metered Customer Account categories are relatively consistent between years, as shown in **Figure 4** below.

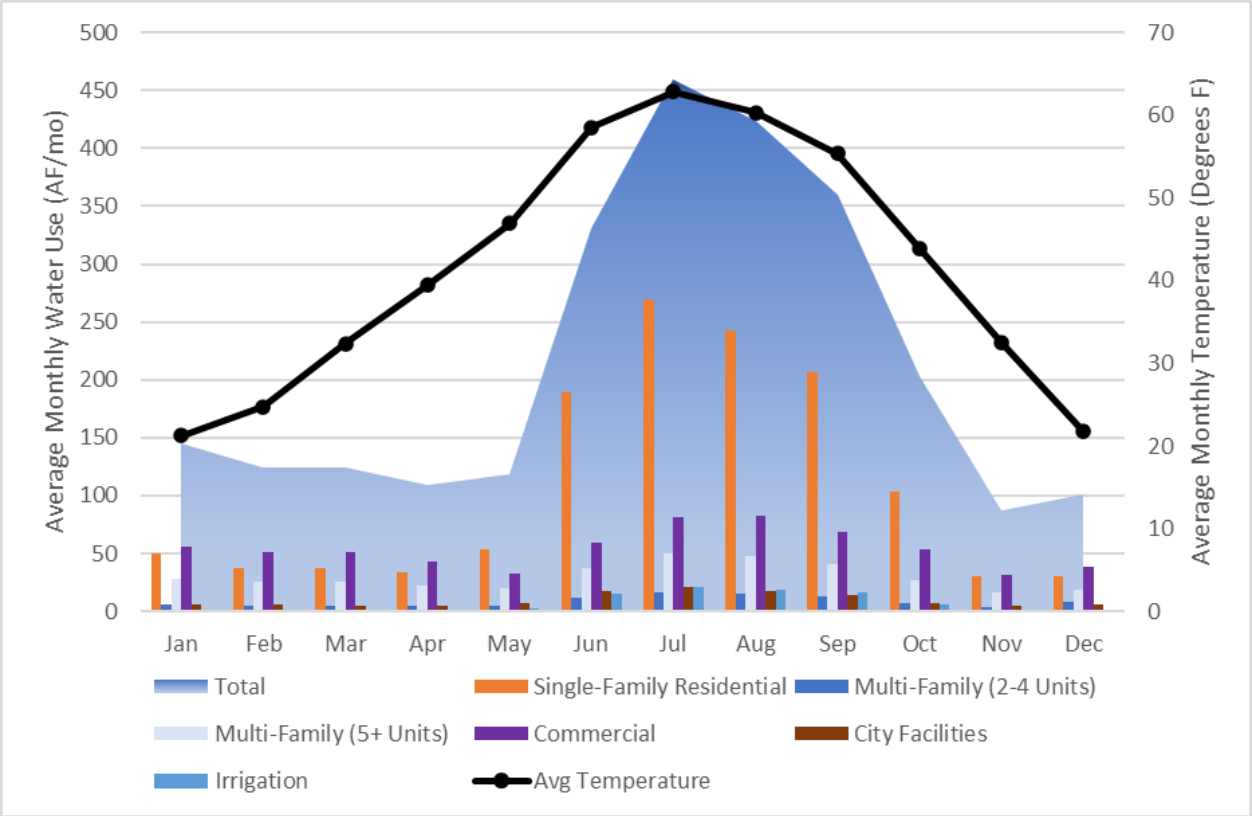



*Figure 3. Potable Water Use, 2012 – 2019 Average Monthly for Metered Customer Account Category.*

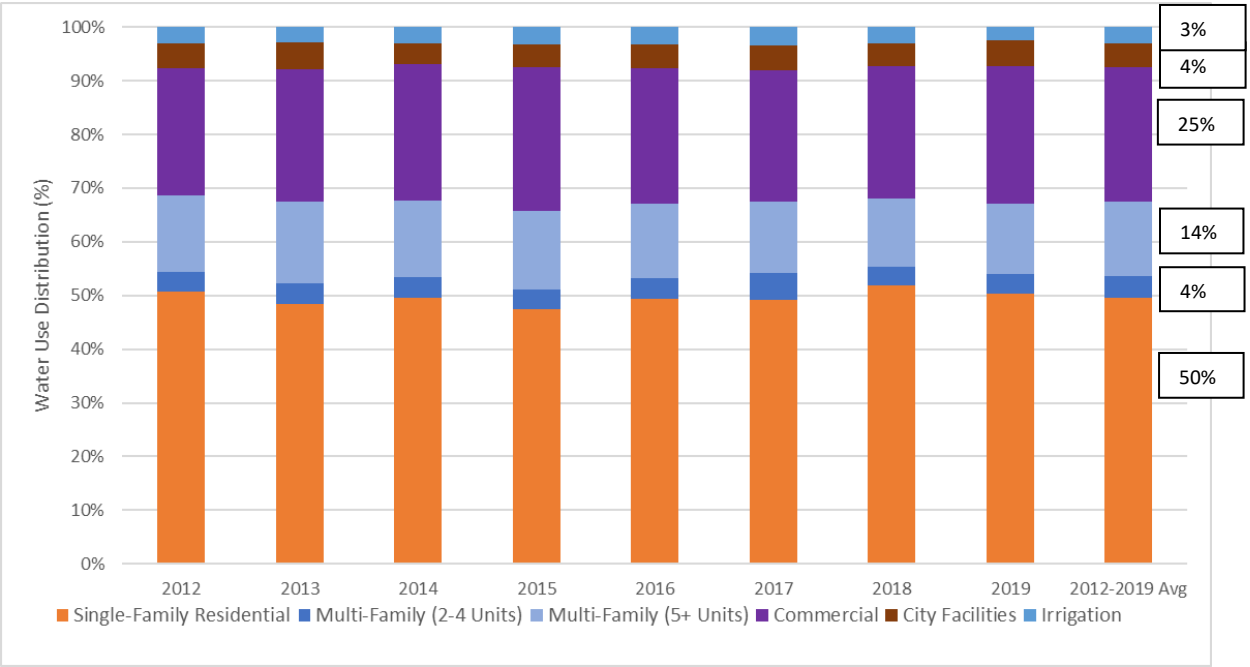



*Figure 4. Potable Water Use, 2012 – 2019 Annual Distribution for Metered Customer Accounts.*

### 2.2.2 "Other" Account Use

Most of the uses in this category are either consumptive or do not get treated at the ACSD WWTP. **Figure 5** below shows the "Other" use category average monthly water use for the period of 2012 through 2019. Snowmaking is the highest use, occurring primarily during the winter months of November through January. The water uses are shown in the month in which the meters are read, and there may be some adjustments needed to represent the timing of actual use. Snowmaking, for example, primarily occurs during November and December, however, some measurements taken in January may represent use that occurred in December.

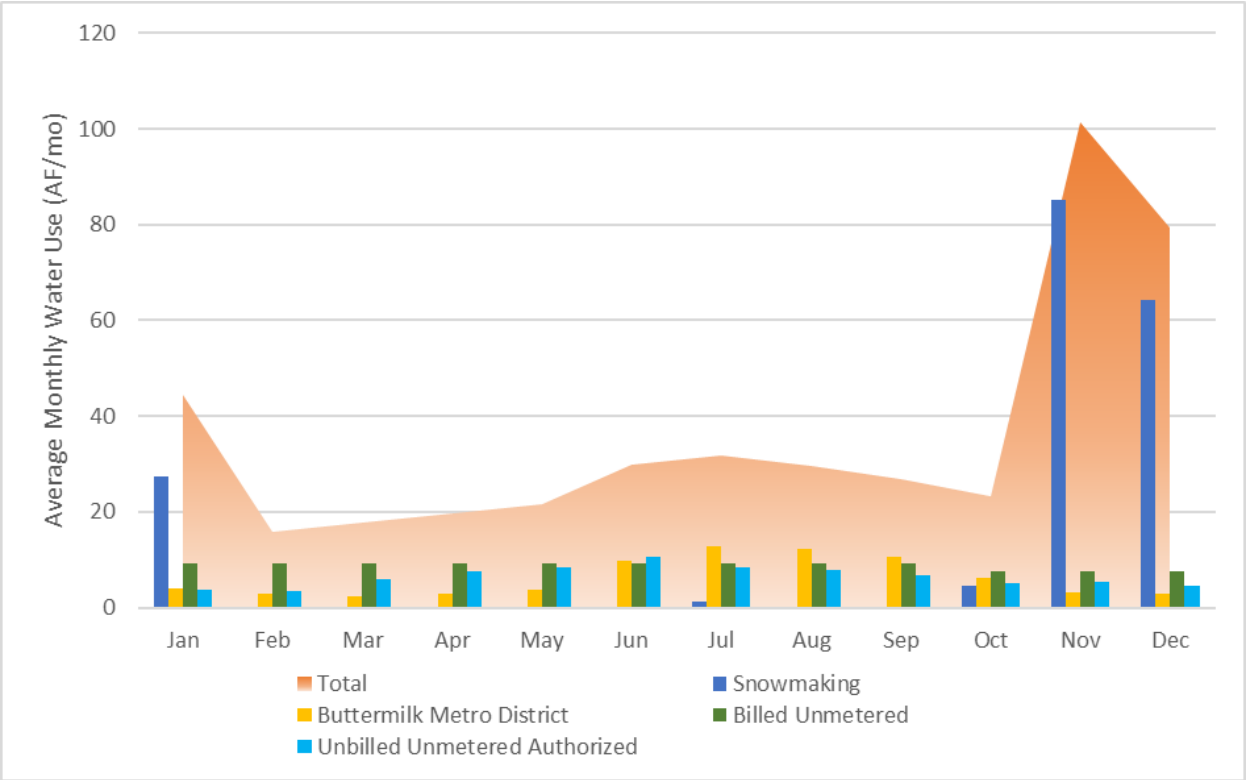



*Figure 5. Potable Water Use, 2012 – 2019 Average Monthly for "Other" Category.*

### 2.2.3 Potable Water Production

A summary of Aspen's annual and peak water production, i.e., treated at the WTPs, values from 2012 through 2019 is presented in **Table 4**. Aspen's peak daily production typically occurs sometime in late June through end of July. Aspen experiences a "second peak" in November or December, influenced by snowmaking and increased visitor populations. Although the ratio of the maximum winter (October through April) daily flow to the average winter daily flow is similar to the ratio of the maximum and average daily flows on an annual basis, the average daily winter flow is significantly lower than the annual average daily flow, as shown in Table 4 below.

*Table 4. Potable Water Production, 2012 – 2019 Annual Characteristics.*

| Year | Annual Peaking Calculations | | | | | | Winter (October through April) Peaking Calculations | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Annual Production (AF/yr) | Annual Production (MG) | Average Daily Flow (MGD) | Maximum Daily Flow (MGD) | Peaking Factor | Peak Day | Average Daily Flow (MGD) | Maximum Daily Flow (MGD) | Winter Peaking Factor | Winter Peak Day |
| **2012** | 3,681 | 1,200 | 3.3 | 7.6 | 2.3 | 6/21 | 2.0 | 3.8 | 1.9 | 12/15 |
| **2013** | 3,314 | 1,080 | 3.0 | 8.0 | 2.7 | 7/24 | 1.8 | 4.2 | 2.3 | 12/4 |
| **2014** | 3,942 | 1,284 | 3.5 | 7.0 | 2.0 | 7/20 | 2.4 | 5.0 | 2.1 | 11/17 |
| **2015** | 4,386 | 1,429 | 3.9 | 8.3 | 2.1 | 7/3 | 3.0 | 5.0 | 1.7 | 12/1 |
| **2016** | 4,928 | 1,606 | 4.4 | 8.1 | 1.8 | 7/29 | 3.4 | 6.4 | 1.9 | 12/2 |
| **2017** | 5,378 | 1,752 | 4.8 | 9.8 | 2.0 | 7/7 | 3.6 | 6.4 | 1.8 | 12/7 |
| **2018** | 4,780 | 1,558 | 4.3 | 8.7 | 2.0 | 6/23 | 3.0 | 5.7 | 1.9 | 11/8 |
| **2019** | 4,039 | 1,316 | 3.6 | 7.2 | 2.0 | 7/12 | 2.6 | 5.2 | 2.0 | 11/30 |
| **Average** | **4,306** | **1,403** | **3.8** | **8.09** | **2.13** | | **2.7** | **5.2** | **1.9** | |

While daily water production data are conventionally used to investigate water and wastewater treatment and delivery capacities, monthly production data are often used for water supply and demand planning. As shown in **Figure 6**, unlike in most recent years, monthly production in 2012 peaked in June before a significant decline in production through October. Aspen declared a Stage 1 Drought in June of 2012, which called for voluntary water-use reductions from customers, placed water use restrictions on public facilities, and increased water rates for the City's highest billing tiers. The decline in water production starting in July of 2012 may reflect a reduction in use influenced by the Stage 1 declaration, which continued through the summer of 2013, likely influencing production through the conclusion of the Stage 1 Drought declaration in September of 2013. Production typically dips in October before a small upswing in November and December for snowmaking and the beginning of ski season tourism.

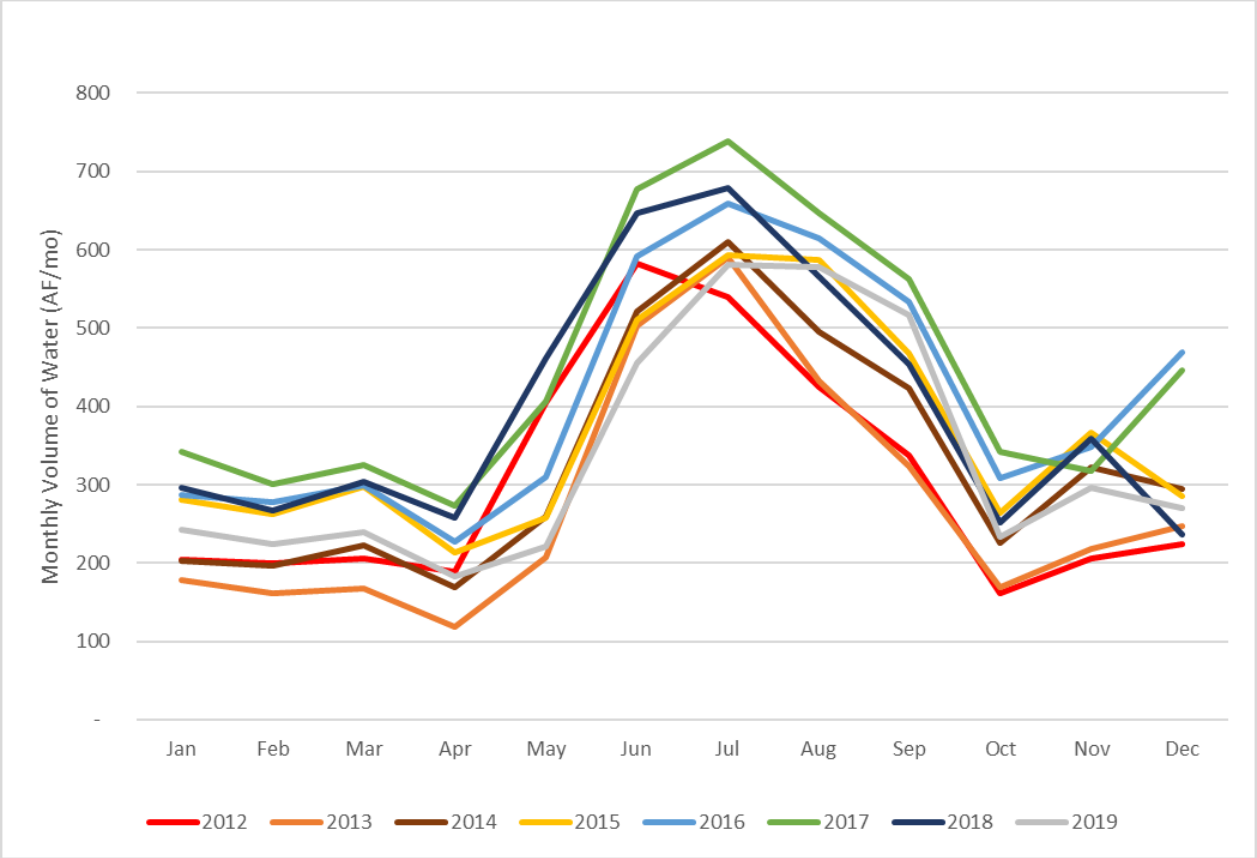



*Figure 6. Potable Water Production, 2012 – 2019 Monthly.*

### 2.2.4 Non-Revenue Water

For purposes of this WEP, non-revenue water (NRW) includes unbilled authorized consumption, apparent loss (customer meter inaccuracies, unauthorized consumption, and data handling errors), and real loss (physical leaks in transmission lines, storage facilities, and service connections) (AWWA, 2016). It is calculated as the difference between the amount of water produced and the total billed (metered and unmetered) potable water use. **Figure 7** below shows the water balance components defined by the American Water Works Association (AWWA) as they relate to NRW as.

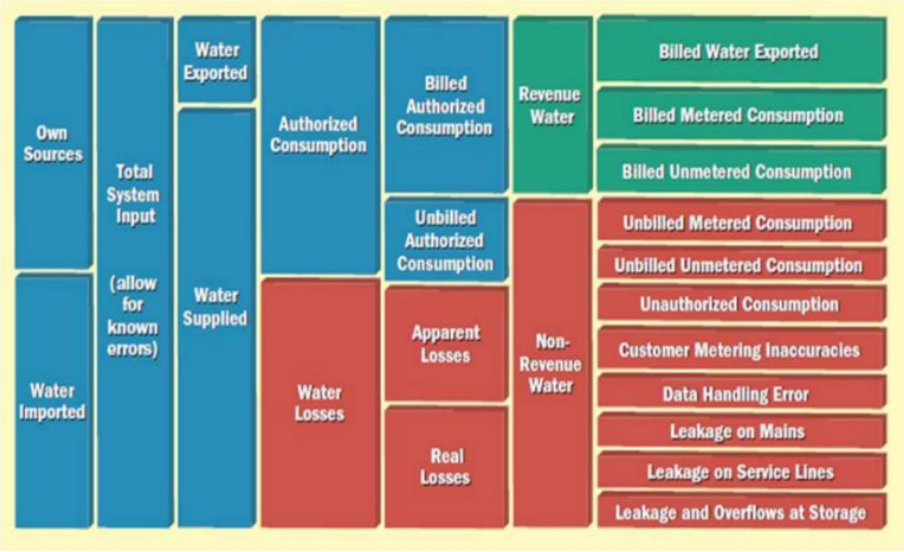



*Figure 7. Water Balance Components, AWWA 2016.*

After completing the 2015 WEP, the City's total annual potable water production began increasing while the total potable water use remained relatively constant, as shown in **Figure 8** below. Consequently, the NRW also began increasing. The calculated NRW peaked in 2017, at around 2,200 AF/yr, accounting for about 41% of the total water production and averaged 28% from 2012 through 2019. In comparison, Aspen's NRW reportedly averaged around 4% from 2009 through 2013.[16] As the NRW levels increased, Aspen began investigating reasons for this trend and pursuing resolutions. This continues to be a primary focus for the City and is further discussed in Section 4 below.

In 2020, the City contracted with Water Systems Optimization, Inc. (WSO) to test the City's potable water production meter. In January 2020, WSO completed a volumetric displacement test to evaluate the production meter accuracy at low flows. In July 2020, the production meter was tested at higher flows. An overread of about 6.7% of production, on average over the year, was identified by WSO. The 2019 production data in **Figure 8** were adjusted by 6.7% for illustrative purposes to reflect the findings by WSO during the production meter testing. With the adjustment applied, the calculated NRW value for 2019 would decrease from 29% to 24%. This adjustment was not made to the reported values in the prior paragraph. As part of its routine operation and maintenance procedures, annually, the City replaces its in-service flow meter with a calibrated meter.

[16] The NRW value reported in the City of Aspen 2015 Municipal Water Efficiency Plan was based on data and analyses that had been completed by City staff at that time, which preceded the AWWA M36 Tracker. It is not known whether similar quality or tracking of data were available at that time.

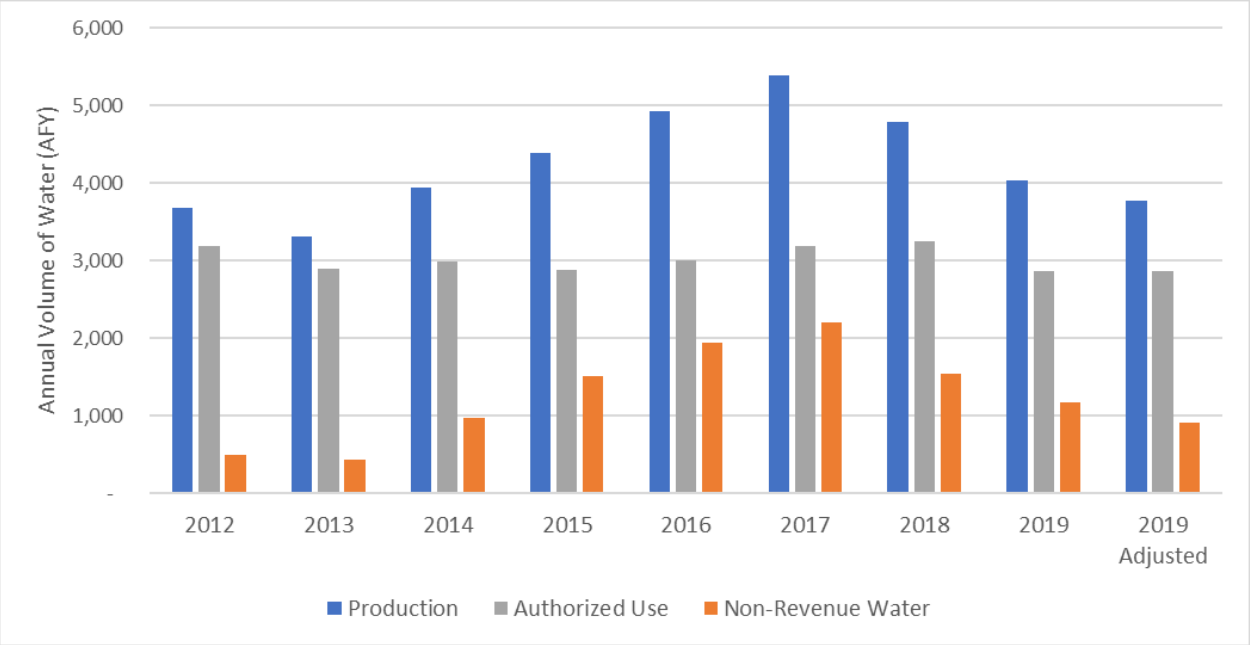



*Figure 8. Potable Water Production, Authorized Use, and NRW, 2012 – 2019 Annual.*

## 2.3 Past and Current Water Efficiency Programs and Activities

Aspen has implemented many of the programs that were identified in the 2015 WEP and the Regional WEP and submits water use and conservation data reporting to the CWCB annually in accordance with Colorado House Bill 10-1051 (1051 reporting).[17] In early 2020, ELEMENT assisted the City in developing a water efficiency program monitoring tool ("Efficiency Monitoring Tool") that the City uses to document, monitor, and evaluate its water efficiency programs. The Efficiency Monitoring Tool includes a description of each program along with estimated water savings that are based on information from the 2015 WEP, the Regional WEP, and the 1051 reporting. Aspen updates the Efficiency Monitoring Tool annually and uses it to develop recommendations to continue, modify, or terminate each efficiency program. A summary of past and ongoing water efficiency activities is shown in **Table 5** below. Some of the activities were delayed or paused due to the pandemic. The City has also been identifying opportunities to modify and improve some of the ongoing programs once Advanced Metering Infrastructure (AMI) data becomes available, as described further below.

[17] HB10-1051 requires covered entities (retail water providers who sell 2,000 acre-feet or more of water annually) to report, on an annual basis, water use and conservation data to be used for statewide water supply planning.

*Table 5. Past and Current Water Efficiency Programs and Activities.*

| Activity Classification | Program | Initial Year Implemented | Current Status |
|---|---|---|---|
| Foundational | Acoustic Leak Survey | 1995 | Ongoing |
| | Inverted Four-Tier Billing Rate | 2006 (updated in 2011) | Ongoing |
| | Irrigated Area Assessments* | 2018 | Ongoing |
| | Metering of Fill Stations | 2019 | Ongoing |
| | Reactive Leak Repair | 1995 | Ongoing |
| | Supply Meter Testing – Volumetric Displacement | 2020 | Ongoing |
| | Water Bypass Valve Inspection and Lockout | 2018 | Ongoing |
| | Water Loss Audit (M36) | 2016 | Ongoing, brought in-house 2020 |
| Targeted Technical Assistance and Incentives | Fixture and Appliance Incentives/ Rebates | Post-2002 | Ongoing |
| | Irrigation Audits (Residential, City Facilities, and Parks)* | 2018 | Ongoing |
| | Slow the Flow | 2013 | Replaced by Irrigation Audits starting in 2018 |
| Ordinances and Regulations | Drought Management Plan | 2020 | Ongoing |
| | Landscape Ordinance* | 2017 | Ongoing |
| | Qualified Water Efficient Landscaper Certification | 2018 | Ongoing |
| | Update to Water Shortage Section of Municipal Code | 2020 | Ongoing |
| | Waste of Water Ordinance Update | 2020 | Ongoing |
| Educational Activities | Community Outreach Event Participation | Pre-2006 | Ongoing, Paused in 2020 due to Pandemic |
| | Public Information, Customer Outreach and Education | 1992 | Ongoing |
| | Utility Billing Inserts & Online Information | 2008 | Ongoing |

*Indicates activities with a land use component.

With the implementation of the 2015 WEP, the City increased its focus on reducing outdoor water use, managing future outdoor demands, and integrating water and land use planning by passing an ordinance in 2017 that established the Water Efficient Landscaping Standards (WELS).[18] Development of the City's WELS was supported through a CWCB grant and fulfilled recommendations identified in the City's 2015 WEP, the Roaring Fork Regional Efficiency Plan, and the Roaring Fork Watershed Plan. The City has also invested in annual irrigation audits, which evaluate individual customer irrigation systems and provide recommendations for more efficient irrigation. Aspen was the first entity in the state of Colorado to become a Qualified Water Efficient Landscaper (QWEL) Certifying Organization, providing free training and certification to local landscaping and irrigation professionals. The City has also begun investigating neighborhoods with large lots and high water use customers to evaluate options for reducing outdoor use and identifying inefficiencies or overuse.

Over the past decade, total annual billed water use has remained relatively constant even while population has increased. This plateauing of water use reflects the success of ongoing conservation and efficiency programs within Aspen, offsetting some of the impacts due to growth. However, the City's NRW

[18] Amended annually through 2022.

has increased over the same period. The 2015 WEP identified a total savings goal of 583 AFY by 2035, which is a total reduction of 14% over 20 years. Linearly interpolating, the savings at 2019 under the 2015 WEP that would have needed to be achieved was 123 AF/yr. From 2014 to 2019, Aspen has reduced its annual total potable water use by about 116 AF/yr, or about 4% as compared to the City's 2019 uses, which is on target with the 2015 WEP goal.

# 3. INTEGRATED RESOURCE PLANNING AND FUTURE DEMAND PROJECTIONS

Aspen finalized an IRP in November of 2021, which is a robust plan to provide a safe, resilient, and reliable water supply to its customers for years to come, while respecting the City's commitment to environmental stewardship. The IRP evaluates potable and non-potable water supplies and demand projections through the year 2070, considering a range of potential future conditions and ultimately selecting a planning forecast and providing a water strategy.[19] It serves as the City's primary planning basis for potable and non-potable programs, projects, and strategies and will be revisited and updated intermittently into the future. Programs presented herein were selected to put Aspen on track to meet the level of efficiency described in the IRP forecast year and beyond. Because the planning duration of a WEP is much shorter than the IRP forecast period, it is important for Aspen to monitor its conservation programs and water use annually and to update this WEP intermittently to re-evaluate water use conditions and conservation programs as they relate to the longer-term planning goals.

The City recently prepared a DMRP, another tool the City uses to manage the supplies that are available under the City's current surface water system operations. The DMRP provides a framework for Aspen to use water sustainably, particularly during drought and other conditions that create a water shortage. Water shortage occurs when water demands exceed available water supplies and is often driven by a combination of snowpack and precipitation conditions, temperature, and water use. Implementation of the DMRP supports the wise use of water under all conditions, helps preserve essential public services, and minimizes the adverse effects of a water supply emergency on public health and safety, environmental resources, economic activity, and individual lifestyles. The DMRP works in concert with the WEP and programs implemented through the WEP, such as the WELS. These plans and programs encourage the efficient use of water at all times by establishing "normal" condition guidelines that are in place unless restrictions are imposed through action by City Council.

## 3.1 FUTURE POTABLE DEMAND PROJECTIONS

The purpose of this WEP is to identify conservation programs and activities that support the long-term demand (including NRW) reduction goals identified in the IRP. For the City's IRP, ELEMENT used the average annual potable water use data for 2012 through 2019 to develop a 2020 baseline water demand, including NRW. Using a population-based projection method, six unique 2070 water demand projections were prepared to provide a demand projection "envelope" for 2070 planning. **Figure 9** below shows historical potable water production and the extent of the projected demand envelope, which represents projected production demands. The high-end projection represents high growth rate, increased outdoor water demand from climate change impacts, relatively low levels of conservation savings, and a moderate reduction in the City's NRW levels. Alternatively, the low range reflects a low growth rate, no impacts from climate change, and moderate reductions in projected demands through conservation and NRW reductions.

[19] For purposes of this WEP, "demand projections" include NRW.

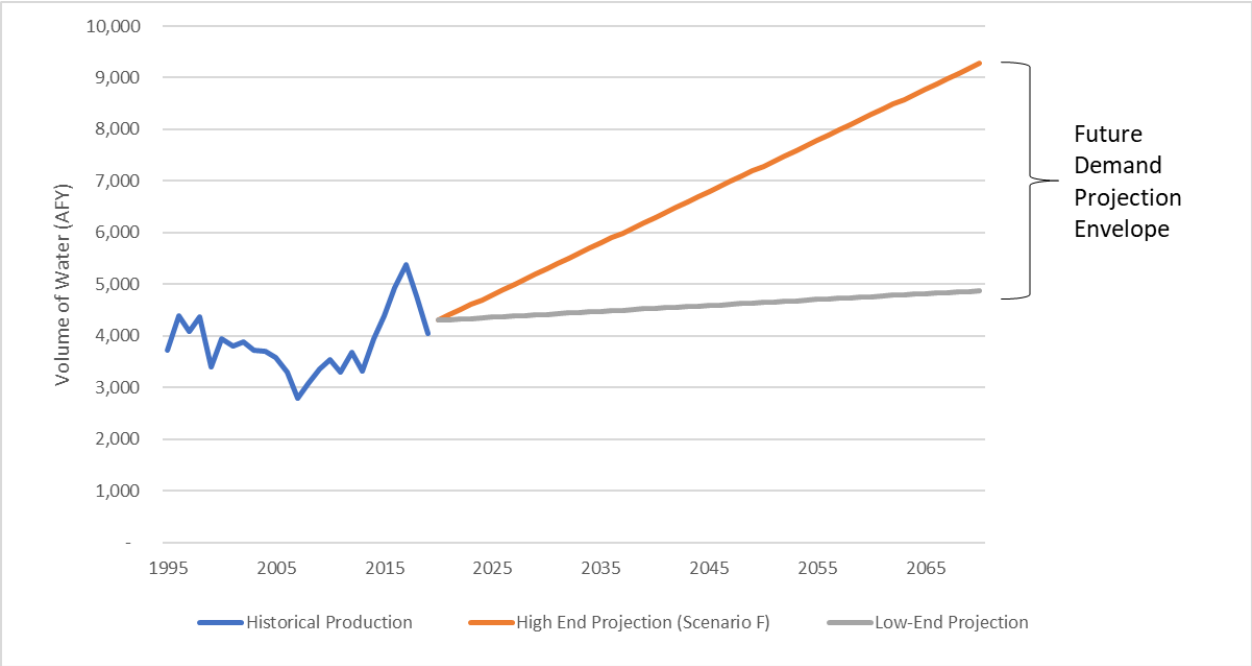



*Figure 9. Historical Production and Potable Water Demand Projection Including NRW through 2070.*

The following section documents the general approach that was used to prepare a 2070 potable water demand projection envelope for the IRP and the method used to prepare a demand savings projection at 2030, including reductions in NRW.

### 3.1.1 2030 Demand Projection

For the IRP, a baseline demand projection and six (6) demand scenarios were developed to provide a demand envelope of potential potable water demands in 2070, as shown in **Figure 9**. For each of the six projection scenarios, five separate drivers that influence demands were used to adjust the Metered Customer Account demands under future conditions:

1. Population Growth and Visitor Occupancy
2. Climate Change
3. Efficiency and Conservation
4. NRW
5. Adjustments to Aspen's "Other" categories

The IRP provides a plan to meet or mitigate the highest demand projection (referred to in the IRP as "Scenario F"), which included the following driver assumptions that were applied to the 2020 baseline water demand to calculate the 2070 total demand shown in **Table 6** below.

*Table 6. 2070 Demand and NRW Projection Drivers for Scenario F (IRP, 2021).*

| Drivers: | Growth Rate | Climate Change Impact | Efficiency and Conservation | | NRW | 2070 Total Demand (AF/yr) |
|---|---|---|---|---|---|---|
| Potential Level of Future Demand Relative to Baseline | % Increase in Metered Customer Accounts | % Increase in Outdoor Demands | % Decrease in Indoor Demands | % Decrease in Outdoor Demands | % of Total Production | |
| Scenario F | 1.8% | 25% | 2% | 5% | 20% | 9,281 |

The selected demand projection represents a high growth rate, increases in outdoor demands influenced by climate change, and relatively low levels of conservation. The projection also assumes that the total NRW will be 20% of the total production in 2070. In 2020, NRW accounted for about 29% of the total production, which serves as a baseline condition in the demand projection.

The IRP then evaluates six different supply and demand reduction portfolios to address a potential future supply gap created under the demand projection compared to current conditions and available supplies. The portfolio recommended for implementation in the IRP (referred to in the IRP as "Portfolio 6") includes "Enhanced Conservation" to reflect the City's implementation of enhanced conservation strategies to decrease future demands and offset some additional supply needs. Portfolio 6 also includes operational storage, groundwater, and non-potable reuse components and projects to mitigate the future supply-demand gap. This Enhanced Conservation assumes the City will adopt more aggressive conservation programs with higher savings than were included in the "Efficiency and Conservation" demand driver that was used to prepare the future demand envelope. **Figure 10** below shows how the projected demand would be reduced through Enhanced Conservation by 2070.

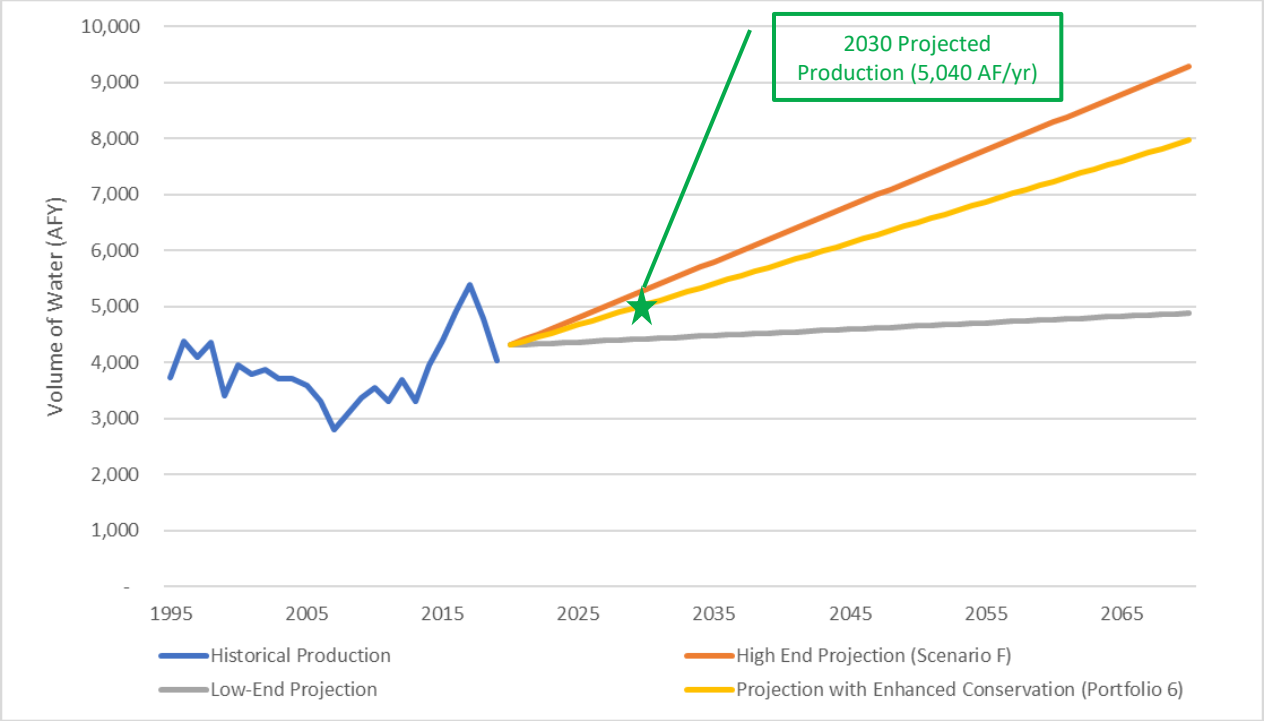



*Figure 10. Historical Production and Demand Projection, including NRW, with Enhanced Water Conservation Planning Scenario through 2070.*

For this WEP, Aspen has identified a demand reduction goal at 2030 that aligns with the Enhanced Conservation and NRW assumptions included in the IRP Portfolio 6 demand projection. The total demand reduction goal in 2070 was calculated as the difference between the Scenario F (high-end) and Portfolio 6 demands in 2070 and was then distributed annually to determine a target demand reduction of 265 acre-feet (AF) relative to the Scenario F (high-end) projection for 2030 projection. Assuming that the high population and climate drivers that Aspen is planning for do occur, approximately 265 AF of water need to be saved by 2030 in addition to the NRW percentage being reduced to 20% or lower. To achieve the NRW reduction by 2030, the potable production needs to be reduced, through programs targeting NRW, by an additional 255 AF relative to the Scenario F (high-end) projection for 2030. Between the two reduction goals, a total of approximately 520 AF of water savings, i.e., demand reduction, relative to the Scenario F (high-end) projection for 2030. The 2030 demand projection is represented as the green star in Figure 10 above. If the future impacts of any of the demand drivers are less than projected, specifically those influencing a higher demand growth or impacts from climate change, the future demands would decrease from the projected level (e.g., slower growth rate would influence a lower future demand), in turn reducing the necessary demand reductions to meet the potential future supply gap. Conversely, a higher growth rate or climate change impact may require additional conservation. The City will continue to monitor potable demands and may modify projections based on changing conditions over time.

## 4. SELECTED WATER EFFICIENCY ACTIVITIES

Aspen staff and customers have historically demonstrated a high level of dedication to the efficient use of natural resources, including water, and it is anticipated that this commitment will continue. Aspen's water efficiency program is designed to meet relatively near-term water use reduction goals that are aligned with the City's long-term IRP water use reduction goals. A set of recommended conservation and

efficiency activities are described below and were designed to support two distinct programs. The "Water Loss Control Program" focuses on identifying and reducing water loss and NRW within the City's system. The "Enhanced Water Conservation Program" focuses on outdoor water use, particularly programs that can result in outdoor water use reductions during the summer irrigation season. While Aspen's current indoor water use is already relatively low, in part due to a significant amount of remodeling throughout the City that has resulted in updates to higher efficiency plumbing fixtures and appliances, some activities presented herein do target additional indoor savings.

## 4.1 New Water Efficiency Activities

The City has identified the following new water efficiency activities to supplement the ongoing activities described above.

### 4.1.1 Water Loss and Conservation Coordinator

Establishing a water conservation coordinator is a foundational best practice for water utilities. The City will hire a full-time water conservation program coordinator within the Utilities Department to be responsible implementing the WEP, including the annual 1051 data reporting, maintaining the AWWA M36 Tracker, maintaining the Efficiency Monitoring Tool and preparing annual conservation reports, and updating the WEP every 7 years. As the City builds upon its already robust conservation program, it is critical to have a designated staff person to administer it. Because so many of the related efforts are currently managed within the City's Utilities Department, this position will likely be within the Utilities Department, working closely with Utilities staff and staff across other departments as needed.

### 4.1.2 Water Loss Control Program

The City's Water Loss Control Program is a collection of foundational activities focused on reducing the City's NRW level by reducing real water loss and using advanced metering technologies to reduce apparent water losses. The goal for this program is to reduce water loss by about 273 AF annually by 2030 relative to the high-end demand projection for 2030, which includes NRW.

***Advanced Metering Infrastructure Installation and Operation:*** In 2018, with the support of contractors, Aspen began designing an AMI project to convert all customer water accounts to AMI. The goal of AMI is to provide the Utilities Department with near real-time water usage data and allow customers to make informed choices about water usage. A portion of this project has been funded through a U.S. Bureau of Reclamation (USBR) WaterSmart Water and Energy Efficiency Grant. In its customer outreach, the City is referring to the project as "AIM", which stands for Aspen Intelligent Metering. The new infrastructure is expected to be implemented and operational by 2023.

***AMI Communication Plan:*** The City began public outreach efforts in the spring of 2019 to communicate the upcoming AIM Project with utility customers. With assistance from a contracted public outreach specialist, educational materials developed to date include project branding, an informational website, bill inserts, and customer letters readily available online and distributed to all utility customers. The communication plan is funded in part through the City's USBR WaterSmart grant.

***Distribution Zone Sub-Metering:*** The City will install new meters throughout its distribution system to sub-meter each billing zone separately. This program is intended to isolate system losses within a zone to better identify and repair real losses in the City's system. This may also help the City identify and resolve apparent losses isolated to a specific billing zone. City staff will monitor sub-meter data and compare against the associated water use billing data within each zone. Losses within each zone will be quantified and used to inform subsequent water loss investigations within that zone. Through these investigations, the City plans to quickly fix any identified leaks or otherwise resolve identified issues contributing to loss within the system.

***Meter Replacement and Testing:*** Prior to initiation of the AMI project, approximately 18% of Aspen's existing customer water meters were identified as being incompatible with the AMI system upgrades and a number were also non-compliant with current City standards, requiring a replacement of approximately 700 water meters. The City funded a meter replacement for the identified meters under its USBR WaterSMART grant to include meter equipment and installation. As the City replaces these meters, it will send a portion of the old meters to a third-party testing facility to quantify meter error levels and provide a more accurate estimate of apparent losses from water metering inaccuracies that will be remedied through this meter replacement effort.

***Water Bypass Valve Inspection and Lockout:*** A physical inspection of all water accounts will be completed by water meter and distribution division staff. These inspections will prioritize commercial and multi-unit accounts. Aspen will create a database that catalogs all bypass valve locations. If open bypass valves are discovered, the bypass valve will be situated in the "closed" position and locked out/tagged out to prevent unauthorized or unattended opening of the bypass valve. Large commercial and multi-unit accounts will be prioritized for audit.

***Water Data Management:*** The City currently tracks monthly billed potable water use and validates the data annually. The City also completes M36 water loss audits annually that are validated through a third-party. The City is committed to continue making improvements to water data tracking and validation. The City will consider more frequent and consistent review of water data as it becomes available through implementation of the AMI project, particularly as it relates to NRW and identifying real water loss. The City will also continue to participate in the Colorado Water Loss Initiative and seek technical assistance when available, such as with an upcoming annual Real Loss Data Analysis to audit a specific set of data and internal record keeping.

### 4.1.3 Enhanced Water Conservation Program

The City's Enhanced Water Conservation Program is a collection of water efficiency activities focused on reducing the City's overall water use through efforts that are categorized as foundational, technical assistance and incentives, regulatory, educational, and land use integration. Many of these activities focus on reductions to outdoor water use across multiple customer use sectors. The City will target reductions in outdoor use during the late summer irrigation months when a gap between available supplies and water demand is most likely to occur. These activities provide valuable contributions to the management of the City's water supplies and minimize the need for infrastructure investments, particularly storage. As shown in Table 3 above, the single-family customer category has the most potential for significant outdoor reductions. The goal for this program is to reduce water use annually by about 242 AF annually by 2030 relative to the high-end demand projection for 2030.

***Conservation-Oriented Rate Study:*** Aspen initiated a new water rate study in September of 2022 which will potentially change the billing rate structure to target efficient water use. The City will implement findings from the new rate study starting in 2024.

***Commercial Water Efficiency:*** Aspen has historically worked with commercial customers to message efficient water use, specifically through the tourism industry. The City plans to increase engagement and communication with its commercial customers to advance indoor fixture replacement and promote indoor best practices to reduce water use. The City will develop and provide resources and materials for commercial customers, primarily in the tourism sector, to communicate the importance of conservation to visitors and will work across different industry sectors to target specific indoor uses. Industry-specific examples include: the lodging industry to request visitors reuse towels and shorten showers, restaurants only provide water upon request, handouts for guests or posting at restaurants, providing free kitchen shut-off spray nozzles to restaurants, etc. The City will create a messaging campaign that includes consistent information with targeted tips for efficiency and will distribute the materials free of charge to commercial customers. The City may consider a targeted outreach campaign that would provide free trainings or informational sessions for staff of specific industries to help build a more informed workforce. The City will also evaluate how it may be able to utilize the Building IQ program, which Aspen recently adopted to reduce community greenhouse gas emissions, to bolster commercial water efficiency.

***Irrigation Audit and Equipment Rebates:*** Beginning in 2022, the City initiated an irrigation audit and equipment rebate project, which is funded through a USBR Small-Scale Efficiency Project grant. Customers who complete a City-sponsored irrigation audit can be reimbursed for a portion of the costs associated with any irrigation system improvements based on audit recommendations, including:

- Integrating Smart Controllers to existing irrigation systems.
- Replacing overhead spray with drip irrigation.
- Converting existing sprinkler heads to new high-efficiency sprinkler heads.
- Replacing high water-use plantings with low water-use plantings.
- Implementing recommendations provided in the irrigation assessment report.

***Landscape Transformation/Conversion:*** Through education, giveaways, incentives, and rebates, Aspen will encourage customers to retrofit existing landscape plant materials from higher water use plant types (e.g., irrigated “turf” such as bluegrass and non-native or high-water use plants) to drought tolerant and lower water use materials and to utilize more efficient irrigation systems. The City will utilize the demonstration garden areas (further described below) to publicly promote low water use landscape planting and efficient irrigation.

***Neighborhood Water Service Agreements Compliance:*** Within the City’s water service billing area, there are multiple neighborhoods being served potable water through water service agreements, which place specific ECU and water use limitations on the entire neighborhood. The City will utilize water use and irrigated area data to determine compliance with volumetric and ECU limitations. Resolution of non-compliance will be required to avoid system shutoffs.

***Replacement of Irrigation Nozzles:*** The City will either supply or provide reimbursement for the replacement of existing low-efficiency irrigation nozzles with high efficiency rotating nozzles that have been defined by the City as a water-saving device. This program will initially target residential customers.

***Target Highest Water Users:*** The City will develop a multi-pronged approach for continuing to identify high water users, generally targeting a reduction of outdoor water use or wasteful water use. The City may incentivize or require these customers to comply with a level of water use reduction that is in-line with what would be required under the WELS.

Staff will complete outreach for the identified accounts, with the goal of working with these customers to prepare a specific plan to improve efficiency. For many of these customers, outdoor use will be the highest targeted reduction. In these cases, the City will work with customers to complete irrigation system audits, support customers with irrigation rebate opportunities, and encourage landscape retrofits through the City's landscape transformation project.

***Water Reuse:*** As described in the IRP, a system to deliver reclaimed water from the ACSD water reclamation facility could be used to support non-potable irrigation and snowmaking needs. The City has already constructed a pipeline from near the ACSD facility to the Aspen Municipal Golf Course with the intent of supplying irrigation water to the golf course. Completion of this system would require construction of a new pump station and a supplemental disinfection system may be required. City staff continue to engage with stakeholders to review feasibility of reuse at the Aspen Municipal Golf Course with the goal of beginning the project around 2025. The City also plans to evaluate options to expand its reuse system to supply irrigation at Burlingame and/or snowmaking at Buttermilk starting around 2029.

***Advancing Water Efficient Landscape Standards:*** The City is continuously evaluating and improving upon its WELS, which currently define landscaping and irrigation design and installation requirements for new landscaping permits. The City will prepare an evaluation of landscapes that have been installed since the onset of the WELS, comparing the actual water use to the water budgets that were approved. This evaluation will be used to prepare recommendations for improvements to the existing WELS, including topics such as reducing the landscape water budget, incorporating limits on irrigated turf, requirements for non-potable water customers, and requirements for existing landscapes.

***Irrigation-Only Customer Investigations:*** The City will investigate all irrigation-only account water use data and irrigated areas to determine whether the water use is within the amount designated for its equivalent capacity unit (ECU) rating. For accounts that are exceeding the water use designated for their ECU rating, the City may mandate upgrades to water-saving irrigation equipment and/or payment of additional tap fees. The City will consider if these accounts may qualify for the irrigation rebate program if an irrigation system upgrade is mandated.

***Customer Engagement, Education, and Outreach:*** Quarterly newsletters are sent to Qualified Water Efficient Landscaper (QWEL) certified professionals through an ongoing contract with Water Now Alliance. Aspen will continue to provide continuing education classes and programs to support the QWEL certification requirements and will look for opportunities to expand this training to provide informational resources to other professionals and individuals in the community. The City will also pursue opportunities to share relevant information with its broader customer base through bill inserts, updated online resources, etc. The City plans to update its webpage to include more water efficiency information and references. The City will provide public education opportunities centering around its turf demonstration project (described below) including new types of lower water use turf options, other native drought tolerant or low water use landscaping materials, and efficient irrigation practices.

***Messaging to Link Efficiency and Environmental Benefits:*** Creating an informed and emotional connection between customer water use and supplies can help foster a culture of conservation. Better understanding of how the same water supplies are depended upon for municipal use, recreational activities, environmental health, and vulnerabilities to changing climate and weather patterns as well as other natural disasters, can help develop this connection. The City will develop informational messages about the Castle and Maroon Creek watersheds for inclusion in outreach materials. The IRP provides a detailed evaluation of the City's primary water supplies and could be utilized to prepare a targeted messaging campaign to educate the City's customers about these watersheds.

***Rain Barrel Outreach and Giveaway:*** Under current Colorado water law, while it is unlikely that rain barrels can eliminate the need for at least intermittent irrigation from other sources; however, they can effectively offset irrigation needs for small areas of low water use plant materials during certain times and promote a water conservation ethic. The City's WELS incentivize the use of rain barrels when used to irrigate low or very low water use plantings with drip irrigation. The City will further promote the use of rain barrels by sponsoring a residential rain barrel outreach program to provide educational materials to participants who qualify under Section 37-96.5-103 of the Colorado Revised Statutes (C.R.S.). Any customer completing a training session will receive one free 55-gallon rain barrel and access to purchase a second 55-gallon rain barrel at a discounted price.

***Turf Demonstration Project:*** In 2016, to demonstrate the potential reduction in water use that can occur when converting irrigated turfgrass to lower-water use plantings, the City replaced approximately 800 square-feet of bluegrass with low-water use plantings. The City will apply lessons learned from that project in new a demonstration project that will include the redesign of a public demonstration garden to showcase four or five low- to moderate-water-use grasses and other native or low-water use plants suited for the local climate and elevation. The City will manage water supplies to the demonstration garden and measure the water use to determine which of the grass types can save water and to what extent while maintaining a healthy landscape. The area will be utilized to hold public education events and will have informational signage specific to each of the plants presented. Annual lunch and learn opportunities for community members may also be incorporated with this project.

## 4.2 WATER EFFICIENCY PROGRAM AND PROJECTED WATER SAVINGS

**Table 7** presents the City's full suite of ongoing and new water efficiency activities selected for the 2022 WEP, categorized as part of the Water Loss Control Program or the Enhanced Water Conservation Program The estimated program savings represent anticipated water savings from new activities and additional savings (not already reflected in the estimated water savings achieved to date) from ongoing activities.

*Table 7. New and Ongoing Water Efficiency Programs, Activities, and Water Savings Estimates.*

| Activity Classification | Program Category | Water Efficiency Activity | | Estimated Program Savings |
|---|---|---|---|---|
| Foundational | All Programs | Water Loss and Conservation Coordinator | New | NA |
| | Water Loss Control Program | Acoustic Leak Survey | Ongoing | 273 AF |
| | | Advanced Metering Infrastructure Installation and Operation | New | |
| | | AMI Communication Plan | New | |
| | | Distribution Zone Sub-metering | New | |
| | | Fill Station Metering | Ongoing | |
| | | Meter Replacement and Testing | New | |
| | | Reactive Leak Repair | Ongoing | |
| | | Supply Meter Testing – Volumetric Displacement | | |
| | | Water Bypass Valve Inspection and Lockout | Ongoing | |
| | | Water Data Management | New | |
| | | Water Loss Audit (M36) | Ongoing | |
| Targeted Technical Assistance and Incentives | Enhanced Water Conservation Program | Conservation-Oriented Rate Study | New | 246 AF |
| | | Commercial Water Efficiency | New | |
| | | Inverted Four-Tier Billing Rate | Ongoing | |
| | | Fixture and Appliance Incentives/Rebates | Ongoing | |
| | | Irrigated Area Assessments* | Ongoing | |
| | | Irrigation Audits (Residential, City Facilities, and Parks)* | Ongoing | |
| | | Irrigation Audit and Equipment Rebates* | New | |
| | | Landscape Transformation/Conversion | New | |
| | | Neighborhood Water Service Agreements Compliance* | New | |
| | | Replacement of Irrigation Nozzles | New | |
| | | Target Highest Water Users* | New | |
| | | Water Reuse | New | |
| Ordinances & Regulations | | Advancing Water Efficient Landscape Standards* | New and Ongoing | |
| | | Drought Management Plan | Ongoing | |
| | | Irrigation-Only Customer Investigations | New | |
| | | Qualified Water Efficient Landscaper Certification | Ongoing | |
| | | Waste of Water Ordinance | Ongoing | |
| | | Water Shortage Section of Municipal Code | Ongoing | |
| Educational Activities | | Community Outreach Event Participation | Ongoing | |
| | | Customer Engagement, Education, and Outreach | New | |
| | | Messaging to Link Efficiency and Environmental Benefits | New | |
| | | Public Information, Customer Outreach and Education | Ongoing | |
| | | Rain Barrel Outreach and Giveaway* | New | |
| | | Turf Demonstration Project | New | |
| | | Utility Billing Inserts & Online Information | Ongoing | |
| **TOTAL EFFICIENCY PROGRAM SAVINGS PROJECTION** | | | | **519 AF** |

*Indicates activities with a land use component.

# 5. PLAN IMPLEMENTATION AND MONITORING

The City's Utilities Department staff are responsible for the implementation of this plan and will continue to work collaboratively with other City departments to operate ongoing efficiency activities and implement new activities identified in this plan. The City will continue to budget money and may pursue CWCB water efficiency and other grants to further achieve its water efficiency goals.

## 5.1 PLAN IMPLEMENTATION

A general approach for implementing the City's water efficiency activities is provided in **Table 8** below. The implementation plan will be managed by the Water Loss and Conservation Coordinator. In the interim, the implementation plan will be managed as a coordinated effort by the City's Utilities Department staff. The plan will be regularly updated as additional information becomes available. Activities will continue to be evaluated through the process of updating the annual Efficiency Monitoring Tool and the AWWA M36 Tracker.

*Table 8. Planned Water Efficiency Program Implementation.*

| Program Category | Water Efficiency Activity | Planned Implementation Year | | |
|---|---|---|---|---|
| | | 2023 | 2024 | 2025 |
| **All Programs** | Water Loss and Conservation Coordinator | | X | X |
| **Water Loss Control Program** | Acoustic Leak Survey | X | X | X |
| | Advanced Metering Infrastructure Installation and Operation | X | X | X |
| | AMI Communication Plan | X | X | X |
| | Distribution Zone Sub-metering | X | X | X |
| | Fill Station Metering | X | X | X |
| | Meter Replacement and Testing | X | | |
| | Reactive Leak Repair | X | X | X |
| | Supply Meter Testing – Volumetric Displacement | | | X |
| | Water Bypass Valve Inspection and Lockout | X | X | X |
| | Water Data Management | X | X | X |
| | Water Loss Audit (M36) | X | X | X |
| **Enhanced Water Conservation Program** | Conservation-Oriented Rate Study | X | | |
| | Commercial Water Efficiency | | | X |
| | Inverted Four-Tier Billing Rate | X | X | X |
| | Fixture and Appliance Incentives/Rebates | X | X | X |
| | Irrigated Area Assessments | X | X | X |
| | Irrigation Audits (Residential, City Facilities, and Parks) | X | X | X |
| | Irrigation Audit and Equipment Rebates | X | X | X |
| | Landscape Transformation/Conversion | | X | X |
| | Neighborhood Water Service Agreements Compliance | X | X | X |
| | Replacement of Irrigation Nozzles | | X | X |
| | Target Highest Water Users | X | X | X |
| | Water Reuse | | | X |
| | Advancing Water Efficient Landscape Standards | X | X | X |
| | Drought Management Plan | X | X | X |
| | Irrigation-Only Customer Investigations | | X | X |
| | Qualified Water Efficient Landscaper Certification | X | X | X |
| | Waste of Water Ordinance | X | X | X |
| | Water Shortage Section of Municipal Code | X | X | X |
| | Community Outreach Event Participation | | X | X |
| | Customer Engagement, Education, and Outreach | X | X | X |
| | Messaging to Link Efficiency and Environmental Benefits | | X | X |
| | Public Information, Customer Outreach and Education | X | X | X |
| | Rain Barrel Outreach and Giveaway | | X | X |
| | Turf Demonstration Project | X | X | X |
| | Utility Billing Inserts & Online Information | X | X | X |

### 5.2 PLAN MONITORING

Aspen will review and update this WEP at least every seven years, or as needed. The City monitors water use on a regular basis and will continue to maintain these records. The City will continue to utilize the AWWA M36 Tracker to monitor potable water production, water use, and NRW trends. The data are reviewed and validated annually, typically by February for the previous year, and are relied upon for the annual M36 audit. Water data tracking will continue to be critical for Aspen to manage supplies and inform operations, and to assess how current conditions are tracking with the long-term planning conditions defined under the IRP.

At least annually, shortly after the AWWA M36 Tracker is validated, the Efficiency Monitoring Tool is updated to tabulate active water efficiency activities for the same year. Where possible, metrics for each activity are updated to summarize implementation (e.g., number of rebates awarded, number of leaks found and repaired, etc.), estimate water savings, and track costs. Activities will be adjusted as needed to support the demand (including NRW) reduction goals defined in this plan to support water supply reliability.

## 6. PUBLIC REVIEW, ADOPTION, AND APPROVAL OF WATER EFFICIENCY PLAN

A public review process is required for all State approved WEPs and the plan must be formally adopted by the local governing entity. The following sections describe the review, adoption, and approval process for this WEP.

### 6.1 PUBLIC REVIEW

Public participation and action are critical to the success of the City's water efficiency efforts. A public review process of no less than sixty days after the date on which the draft plan is made publicly available is required for all CWCB-approved plans per C.R.S. 37-60-126 (5). The City posted a draft copy of the draft WEP on their website on December 2, 2022, followed by a 60-day public review and comment period ending January 31, 2023. One set of public comments was received. A summary of the City's public review notification, public comments received, and the City's response public comments are included as **Appendix A**.

### 6.2 WATER EFFICIENCY PLAN ADOPTION

The manner in which a covered entity develops, adopts, makes publicly available, and implements a plan shall be determined by the covered entity in accordance with C.R.S. Section 37-60-126. On November 29, 2022, the City's Utilities Department staff provided an informational memorandum about the WEP to City Council, prior to publishing the draft plan for public review. On February 14, 2023, City Council adopted the WEP under Resolution No. 007 (Series of 2023), included as **Appendix B**.

### 6.3 WATER EFFICIENCY PLAN APPROVAL

The draft WEP was submitted to the CWCB on November 22, 2022, during the public review period. CWCB comments were addressed in this updated final report. On May 10, 2023, the City received official notification that the WEP was approved by the CWCB (see **Appendix C**).

# 7. COMPLIANCE WITH STATE PLANNING REQUIREMENTS

C.R.S. Section 37-60-126 requires a covered entity to develop, adopt, make publicly available, and implement a water conservation plan that will encourage its domestic, commercial, industrial, and public facility customers to use water more efficiently. According to the statute, a "covered entity" is a "municipality, agency, utility, including any privately owned utility, or other publicly owned entity with a legal obligation to supply, distribute, or otherwise provide water at retail to domestic, commercial, industrial, or public facility customers, and that has a total annual demand for such customers of two thousand acre-feet or more." Aspen meets the statutory definition of a covered entity.

According to the statute, key elements that must be evaluated through the plan development are listed below:

**A.** Water-saving measures and programs including:
1. Water-efficient fixtures and appliances;
2. Low water use landscapes, drought-resistant vegetation, removal of phreatophytes, and efficient irrigation;
3. Water-efficient industrial and commercial water-using processes;
4. Water reuse systems;
5. Distribution system leak identification and repair;
6. Information and education;
7. Conservation-oriented rate structures and billing systems;
8. Regulatory measures designed to encourage water conservation; and
9. Incentives to implement water conservation techniques including rebates.

**B.** Role of conservation in entity's supply planning.

**C.** Plan implementation, monitoring, review, and revision.

**D.** Future review and update of adopted plan within seven years.

**E.** Estimated savings from previous conservation efforts and from implementation of the new plan.

**F.** Best management practices for water demand management, water efficiency, and water conservation that may be implemented through land use planning efforts.

**G.** A plan must include a schedule for implementation.

## 7.1 CITY OF ASPEN WATER EFFICIENCY PLAN COMPLIANCE

The City of Aspen developed the 2022 WEP to comply with C.R.S. Section 37-60-126. Each element of compliance is documented below.

**A. Consideration of specific water efficiency measures.**
1. Fixtures and appliances: The City has carefully considered and evaluated the costs and benefits associated with giveaways, rebates, and incentives to encourage more rapid adoption of efficient technology and continues to offer incentives for replacing WaterSense labeled fixtures and appliances.
2. Outdoor water efficiency: The City's Enhanced Water Conservation Program was designed to aggressively pursue outdoor water efficiency activities. Many of the activities identified herein target outdoor water use including irrigation rebates, landscape transformation, and irrigation nozzle installations. The City's WELS require

that all new or redesigned landscapes meet a maximum water budget. The City is consistently evaluating the WELS and preparing updates to continue advancing outdoor efficiency through mandated standards.

3. Commercial, Industrial, and Institutional (CII) measures: Aspen has historically worked with commercial customers to message efficient water use, specifically through the tourism industry. The City's Commercial Water Efficiency project focuses on increasing indoor efficiency through audits to identify system improvements, recommend best practices, and target messaging for certain sectors (e.g., hotels, restaurants, etc.). Through this project, the City will evaluate how it can utilize the Building IQ program to bolster a commercial water efficiency program.
4. Water reuse systems: The City has decreed the right to divert and use treated wastewater effluent and has constructed portions of a reclaimed water system to exercise this right. City staff continue work on advancing the reuse projects that were included in Portfolio 6 of the City's IRP, which is the City's selected long-term planning portfolio. The City is initially evaluating the feasibility of irrigation reuse at the Aspen Municipal Golf Course. Longer-term, the City will evaluate the expansion of the reuse system to additional sites for decreed uses including irrigation and snowmaking.
5. Water loss and system leakage reduction: The City's Water Loss Control Program was designed to investigate, evaluate, identify, and reduce NRW through the associated activities. The City has been actively investigating and addressing its NRW levels over at least the past 5 years and will continue to prioritize these efforts.
6. Information and public education: The City regularly provides information to customers about ways to conserve water and avoid water waste through participation at community forums, flyers and bill inserts, and the utility maintains conservation materials and information that are available upon request. The City also plans to provide educational opportunities to its customers through rain barrel outreach and giveaways. Through implementation of this plan, key messaging components will be prepared and included through the advancement of the City's ongoing efforts.
7. Water rate structure: Aspen currently bills most of its customers monthly using a four-tier inclining block rate structure. The City will complete a conservation-oriented rate study during the first year of plan implementation and will adjust its billing structure based on the final recommendations.
8. Regulatory measures: Aspen maintains a water waste ordinance, water conservation building code, Water Efficient Landscaping Standards, and drought response regulation.
9. Incentives: Under this WEP, the City will implement an irrigation equipment rebate project, provide free rain barrels for customers attending targeted training, and will advance incentives under its landscape transformation project.

**B. Role of conservation in the City's supply planning.** Aspen has integrated conservation throughout its various planning documents. This WEP was designed to work in concert with the City's recently completed IRP, which serves as its driving planning document, the City's DMRP, and the WELS.

**C. Plan implementation, monitoring, review, and revision.** The City monitors water use on a regular basis and will continue to do so. The City produces monthly and annual demand reports for each customer sector and the system as a whole and keeps close track of water production and water use. Aspen will review and update this water efficiency plan every

seven years or as needed. During the review, progress toward achieving the stated conservation goal will be evaluated.

**D.** **Future review of plan within seven years.** Aspen will review and update this water efficiency plan every seven years or as needed.

**E.** **Estimated savings from previous conservation efforts and current plan.** The 2015 WEP identified a total savings goal of 583 AFY by 2035, which is a total reduction of 14% over 20 years. Linearly interpolating, the savings at 2019 under the 2015 WEP that would have needed to be achieved was 123 AF/yr. From 2014 to 2019, Aspen reduced its annual total potable water use by about 116 AF/yr, or about 4% as compared to the City's 2019 uses, which is on target with the 2015 WEP goal. By 2030, the City projects a total estimated savings of 519 AF/yr through implementation of the 2022 WEP.

**F.** **Water efficiency and conservation that may be implemented through land use planning.** The City is continuously evaluating and improving upon its WELS, which currently define landscaping and irrigation design and installation requirements for new landscaping permits. Aspen will implement a project to target its highest water use account through a three-pronged data-driven approach. The City will work directly with these customers to reduce wasteful or inefficient water use. The City will also evaluate neighborhoods for compliance with their specific water delivery agreements.

**G.** **Plan Implementation Schedule.** The plan implementation schedule is provided in Section 5, above.

# 8. REFERENCES

AWWA 2016. M36 Water Audits and Loss Control Programs, Fourth edition. Copyright 2016 American Water Works Association. Prepared by the American Water Works Association. 2016.

CDSS Precipitation and Temperature: CWCB/DWR Climate Data Website. https://www.colorado.gov/cdss/climate-data.

CWW: Colorado WaterWise Guidebook of Best Practices for Municipal Water Conservation in Colorado. Prepared by Aquacraft Inc. Prepared with Support from Colorado Water Conservation Board. October 2010.

DMRP 2020: City of Aspen Drought Mitigation and Response Plan. Prepared for the City of Aspen by ELEMENT Water Consulting Inc. July 2020.

IRP 2021: City of Aspen Integrated Water Resource Plan. Prepared for the City of Aspen by Carollo in association with ELEMENT Water Consulting Inc. and Ross Strategic. November 2021.

Regional WEP: Roaring Fork Watershed Regional Water Efficiency Plan. Prepared by ELEMENT Water Consulting and WaterDM. November 2015.

Title 25: City of Aspen Municipal Code, Title 25 – Utilities. Last updated in January 2020.

United States Drought Monitor: United States Drought Monitor Map Website. https://droughtmonitor.unl.edu/CurrentMap.aspx.

USGS Streamflow: USGS National Water Information System Site Inventory for Colorado Website. https://waterdata.usgs.gov/co/nwis/inventory.

WEP 2015: City of Aspen Municipal Water Efficiency Plan. Prepared for the City of Aspen by ELEMENT Water Consulting Inc. and WaterDM. October 2015.

# APPENDIX A

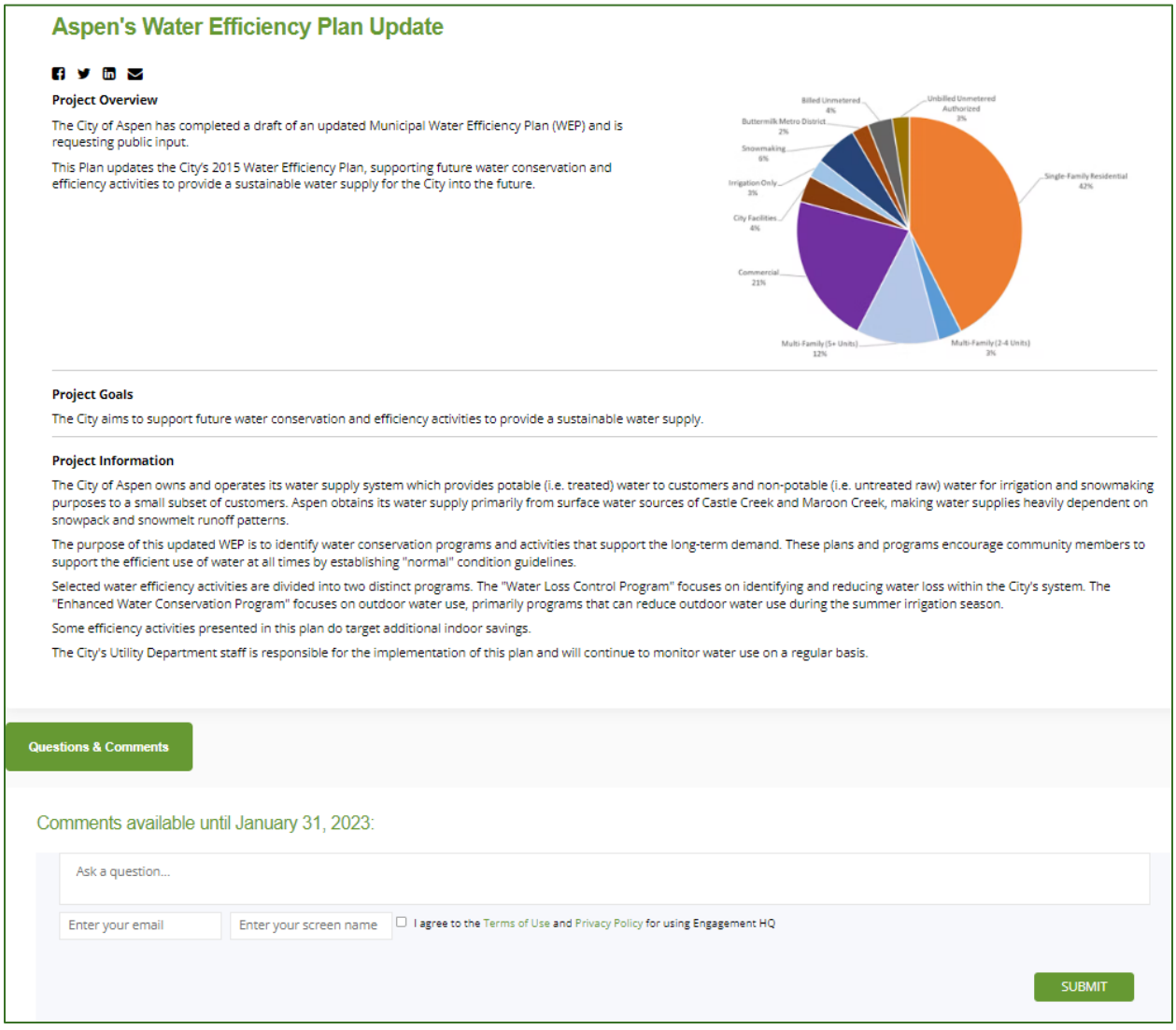
Public Notice, Public Comments Received, and Responses to Public Comments

## PUBLIC NOTICE ANNOUNCEMENT

A public notice was published on December 2, 2022 on the City of Aspen website:

https://www.aspencommunityvoice.com/aspens-water-efficiency-plan

Comments were submitted to the City through an online "Questions & Comments" form and were accepted through January 31, 2023. Below is a screen capture of Aspen's Water Efficiency Plan public notice announcement and comment request form.



## PUBLIC COMMENTS

During the 60-day public review and comment period, the City received one set of comments via the Questions & Comments form shown above, which are provided on the following pages.

ASPEN WATER EFFICIENCY PLAN-COMMENT

Dear Ryan,

I have digested and studied the Aspen Water Efficiency.
Plan, and after my analysis, I contact John Musick, who served as the City and County's water attorney for about 2 decades. He was hired during my first term as Mayor in 1973 and served Herman Edel and Bill Stirling's administrations as well. There is, in my mind, no better authority on Aspen's water, and in fact the entire Colorado River Basin.

He and I have drafted the following comments to the AWEP for your and the Council's consideration.

I hope you will take them in the spirit they are offered, and not take offense to some obviously contrary suggestions.

Sincerely,
Stacy Standley, Mayor, 1973-1979

In the period 1973 through 1991 John served Stacy Standley's council followed by Herman Edel and then Bill Stirling. All 3 of these city councils and Pitkin County Commissioners were focused on the proper balance of fairness, growth and prosperity based in no small part on a complete understanding of the intricacies of the "Water - Energy - Food - Climate - Society NEXUS". We developed and implemented with strong public support the Aspen first "Comprehensive Water and Energy Management Plan". That plan served the City and County well for decades. Now is the time to take a giant step into the future with revolutionary ideas that transcend the parochial local interests of the Roaring For River Valley, by recognizing that Climate/Weather change along with population growth has erased boundaries of the Colorado River Basin. Aspen is now the pivotal "headwaters" of the Colorado River Basin which has become a small compacted "irrigation canal" instead of a great river system that has shrunk many hundreds of miles into but a few feet, and as such Aspen must take a major, significant role in the future of the entire Colorado River Basin by proposing in the new "Water Management Plan" steps throughout the Colorado River Basin. It was in that spirit that the following concepts are proposed for the new Aspen Water Ethic. These concepts are based upon John Musick's years working on the entire Colorado River System and consulting with the very best minds of public policy, engineering, and science and water law. Every concept has deeply embedded science, engineering, public policy and law that are accepted knowledge.

New Aspen Water Ethic "Water - Energy - Food - Climate - Society NEXUS".

1. There should be 100% metering and billing of every drop of water: 7% of the Aspen distribution is un-metered and/or unbilled and un-metered, and should be eliminated.

2. You can not distribute or control what you do not measure: Metering and billing should be by constant recorded instantaneous Wi Fi linked electronic services on all distribution points and reported to every customer and the water department on a instantaneous daily basis, with auto shutoff's for an aberration of usage by 1% or more.

3. All wastewater and storm water must be a fully integrated part of the treated water supply system by municipal recycling and-or irrigation and municipal water usage.

4. Downstream water flows which exceed minimum stream flow must be acquired and piped back into the upstream Aspen intake.

5. Aspen and Pitkin county must negotiate with Twin Lakes Canal and Reservoir Company and Fry-Ark project to create water savings for their service area which water can be allowed to stay in the Roaring Fork River Valley.

6. Salvation Ditch, Red Mountain Ditch and all other local irrigation systems should become a part of the Aspen water conservation and reuse ethic.

7. 100% of all leaks and water waste must be ended immediately.

8. Every tree, plant and natural out-of-house improvement must be identified and the water usage calculated by Lysimeter and or other instantaneous soil moisture storage measurement system, and then a local research and development lab created to test, grow and install water conserving plants and systems for out-of-house water management and control.

9. All local streets should be coated with bright reflective surfaces to maintain a cooler Urban Heat island and thus improve out-of-house water usage.

11. Aspen should create its own bottled (no plastic) water supply for individual use from high quality spring and distribute at least 2 gallons per person per day inside of city service area for drinking water usage at cost to increase the Aspen water supply.

12. Aspen should divert into vertically oriented pipeline coils (24 to 48 inch) in all areas streams to capture water runoff that exceeds minimum stream flows, and keep the vertical coiled pipelines at or above the city base elevation for instantaneous "pipeline coil reservoir storage".

13. Every new or remodeled home and business must have installed an on-site water storage tank for at least 3 months of driest month in-house water usage.

14. Aspen should participate individually and/or with other Colorado River Basin water users in regional ocean, salt flats and poor quality oil field wastewater/"Produced water (i.e., Rangely Field and Utah basin) purification desalination and urban wastewater recycling for earning water use credits.

15. Aspen should negotiate with Colorado River Basin Indian tribes to create constructive water savings and water credit system for the benefit of Indian Reservation and also Aspen water usage.

16. Aspen should negotiate to replaced Colorado River Basin hydroelectric power generation with renewable energy to earn water storage credits for regional reservoir.

## CITY OF ASPEN RESPONSES TO PUBLIC COMMENTS

The City of Aspen prepared and provided the following response to the public comments received.

*The City of Aspen appreciates the comments received. The comments have been reviewed and acknowledged. Utilities' staff believe the updated Water Efficiency Plan and Aspen's Integrated Resource Plan reflect wise water stewardship and responsible and efficient use of water resources. Responses to specific items are provided below.*

1. There should be 100% metering and billing of every drop of water: 7% of the Aspen distribution is un-metered and/or unbilled and un-metered, and should be eliminated.

*Response: Aspen endeavors to meter water provided to all permanent customers. Accounts associated with the unmetered categories are typically homes in the remodel or construction process that do not have the ability to install a physical meter. This condition is temporary, and all accounts are metered as soon as feasible.*

2. You can not distribute or control what you do not measure: Metering and billing should be by constant recorded instantaneous Wi Fi linked electronic services on all distribution points and reported to every customer and the water department on a instantaneous daily basis, with auto shutoff's for an aberration of usage by 1% or more.

*Response: Aspen has implemented advanced metering infrastructure in the connections to its water customers. This system allows near-instantaneous tracking of consumption and this data is shared transparently with customers through a web portal. This information allows both customers and the utility to make informed resource-use decisions in real-time. Extra ordinary use is reviewed on a case-by-case basis and communicated with the customer. The Water Loss Program described in the updated Water Efficiency Plan further addresses this topic.*

3. All wastewater and storm water must be a fully integrated part of the treated water supply system by municipal recycling and-or irrigation and municipal water usage.

*Response: Aspen includes these water sources within its integrated water system planning process.*

4. Downstream water flows which exceed minimum stream flow must be acquired and piped back into the upstream Aspen intake.

*Response: This proposal is incompatible with current Colorado water law and cooperative regional water planning efforts.*

5. Aspen and Pitkin county must negotiate with Twin Lakes Canal and Reservoir Company and Fry-Ark project to create water savings for their service area which water can be allowed to stay in the Roaring Fork River Valley.

*Response: Aspen and other regional partners communicate frequently with adjacent water managers and continue to work collaboratively to find efficiencies and enhancements for both Aspen and the larger region.*

6. Salvation Ditch, Red Mountain Ditch and all other local irrigation systems should become a part of the Aspen water conservation and reuse ethic.

*Response: Aspen regularly shares its values around water efficiency and conservation through ongoing community outreach and public information activities. Water rights holders outside of Aspen's jurisdictional authority are governed by the Colorado Division of Water Resources. The Educational Activities under the Enhanced Water Conservation Program described in the updated Water Efficiency Plan further address this topic.*

7. 100% of all leaks and water waste must be ended immediately.

*Response: Aspen endeavors to proactively find and repair any system issues to prevent loss. Metering calibration, leak surveillance, real-time system monitoring, and use of advanced metering infrastructure are just some of the methods Aspen uses to minimize water waste. The Water Loss Program described in the updated Water Efficiency Plan further addresses this topic.*

8. Every tree, plant and natural out-of-house improvement must be identified and the water usage calculated by Lysimeter and or other instantaneous soil moisture storage measurement system, and then a local research and development lab created to test, grow and install water conserving plants and systems for out-of-house water management and control.

*Response: Aspen is a leader in creating the sustainable urban landscaping that is called for in the recently updated Colorado Water Plan. Aspen has created the Water Efficient Landscape Standards [https://www.aspen.gov/DocumentCenter/View/8928/WELS---Water-Efficient-Landscaping-Standards-October-2022-Revised-10132022](https://www.aspen.gov/DocumentCenter/View/8928/WELS---Water-Efficient-Landscaping-Standards-October-2022-Revised-10132022) which guide new developments and substantial remodels in creating a water budget and resilient landscape that furthers the community's conservation values. This and other activities under the Enhanced Water Conservation Program described in the updated Water Efficiency Plan further address this topic.*

9. All local streets should be coated with bright reflective surfaces to maintain a cooler Urban Heat island and thus improve out-of-house water usage.

*Response: Aspen maintains a vibrant urban forest and is part of the Tree City USA program. These efforts coupled with open space and land planning tactics greatly reduce the impact of urban heat within Aspen.*

11. Aspen should create its own bottled (no plastic) water supply for individual use from high quality spring and distribute at least 2 gallons per person per day inside of city service area for drinking water usage at cost to increase the Aspen water supply.

*Response: In addition to the high-quality potable water supplied to any Aspen customer, Aspen has created the Aspen Tap program and distributed publicly-available drinking fountains throughout the City for citizens and visitors alike to enjoy.*

12. Aspen should divert into vertically oriented pipeline coils (24 to 48 inch) in all areas streams to capture water runoff that exceeds minimum stream flows, and keep the vertical coiled pipelines at or above the city base elevation for instantaneous "pipeline coil reservoir storage".

*Response: Without a decreed water right, this proposal is-incompatible with current Colorado water law and cooperative regional water planning efforts.*

13. Every new or remodeled home and business must have installed an on-site water storage tank for at least 3 months of driest month in-house water usage.

*Response: This proposal is incompatible with current Colorado water law, cooperative regional water planning efforts, and Environmental Protection Agency and Colorado Department of Health and Environment drinking water standards.*

14. Aspen should participate individually and/or with other Colorado River Basin water users in regional ocean, salt flats and poor quality oil field wastewater/"Produced water (i.e., Rangely Field and Utah basin) purification desalination and urban wastewater recycling for earning water use credits.

*Response: Aspen and other regional partners communicate frequently with adjacent water managers and continue to work collaboratively to find efficiencies and enhancements for both Aspen and the larger region.*

15. Aspen should negotiate with Colorado River Basin Indian tribes to create constructive water savings and water credit system for the benefit of Indian Reservation and also Aspen water usage.

*Response: Aspen and other regional partners communicate frequently with adjacent water managers and continue to work collaboratively to find efficiencies and enhancements for both Aspen and the larger region.*

16. Aspen should negotiate to replaced Colorado River Basin hydroelectric power generation with renewable energy to earn water storage credits for a regional reservoir.

*Response: Currently, the City of Aspen owns and operates a 100% renewable energy portfolio for its electric utility. Aspen continuously looks to refine and optimize renewable energy sources to benefit its customers, align with community values, and provide larger regional benefits.*

# APPENDIX B

Resolution for Plan Adoption

RESOLUTION #007
(Series of 2023)

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF ASPEN, COLORADO, ADOPTING THE CITY OF ASPEN UPDATED MUNICIPAL WATER EFFICIENCY PLAN.

WHEREAS, the City of Aspen has demonstrated a long-term commitment to wise water stewardship and responsible and efficient use of its water resources; and

WHEREAS, the City of Aspen carefully developed a City of Aspen Municipal Water Efficiency Plan (WEP) that Council adopted in 2015; and

WHEREAS, the 2015 adopted Municipal WEP requires a 7-year plan update, attached hereto as Exhibit A, in accordance with the Colorado Water Conservation Act of 2004 so that it meets or exceeds all statutory requirements according to Colorado Revised Statute § 37-60-126; and

WHEREAS, the Updated Aspen WEP was created to identify opportunities for further efficiencies in the Aspen water system; and

WHEREAS, the City of Aspen has been successful in implementing a number of indoor and outdoor water conservation and efficiency measures and has now identified additional measures that focus on water efficiency to reduce water demands and provide reasonable cost savings for water utility customers.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF ASPEN, COLORADO,

Section One

The City Council of the City of Aspen hereby adopts the updated City of Aspen Municipal Water Efficiency Plan.

INTRODUCED, READ AND ADOPTED by the City Council of the City of Aspen on the 14th day of February 2023.

Torre, Mayor

I, Nicole Henning, duly appointed and acting City Clerk do certify that the foregoing is a true and accurate copy of that resolution adopted by the City Council of the City of Aspen, Colorado, at a meeting held, February 14th 2023.

Nicole Henning, City Clerk

# APPENDIX C

CWCB Plan Approval

COLORADO
Colorado Water Conservation Board
Department of Natural Resources
1313 Sherman Street, Room 718
Denver, CO 80203

May 9, 2023

Cole Langford
City of Aspen Utilities
427 Rio Grande Pl
Aspen, CO 81611

Dear Cole Langford:

The Colorado Water Conservation Board (CWCB) received a locally adopted Water Efficiency Plan from the City of Aspen for review and approval. The CWCB has determined the Plan to be in accordance with §37-60-126 and the CWCB's Guidelines for the Office to Review Water Conservation Plans Submitted by Covered Entities. The Plan is hereby ***approved*** and City of Aspen may proceed with its implementation.

The Plan will be kept on file at the CWCB and shall be accessible to the public through our website and the Water Resource Information Center. The Plan will also be made available to the Colorado Water Resources & Power Development Authority and the Finance section within the CWCB should you apply for a loan from either agency. ***This Plan will expire May 9, 2030***.

As City of Aspen begins implementing the efficiency measures outlined in the Plan, please know that the CWCB staff will be available to provide technical and financial assistance.

Thank you again for all your efforts in developing a Water Efficiency Plan. Should you have any questions or need additional assistance, please feel free to contact Sam Stein at sam.stein@state.co.us.

Sincerely,

Rebecca Mitchell

Rebecca Mitchell
CWCB Director

cc: Matt Stearns, CWCB Finance Section
Jim Griffiths, Colorado Water Resources & Power Development Authority