CITY OF
ARVADA

UTILITIES DEPARTMENT
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April 14, 2021

Colorado Water Conservation Board
Office of Water Conservation and Drought Planning
1313 Sherman Street, Room 721
Denver, Colorado 80203
Attn: Kevin Reidy

RE: City of Arvada's Water Conservation Plan

Mr. Reidy,

On behalf of the City of Arvada, I am submitting the final draft of our Water Conservation Plan for the review of the Colorado Water Conservation Board, as required by Section 37-60-126 C.R.S. Pursuant to the Plan guidelines, our company and plan development contact information is as follows:

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City of Arvada- Director of Utilities
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Wendy Essert
City of Arvada- Water Resources Analyst and Plan Coordinator
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In compliance with the 60-day public comment period, notice was placed in the March 2020 issue of The Arvada Report, which is a bi-monthly newsletter published by the City of Arvada. It is distributed to all households, businesses, and City employees. The notice stated that an updated Water Conservation Plan was available online for review and comment, and the location of the plan on the City's website was provided. Nine comments were received within the sixty days, which began on April 1, 2020 and ended on May 30, 2020.

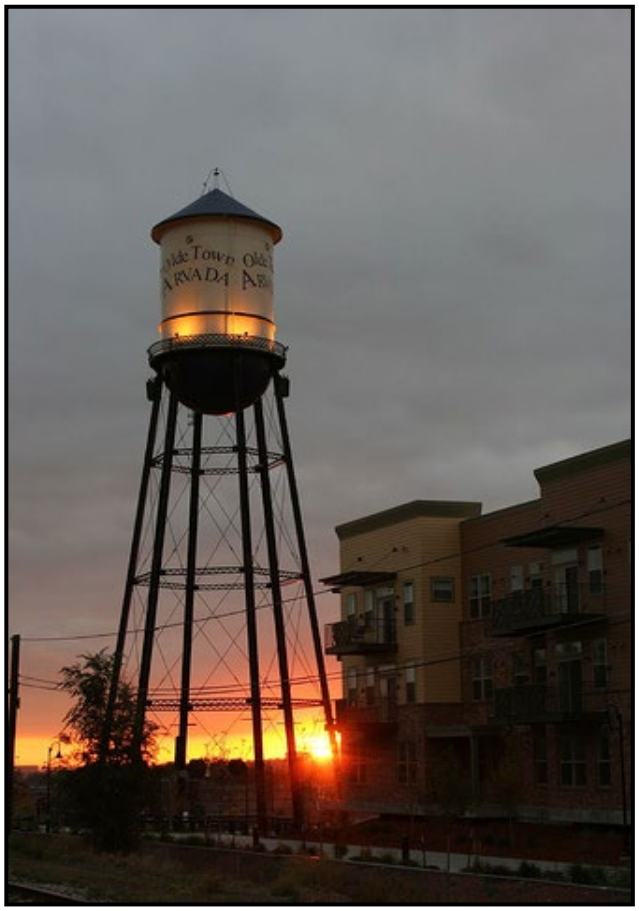
In addition, Arvada's City Council adopted the updated Plan by resolution R21-054 in the April 5, 2021 City Council meeting. The City of Arvada is committed to the implementation of this plan and the resources necessary to carry that out.

Please feel free to contact Wendy Essert, the plan coordinator, at with any questions. Her contact information is listed above.

Thank you-

Sharon Israel
City of Arvada
Director of Utilities

CITY & COMMUNITY OF ARVADA



Water Conservation Plan

September 2019

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Introduction

Arvada's History

Arvada's history began in June of 1850 with the first recorded discovery of gold in Colorado by Lewis Ralston. The first irrigation ditch was dug in 1860 and a maze of irrigation ditches followed, many of which still exist today. The ditches alone could not provide enough reliable, quality water, and the first well was dug in 1870.

When the Town of Arvada was incorporated in 1904, it was an agricultural community known as the "Celery Capital of the World". The town had a population of 600. Water was either drawn from individual wells or from buckets filled in the irrigation ditches.

As Arvada's early pioneers settled into their daily routines, the demands for water grew along with the population. Farmers needed water to grow crops and miners required water for milling operations. The local blacksmith and the barber needed water for their daily operations as well.

A primary responsibility of any municipality is the provision of water. In 1910, the Arvada Water Tank was completed, providing artesian water that promised to end all water problems. However, it didn't take long for a growing population to stress the existing water system.

Throughout the years that followed, more wells were dug and dug deeper again. Pumps were installed and more water storage was added. By 1955 the population had grown to over 10,000. Residents were using 160 million gallons of water on an annual basis, and the well system was strained to the breaking point.

In 1957, a small water treatment plant was built which utilized water from the Clear Creek basin water rights the City had acquired.
In 1960, a contract was signed between Arvada and the Denver Water Board for 19,000 acre feet of water per year. The contract secures three-fourths of Arvada's current annual water needs. This water is collected from the Fraser River and South Boulder Creek Basins and transported first to Gross Reservoir and then to Ralston Reservoir. The water is treated in the City's Ralston Water Treatment Plant, which operates year-round.

The remaining one-fourth of the City's water supply comes from the City's Clear Creek basin water rights. These agricultural rights have been converted into municipal use. This water is stored in the Arvada Reservoir and treated in the Arvada water treatment plant facility, a peaking plant generally used in the summer months.

Today, Arvada is a bustling city combining suburban residential comfort with an eclectic mix of lively businesses. Spread out over more than 25,000 acres of land, the City's population has grown to over 120,000.

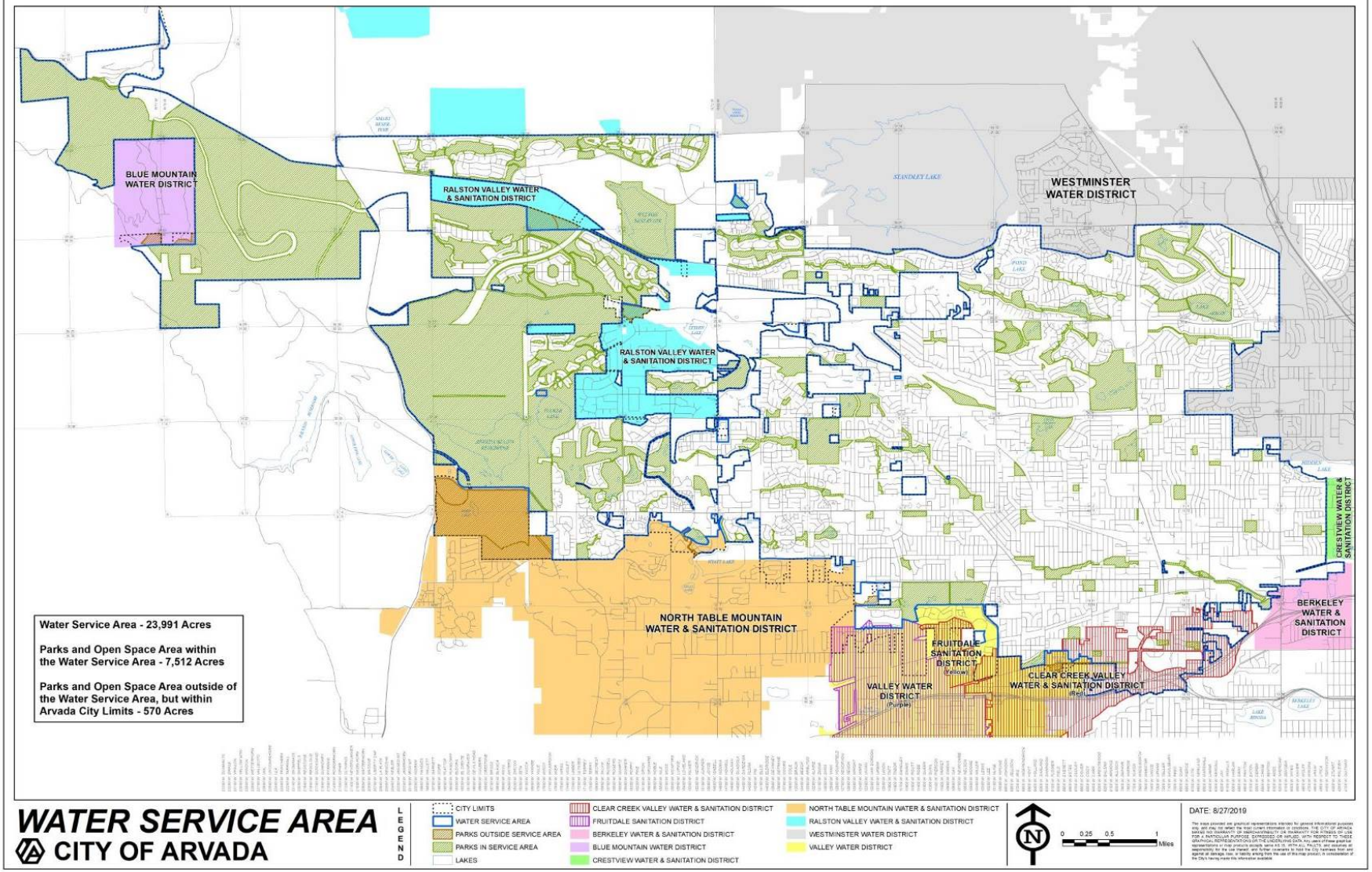
Throughout Colorado the competition and expense for water supplies is increasing while the availability of local water supply sources is decreasing. Water conservation is becoming an increasingly important staple in water management strategies across the Front Range.

Fortunately, the City of Arvada has been a longtime advocate of water conservation. The City adopted universal metering prior to 1950. In 1974 a billing structure was developed with increasing block rates according to customer usage. In 1979 a City code was adopted requiring that all plumbing fixtures be low-flow and all exterior hoses have automatic shut-off valves. In 1989, a comprehensive Water Conservation Master Plan was created and adopted. And most recently, the Arvada Water Supply and Demand Analysis was completed in 2015.

The following is an updated version of Arvada's existing water conservation plan pursuant to the requirements of the Office of Water Conservation and Drought Planning §37-60-126. The statute states that all entities which serve more than 2,000 acre-feet of water per year must file a Conservation Plan with the Colorado Water Conservation Board, and that the plan be updated at least every seven years.

Definition of Terms

Acre-Foot (AF):	The amount of water it would take to cover one acre of land to a depth of one foot; 325,851 gallons.
GPF:	Gallons per flush.
GPM:	Gallons per minute.
Maximum Day:	The largest amount of water used in a single day.
MGD:	Million gallons per day.
MGH:	Million gallons per hour.
Potable Use:	Water that is treated to drinking water standards for municipal use.
Non-Potable Use:	Water that is not treated and is either used for irrigation or other non-potable uses.
Return Flows:	A portion of a water right that was historically used for irrigation that was not consumed by crops and made its way back to the river system as surface water and groundwater.
SFE:	Single Family Equivalent- the amount of water used in a typical single-family home in one year.
ULV:	Ultra-Low Volume- low-flow toilets that use 1.6 gallons of water or less per flush.


BLUE MOUNTAIN WATER DISTRICT
RALSTON VALLEY WATER & SANITATION DISTRICT
RALSTON VALLEY WATER & SANITATION DISTRICT
WESTMINSTER WATER DISTRICT
CRESTVIEW WATER & SANITATION DISTRICT
BERKELEY WATER & SANITATION DISTRICT
NORTH TABLE MOUNTAIN WATER & SANITATION DISTRICT
FRUITDALE SANITATION DISTRICT
VALLEY WATER DISTRICT
CLEAR CREEK VALLEY WATER & SANITATION DISTRICT
Water Service Area - 23,991 Acres
Parks and Open Space Area within the Water Service Area - 7,512 Acres
Parks and Open Space Area outside of the Water Service Area, but within Arvada City Limits - 570 Acres
WATER SERVICE AREA
CITY OF ARVADA
LEGEND
CITY LIMITS
WATER SERVICE AREA
PARKS OUTSIDE SERVICE AREA
PARKS IN SERVICE AREA
LAKES
CLEAR CREEK VALLEY WATER & SANITATION DISTRICT
FRUITDALE SANITATION DISTRICT
BERKELEY WATER & SANITATION DISTRICT
BLUE MOUNTAIN WATER DISTRICT
CRESTVIEW WATER & SANITATION DISTRICT
NORTH TABLE MOUNTAIN WATER & SANITATION DISTRICT
RALSTON VALLEY WATER & SANITATION DISTRICT
WESTMINSTER WATER DISTRICT
VALLEY WATER DISTRICT
0 0.25 0.5 1 Miles
DATE: 8/27/2019

Profile of Existing Water System

Water Sources and Delivery

The City of Arvada covers 39.51 square miles of land, has a current population of approximately 120,490 residents, and maintains 625 miles of distribution mains. The City operates two water treatment plants: Ralston Water Treatment Plant, with a capacity of 36 mgd, and Arvada Water Treatment Plant, with a capacity of 16 mgd. The City of Arvada has emergency interconnects with the City of Westminster and North Table Mountain Water and Sanitation District.

The City has two perpetual firm yield contracts with the Denver Water Board, representing up to 19,531 AF of raw water annually.[1] In addition, Arvada also owns various surface rights in the Clear Creek watershed with an average annual yield of 5,500 AF. Arvada is not currently utilizing its decreed non-tributary groundwater in its domestic water supply.

Arvada Reservoir is the City's main water storage facility with a capacity of 6,361 AF.

Combining the two water treatment plants, Arvada has a total supply capacity of 52 mgd. Maximum water production capacity is 2.17 mgh.
The City's water accounts are fully metered. 2018 service connections and water consumption are broken down as follows:

Table 1: Service Connections

TYPE	ACCOUNTS
Single Family	34,964
Multi-Family Taps	1,489
Commercial	991
Parks & Irrigation	342
Other Accounts	12
TOTAL:	37,798

[1] Storage facilities for contractual water are owned and operated by Denver Water.

Table 2: 2018 Total Water Production (in Acre Feet)

Metered Water:	
Residential	12,615
Commercial	2,123
Parks & Irrigation	2,219
Other	410
Non-Billed Metered Water	192
Total Metered Water	**17,559**
Estimated Usage (R&M,Utility,Fire,etc.)	161
Water Loss	843
Total Water Produced	**18,563**

Water Billing and Rate Structure

The City of Arvada has a four-tiered bimonthly billing system. For in-city residential accounts, consumption up to 30,000 gallons is billed at the first tier rate. As of January 2019, the first tier rate is $3.96 per 1000 gallons. Usage between 30,001 and 60,000 gallons is billed at the second tier rate of $4.96 per 1000 gallons. Usage between 60,001 and 90,000 gallons is billed at the third tier rate of $5.94 per 1000 gallons. Anything over 90,000 gallons is billed at the fourth tier rate, $7.92 per 1000 gallons. Out-of-city customers pay double the in-city rates following the same tier structure; $7.92 per 1000 gallons for the first tier, $9.92 for the second tier, $11.88 for the third tier, and $15.84 for the fourth tier.

Commercial customers have separate tiers based on the size of the meter, as shown below.

Table 3: Non-Residential Water Use Charges- Within City

Meter Size	*Quantity (in 1,000 gallons) at a rate of $3.96 per 1,000 gallons*	*Quantity (in 1,000 gallons) at a rate of $4.96 per 1,000 gallons*	*Quantity (in 1,000 gallons) at a rate of $5.94 per 1,000 gallons*	*Quantity (in 1,000 gallons) at a rate of $7.92 per 1,000 gallons*
5/8" x 3/4"	0 to 170	170 to 340	340 to 510	All Over 510
3/4"	0 to 170	170 to 340	340 to 510	All Over 510
1"	0 to 280	280 to 560	560 to 840	All Over 840
1 1/2"	0 to 600	600 to 1,200	1,200 to 1,800	All Over 1,800
2"	0 to 900	900 to 1,800	1,800 to 2,700	All Over 2,700
3"	0 to 2,000	2,000 to 4,000	4,000 to 6,000	All Over 6,000
4"	0 to 3,400	3,400 to 6,800	6,800 to 10,200	All Over 10,200

Table 4: Non-Residential Water Use Charges- Outside City

Meter Size	*Quantity (in 1,000 gallons) at a rate of $7.92 per 1,000 gallons*	*Quantity (in 1,000 gallons) at a rate of $9.92 per 1,000 gallons*	*Quantity (in 1,000 gallons) at a rate of $11.88 per 1,000 gallons*	*Quantity (in 1,000 gallons) at a rate of $15.84 per 1,000 gallons*
5/8" x 3/4"	0 to 170	170 to 340	340 to 510	All Over 510
3/4"	0 to 170	170 to 340	340 to 510	All Over 510
1"	0 to 280	280 to 560	560 to 840	All Over 840
1 1/2"	0 to 600	600 to 1,200	1,200 to 1,800	All Over 1,800
2"	0 to 900	900 to 1,800	1,800 to 2,700	All Over 2,700
3"	0 to 2,000	2,000 to 4,000	4,000 to 6,000	All Over 6,000
4"	0 to 3,400	3,400 to 6,800	6,800 to 10,200	All Over 10,200

Current Water Conservation Efforts

The City of Arvada has a comprehensive water conservation program in place with current emphasis on increasing the level of customer participation. The City is required by contract to follow any emergency water restrictions imposed by the Denver Water Board. Current water-reduction guidelines in place pertain to the summer watering season, between May 1 and October 1, and state that customers should avoid watering between 10 am and 6 pm, not allow water to spray or pool on non-landscape areas, and avoid using spray irrigation during rain or strong winds.

City Efforts

- The City requires the installation of ultra low-volume (ULV) toilets for new construction or when remodeling includes changes to the existing plumbing system.
- Reduced tap fees are offered for water-conserving landscaping.
- An ongoing Xeriscape program at the Majestic View Nature Center, which includes demonstration gardens and public education, is available to the public year-round.
- Watering guidelines as well as water conservation tips are available on the City's website.
- Garden-in-a-Box kits and Water-Wise Landscape Seminars are offered seasonally to all City residents.
- 6% of the water system is inspected for leaks annually.
- Approximately 20% of the Water Fund's annual operating budget is dedicated to replacing old and leaking pipe infrastructure.

Public Education

The City of Arvada takes advantage of the many types of media available for relaying water conservation information to the citizens of Arvada.

- Water-saving tips are posted on the City's public website at arvada.org.
- The Arvada Report, which is a bi-monthly newsletter sent out to Arvada residents and businesses, periodically contains water conservation information such as watering guidelines, water-saving tips, and information on detecting sprinkler system leaks.

- The City's Nature Center staff educates both adults and children with their hands-on water demonstrations both at the Majestic View Nature Center and at local elementary schools.

City Facilities

The Majestic View Nature Center is a 3,000 square-foot public facility located in Arvada that features hands-on nature and environmental displays, Xeriscape gardens, wildlife exhibits, classrooms, and a children's area. The following is their 2018 Water Education Report which is supplied to various departments within the City:

Water Education Report 2018
Majestic View Nature Center

Within Majestic View Nature Center's mission of promoting environmental education and interpretive sciences for the Arvada community, many programs focus on Water Conservation and Stormwater Education. In 2018 the Nature Center worked with schools, scout groups and the public in varying capacities from education to partnering with programs that promote water conservation.

The *Science and Conservation of Water* outreach program was presented to ten 6th grade classes (556 students). Four of the ten classes (209 students) finished the optional at-home water conservation challenge to earn a pizza party. Each class received a 40 minute to 1 hour program focusing on the importance of water, the water cycle, Arvada's water sources and conservation ideas. The students received a kit containing their at-home challenge booklet, an information book about water and water resources, a Water Conservation Water Wheel, Toilet Tabs to check for leaks and a Shower Timer.

As part of the *Elementary Exploration* field trip program, seven schools/groups (575 students) chose the Enviroscape class-water pollution source, during their field trip. These students went through a 25-minute hands-on demonstration showing what types of pollutants can end up in our waterways and how it gets there.

The Nature Center's water conserving demonstration garden has name tags for the public to use in deciding which plants they would like in their garden, and an online virtual tour of the garden is in development to be placed on an interactive-touchscreen device within the Nature Center.

The Center has been a host site for *Garden in a Box* pick-up for the past 5 years and this year 510 people visited the site while receiving their water-conserving garden plants. 75 people visited Majestic View while they were picking up their low water demand trees during the *Trees Across Arvada* Event which the Nature Center has hosted for at least 11 years.

Majestic View Nature Center also worked with KATV to create a water-conserving educational video that challenged viewers to become Water Wise. This video encouraged viewers to complete a water conserving checklist, available on our website or in the Nature Center, to look around their home for ways to prevent water waste. If completed and brought into the Nature Center, viewers would receive a prize. The prize is the same as the take-home kits for the *Science and Conservation of Water* students. This was released in late 2018 and already has three completed checklists with 162 views on YouTube and reached 904 Facebook users.

Overall, Majestic View Nature Center ran water focused education programs for 1,131 students and 139 adults in on-site and outreach school programs in 2018. The sustained support from the City of Arvada's Department of Utilities is appreciated and staff is excited to continue promoting water conservation and storm water education.

Water Use and Forecasted Demands

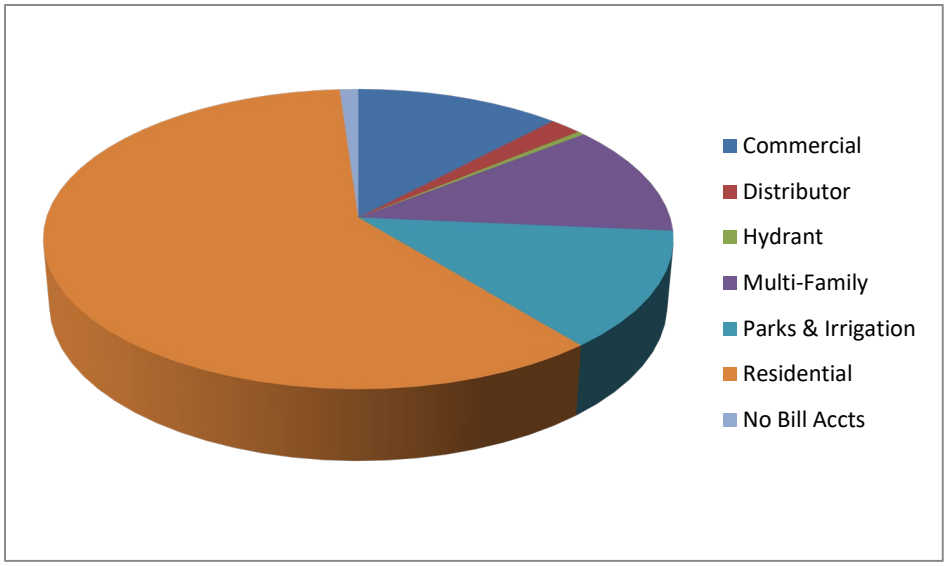
Current Water Use

The City of Arvada supplied 17,559 acre-feet of water to 37,798 accounts in 2018. Accounts are broken down into the following categories:

Table 5: Current Water Use

Category	Acre-Feet
Distributor	335
Hydrant Meters	75
Commercial	2,123
Single-Family Residential	10,510
Multi-Family Residential	2,105
Parks & Irrigation	2,219
No-Bill Accounts	192
TOTAL	17,559

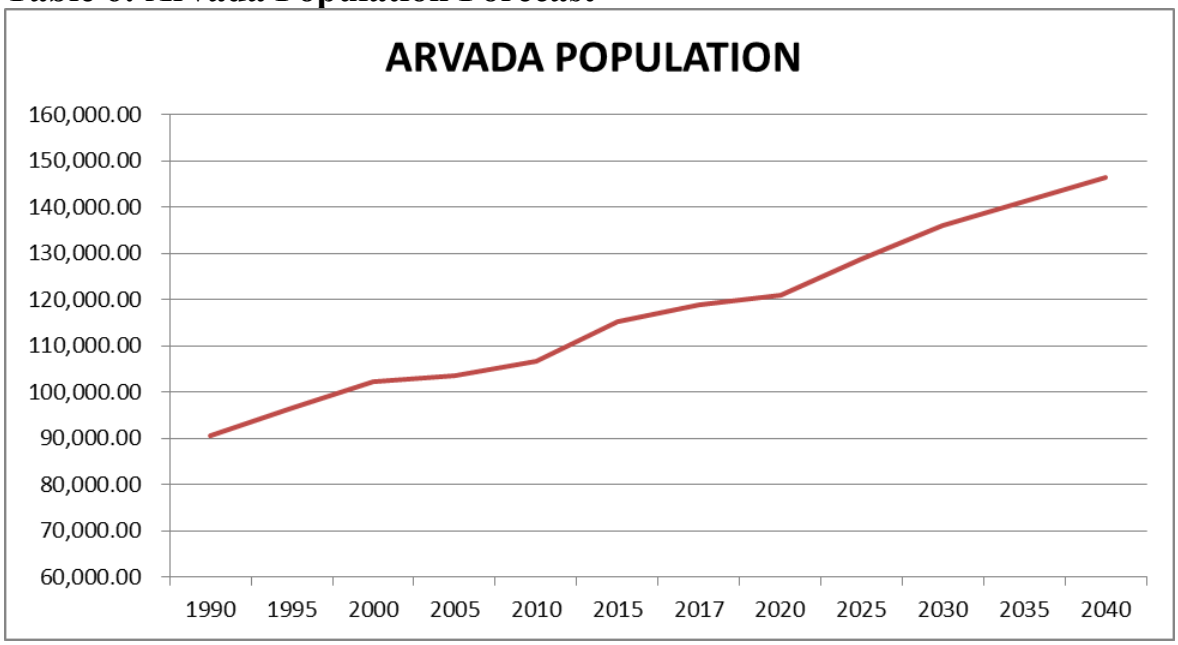
2018 Water use by category can be seen in the following graph:



Demand Forecast

From 1990 to 2018, Arvada's population grew from 90,490 to 120,492. The Arvada Water Supply and Demand Analysis forecasts a steady population increase to over 146,000 by 2040.

Table 6: Arvada Population Forecast



Anticipating a steady population increase and a similar trend in job growth, the table below shows an approximate annual water demand of 20,902 acre-feet per year by 2038.

Table 7: Preliminary Water Demand Forecast (in acre-feet)

	2018	5-Year Forecast	10-Year Forecast	20-Year Forecast
Residential Demand				
Annual Water Sales- Residential	15,244			
Current Population	120,492			
Residential Sales per Capita	0.1265			
Projected Population		125,000	132,500	144,500
Projected Residential Water Demand		15,813	16,761	18,279
Non-Residential Demand				
Annual Non-Residential Sales	2,123			
Current Number of Jobs	37,207			
Water Use per Job	0.0571			
Projected Number of Jobs		38,821	40,036	42,575
Projected Non-Residential Water Demand		2,217	2,286	2,431
Non-Account Water				
Current and Forecasted Amount	192	192	192	192
Water System Total Demand				
Current Total Annual Water Demand	17,559			
Projected Total Annual Water Demand		18,221	19,239	20,902
Total Annual Water Demand Forecast	**17,559**	**18,221**	**19,239**	**20,902**

Based on the above chart, average-day and maximum-day demand can be forecast as follows:

Table 8: Average-Day and Maximum-Day Demand Forecast (in mgd)

	2018	5-Year Forecast	10-Year Forecast	20-Year Forecast
Average-Day Demand	15.0	15.7	16.5	18.1
Maximum-Day Demand	41.2			
Maximum to Average Day Demand Ratio	2.75			
Projected Maximum-Day Demand		43.1	45.3	49.7
Maximum-Day Demand Forecast	41.2	43.1	45.3	49.7
Daily Treatment Capacity	52.0	52.0	52.0	52.0

Proposed Facilities

Moffat Collection System Project

The City of Arvada and Denver Water have entered into a contract that would provide Arvada with 3,000 acre-feet of raw water with storage. This project will include the expansion of Gross Reservoir. Construction is anticipated to begin by 2020, with an estimated cost to the City of Arvada of $111 million.

Highway 93 Reservoir

Highway 93 Reservoir is a proposed storage area in western Arvada that would provide an additional 3,000 acre-feet of water storage. Estimated costs are between $30 and $50 million dollars. Construction is anticipated to begin in 2025.

Candelas Development Water Storage

The Candelas Development is a 1500-acre urban renewal area located in the northwest quadrant of the City of Arvada. Several water storage tanks have been built as the development has progressed. An additional 1.5 million gallon tank will be constructed by 2021. The estimated cost is $3.2 million.

Conservation Goals

Water Conservation Goals

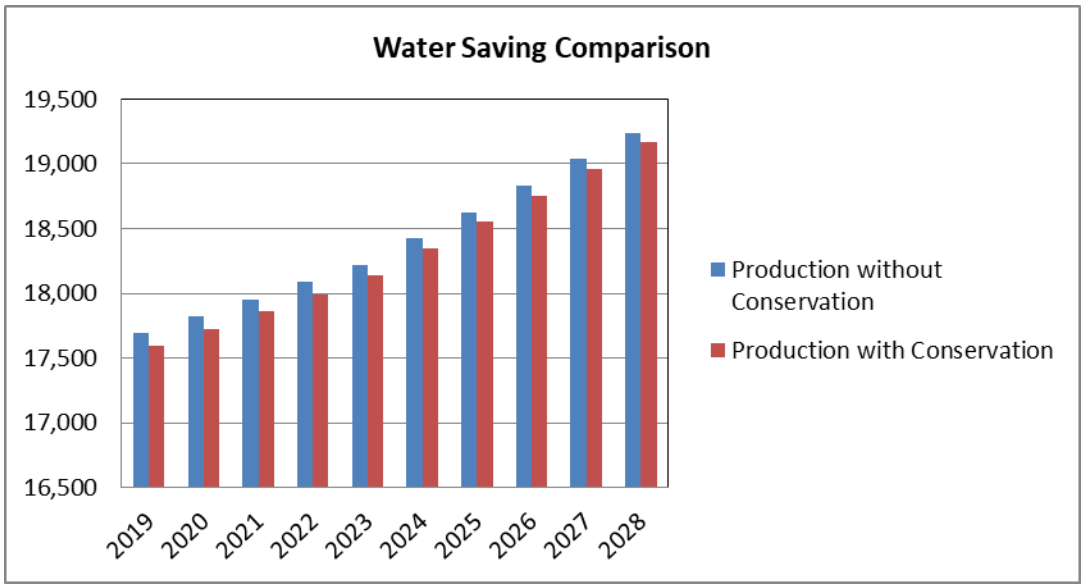
Water conservation can benefit the citizens of Arvada by preserving water resources, lowering long term water costs, reducing demand on the wastewater system, and extending the life of existing facilities.

The City Council has adopted goals relating to resource conservation and the environment in its Comprehensive Plan. Water supply conservation goals are as follows:

Table 9: Water Supply Conservation Goals

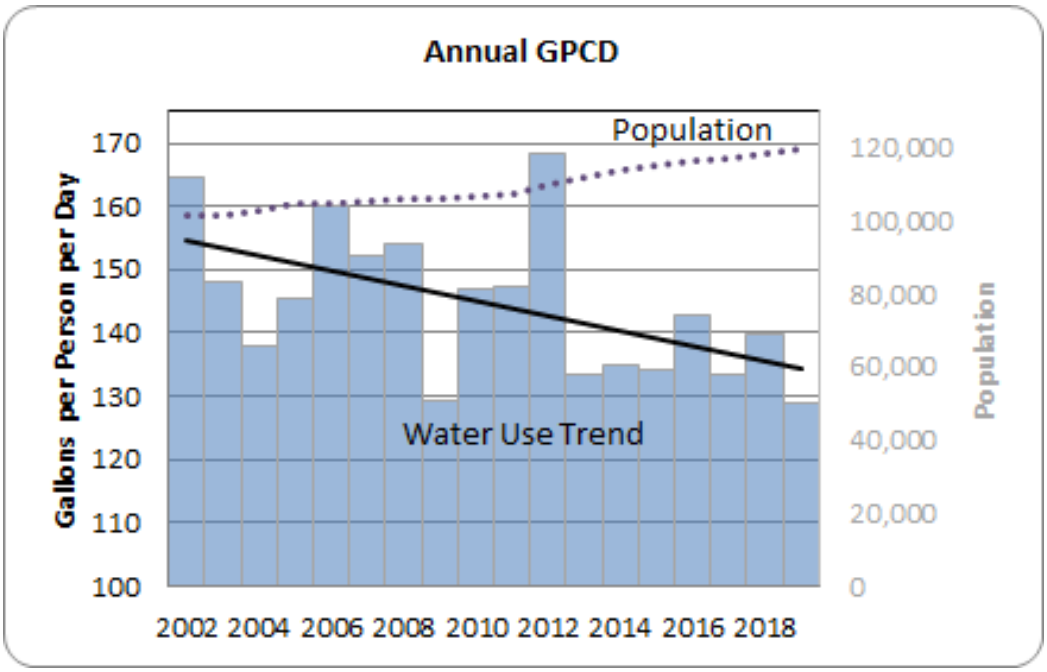
R-7.1 Water-Wise Landscaping	Review and amend the Land Development Code for xeric and urban landscaping requirements: being written with periodic updates to City Council.
R-7.2 Water Efficient Compact Development	Promote Transit Oriented Development, compact and mixed use development opportunities to developers. This will also be included in the Land Development Code update.
R-7.3 Expand Public Education Programs	Continue long-term partnership with the Resource Center to offer "Garden-in-a-box" and other homeowner programs. The focus is on turf reduction as well as encouraging use of EPA's WaterSense labeled products.
R-7.4 Increase Water Conservation on Public Lands	New park projects incorporate 15% or greater native landscape per Parks Master Plan recommendations.
R-7.5 Internal Water Efficiency	Support EPA WaterSence program for development and promotion of efficient water application devices.

The City believes its programs will result in an additional 838 AF of water savings by 2029. This amount was reached by forecasting future water consumption, factoring in future population growth, and estimating a declining rate of savings. The 838 AF is based on combined passive and active conservation efforts and represents an overall decrease of 4% of the annual 19,239 AF estimated in our ten-year forecast, as shown in the graph below.



The City of Arvada remains dedicated to water conservation. The City's current water conservation programs have resulted in significant reductions in water needs. As the population has continued to rise, the water use trend has continued to decline. The City will be continuing these effective programs. Although Arvada is optimistic about reduced consumption as a result of water conservation, we will continue to plan ahead for future drought and potential water shortages through the planned Moffat Collection System Expansion Project.

Table 10: Water Use Trend



Identify Water Conservation Measures & Programs

Per the requirements stated in statute 37-60-126, the following water conservation measures and programs have been identified and evaluated for current implementation and future consideration.

Table 11: Water Conservation Measures and Programs

Conservation Measure	Program	Cost	Water Savings in Acre-Feet per year
Water-Efficient Fixtures & Appliances	Water Conservation Ordinance	-	-
Landscape Efficiency- Seminars	Water-Wise Landscape Seminars	5,400	.5
Landscape Efficiency- Consultations	Landscape Consultations	17,000	1.6
Landscape Efficiency- Xeriscape/Customer Incentives	Garden-In-A-Box Program	28,300	1.4
Landscape Efficiency- Customer Incentives	Reduced tap fee program	-	31.4
Water-Wise Landscaping Code Requirements	Revisions to development standards requiring more water-efficient landscaping	-	7.9
Water Efficient Compact Development Code Changes	Revisions to zoning requirements to allow for less landscaped area	-	1.6
Increase Water Conservation on Public Lands	New park projects to incorporate 15% or greater native landscape	-	1.5
Water Efficient Industrial & Commercial Water Using Processes	Car Wash Recycle Program	-	-
Distribution System Leak Detection and Replacement	Replacement of worn out leaking pipelines	3,800,000	27
Public Education and Information Dissemination	Various Programs	32,000	25
Water Rates Structure and Billing Systems Designed to Encourage Efficiency	4-Tiered Bimonthly Billing System	-	-
Regulations/Ordinances	Currently Implemented	-	-
		3,882,700	97.9

Evaluation and Selection of Conservation Measures & Programs

Water Efficient Fixtures and Appliances

The City of Arvada has low-flow plumbing ordinances in place that require the installation of ULV toilets on all new construction or when any remodeling includes changes to the existing plumbing system. As specified in the regulations/ordinances section of this Plan, all additions and alterations to existing residential, commercial, and industrial structures issued a building permit must comply with the 1.6 gallons or less per flush for toilets. In addition, all showerheads used for the purpose of bathing, lavatory faucets, and sink faucets shall have a maximum flow capacity of 2.5 gallons per minute. However, due to the increased availability and lower costs of higher-efficiency fixtures and appliances, many builders and homeowners are opting for the newer EPA standard toilets and showerheads that use a maximum of 1.28 gpf and 2.0 gpm, respectively.

Landscape Efficiency

The City of Arvada's Land Development Code requires water wise landscaping standards. These standards are explained in the Regulations/ Ordinances section of this Plan. The City has an ongoing Xeriscape program which includes demonstration gardens and public education. A large interactive demonstration garden was debuted in 2010 at the Majestic View Nature Center.

Partnering with ReSource Central, the City offers Landscape Seminars which focus on Xeriscaping and other sustainable landscaping practices. 297 people attended the seminars in 2018.

ReSource Central also offers professional landscape consultations designed to help residents save water through changes in landscape. They provided 166 consultations and follow-ups in 2018, at no charge to City residents.

Arvada has participated in ReSource Central's Garden-in-a-Box Xeriscape Program since 2013. Through this program, the City offers residents "plant-by-number" Xeriscape gardens along with the planting and care instructions. The gardens use half the water of typical landscapes, and are offered to the residents at a discounted cost.

The city purchased 456 gardens in 2018 at a cost of $28,272. For each garden that replaces turf, the water savings is estimated at 1,000 gallons per year. This program has proven very popular in recent years.

Reduced tap fees are offered for water-conserving landscaping. Owners and developers who request an irrigation meter are required to supply the City's Utility department with maps and information detailing how much of the landscape/irrigation area will be sod (non-conserving landscape) and how much will be non-sod, such as mulch beds, shrubs, or trees (water-conserving landscape). The plans are reviewed, and the tap fees are then determined based on square footage of sod and non-sod areas.

Current tap fees are 1.48 cents per square foot for sod, and 74 cents per square foot for non-sod. The reduced tap-fee program is listed in the City's Water Tap Fee schedule which is posted on the City's web page or available at City Hall. Tap fees are determined on a case-by-case basis. To estimate savings, the City of Arvada issued irrigation taps in 2018 that irrigated 1,137,650 square feet of low-water-use landscaping. Assuming non-sod areas need 9 gallons per square foot per year and sod needs 18 gallons per square foot per year, the reduced tap fee program saved approximately 31.4 AF of water.

In addition, the City of Arvada has drafted updates to the Land Development Code, which are currently under review. The new code is scheduled to be adopted in 2020. Three new water conservation measures are included in the updates.

Development standards will require 10% more water-wise landscaping for new developments. It is estimated that 8 gallons per square foot will be saved. Based on developments approved in 2018, approximately 7.93 AF of water would be saved annually.

Revisions to zoning requirements will allow for smaller lot sizes in exchange for permanent protection of sensitive lands and/or common open space. The result will be a 10% reduction in that landscaped area. Based on an estimate that one development annually will take advantage of this type of zoning, an estimated 1.63 AF of water will be saved.

To increase water conservation on public lands, the City will require all new park projects to incorporate 15% or greater native landscape. At one ten-acre park per year, a 15% savings will equate to 1.5 AF of water saved.

Industrial and Commercial Efficiency

All in-bay automatic and conveyor car wash installations that obtain a certificate of occupancy or a temporary certificate of occupancy from and after June 1, 2003 that use water supplied by the city water system shall be required to be equipped with, and shall maintain in operation, a water recycling system that will recycle not less than 50 percent of the water being used by such car wash installation.

Water use at car washes varies greatly due to many factors such as weather, location, and type of car wash. Therefore, estimating water savings as a result of water recycling can be somewhat difficult. However, according to the International Carwash Association, water use by car washes with reclaim systems can reduce water use by more than half.

Water Reuse Systems

By contract, the water obtained from Denver Water cannot be reused. Arvada has a one-time use with this water, and then dominion and control reverts back to Denver Water. The City has a number of water rights that allow for reuse of return flows. The City currently utilizes return flow credits to supplement the raw water supply. Approximately one half of our Clear Creek water is treated at the Metro Wastewater Reclamation District, which we then use to meet our return flow obligations on the South Platte.

Distribution System Leak Detection and Replacement

The City utilizes a leak detection system to routinely monitor the system for leaks that have not surfaced. The City's Water Transmission and Distribution Department uses Permalog sensors to survey for leaks. The data is collected by a receiver and then downloaded to a computer for analysis. The system is also used to assist homeowners in detecting leaks in the household system.

In addition, the City has an ongoing main line replacement program which costs approximately $3.8 million per year to replace the older water mains, which are increasingly prone to failure and leakage. Literature reviews

indicate that between 250,000 and 300,000 breaks occur every year in the U.S., which corresponds to a rate of 25 to 30 breaks/(100 miles)/year (Grigg, 2007; Deb et al., 2002). It is estimated that the main replacement program prevents the loss of approximately 27 AF of water per year.

Public Education and Information Dissemination

The City currently utilizes water-bill inserts, newsletters, informational booths at public events, youth education programs, the City website, and social media such as Twitter and Facebook to educate and engage its customers regarding water conservation and water resources management. In addition, the City employs a full-time Water Conservation Specialist at the Majestic View Nature Center. This position was funded to help provide water conservation educational materials to the public, with many of the programs designed for elementary-age children.

According to *Water Conservation for Small- and Medium-Sized Utilities* (Deborah Green, 2010), public information, on its own, is likely to save the least amount of water when compared to other measures. When public information is the only measure offered by a utility, water savings range from 2 to 5 percent during non-crisis periods. It is, however, intended to support and supplement the other measures by providing residents and businesses information about the water-saving programs available to them. Although the direct effects of public education alone cannot be measured, it is a vital part of the overall water conservation plan, encouraging consumer behavioral and lifestyle changes.

Customer Water Use Audits

The City of Arvada conducted a Residential Water Audit Program from 1991 to 1993. The program included retrofitting homes with low-flow showerheads, faucet aerators, and Future Flush toilet retrofit devices. The project also included distributing literature, education, and a review of individual water consumption histories. The three-year cost of the project was $189,200, with 90.6 AF of water saved.

The City's current water use audits are done through the billing system and are based on monitoring increases in customer water consumption. A large jump in water consumption from one billing cycle to the next triggers an account review. Customers are contacted by City staff to quickly notify them of the increase and to assist in determining the cause of the increase.

Bi-monthly reports, which are created through the billing system, flag accounts with possible leaks and list the top 100 water users. The potential leaks are forwarded to the leak detection program administrator for review, and the list of high water users is analyzed by the water resources administrator.

Water Rates Structure and Billing Systems Designed to Encourage Efficiency

The City's water rates are designed to promote water conservation. The City has a four-tiered bimonthly billing system for its residential customers, with inclining block rates based on usage. Commercial customers have separate tiers based on the size of the meter. See the Water Billing and Rate Structure section of the plan for details.

Regulations/Ordinances

City of Arvada- Land Development Code
Section 6.5.2, Parts G and H
G. Water Wise Landscaping Required. All landscaping plans shall be designed to conserve water to the greatest degree practicable. The regulations of paragraph "H" cover the following types of development:
1. Single-family detached development where landscaping is installed by the developer or builder;
2. Two-family development where landscaping is installed by the developer or builder;
3. Multi-family development;
4. Commercial development;
5. Industrial development;
6. Office development;
7. Any privately-owned common open space; and
8. Landscaping installed within public rights of way as may be required as part of the development approval process or City street templates.

H. Water Wise Landscaping Standards.
1. Plant Selection. All tree, shrub, groundcover, perennial, vine, and grass selections shall come from the City's recommended list.
Substitutions are only allowed if approved by Community Development Director upon reviewing evidence as to the waterconserving qualities of proposed substitutions.
2. Use of High-Water-Demand Landscapes. High water-demand

landscapes (such as irrigated cool season turf grass) are limited to areas of high pedestrian activity, tree lawns, primary entrance features, club-houses, wetland plantings, or in single-family lot front yards. High-water-demand turf shall be minimized to the extent practicable and not exceed 50% of the total landscaped area in residential projects and 35% in commercial, office or industrial projects. High-water-demand turf is specifically prohibited in the following (unless approved by the Community Development Director after reviewing evidence of a water-efficient irrigation system):

a. Parking lot islands,

b. Slopes greater than 4:1,

c. Street medians,

d. Storm water detention ponds, unless designed for active recreation or needed as part of required wetlands;

e. Any space less than 8 feet wide.

3. Grouping Plants According to Water Needs. All plantings should be grouped according to their water needs to minimize water use.

4. Soil Amendments. Prior to planting, all sites for plantings shall incorporate soil amendments at a rate of 3 cubic yards per 1000 square feet to a minimum depth of 6". A lesser amount shall be allowed if a soil test shows that 3 cubic yards per 1000 square feet is not necessary for water retention and deep rooting of plant materials. If the specified plant material requires less fertile soil, those areas may have less soil amendments installed if approved by the Community Development Director. These areas shall be identified on the landscape plan. Existing topsoil shall be salvaged and stockpiled for use as soil amendments or topsoil. No topsoil shall be removed from the site unless the City approves the transfer of topsoil to a City-owned park or open space area. A note shall be placed on the landscape plan reflecting the above requirements regarding soil amendments and topsoil. Examples of acceptable soil amendments include compost and aged manure. Mountain peat and inorganic materials such as sand, gypsum and lime are prohibited soil amendments. All sites are subject to inspection by the City for compliance with soil amendment requirements.

5. Irrigation. The landscape plan shall label or note the type of irrigation to be applied to each plant hydrozone to ensure that plants receive only the needed water. In addition, the plan shall

include:
a. A rain sensor with automatic shut-off of the system during periods of high moisture;
b. A drip, sub-surface, bubbler or low volume irrigation system for all planting strips less than 8' wide and all planting beds involving trees, shrubs, perennials and groundcover; and
c. An irrigation clock which allows programming to meet the differential needs of the specified planting plan.
6. Restrictive Covenants Requiring Sod. Any restrictive covenant that becomes effective after July 15, 2003 shall not prohibit the use of water-wise landscaping or require more than 50% highwater-demand turf. This provision shall not restrict the individual and voluntary use of a greater percentage of high-water-demand turf.

The following ordinances pertaining to water conservation have been adopted by the City of Arvada:

ARVADA, COLORADO CODE OF ORDINANCES
UTILITIES
WATER AND SEWER
DIVISION 4. WATER CONSERVATION

Sec. 102-101. Intent.
(a) The purpose of this division is to require mandatory provisions for the conservation of the city potable water supply by the utilization of certain plumbing fittings and fixtures and water use practices.
(b) These provisions apply to all residential structures, including but not limited to one- and two-family residences, townhomes, condominiums, apartment buildings, hotels and motels that are issued a building permit. Section 102-103(b) applies to commercial and industrial structures issued a building permit.
(c) All additions and alterations to existing residential structures issued a building permit will comply with the provisions of this division when the work includes the installation or replacement of plumbing fixtures and fittings governed by this division.
(d) All additions and alterations to existing commercial and industrial structures that are issued a building permit will comply with the provisions of subsection (b) of this section when the work includes the installation or

replacement of plumbing fixtures and fittings governed by section 102-103(b).
(Code 1981, § 33-51; Ord. No. 2574, § 1, 11-21-1988)

Sec. 102-102. Maximum capacity of plumbing fixtures and fittings.
(a) The potable water system in all residential structures shall be equipped with an approved pressure regulator valve when the water pressure at the city water main is greater than 80 pounds per square inch gauge (psi). The maximum water pressure on the discharge side of the pressure regulator valve shall not exceed 75 psi.
(b) Tank-type water closets shall be designed to flush with a maximum of 1.6 gallons of water.
(c) Showerheads used for the purpose of bathing, lavatory faucets and sink faucets shall have a maximum flow capacity of 2.5 gallons per minute.
(Code 1981, § 33-52; Ord. No. 2574, § 1, 11-21-1988; Ord. No. 2763, § 1, 11-5-1990; Ord. No. 3127, § 8, 10-24-1994)

Sec. 102-103. Contractor/owner responsibility.
(a) The licensed contractor or owner/occupant responsible for the installation of waterflow control plumbing fittings specified in this division will provide information upon request to the building inspection division certifying that the fittings are in conformance with the maximum waterflow to volumes stipulated herein. Testing reports by a recognized, independent testing laboratory or reports of tests performed by the manufacturer, using established principles of mechanics, are acceptable.
(b) All waterflow control fittings installed as specified in this division will be maintained in a sanitary working condition and free of defects which may reduce the effectiveness of water conservation.
(Code 1981, § 33-53; Ord. No. 2574, § 1, 11-21-1988)

Sec. 102-104. Special equipment for hoses used to wash vehicles.
Hoses used for washing of vehicles shall be equipped with a shut-off valve that is normally closed and necessitates hand pressure on the valve to permit the flow of water.
(Code 1981, § 33-54; Ord. No. 2574, § 1, 11-21-1988)

Sec. 102-105. Appeal for exception.
Relief from the requirements of this division may be granted by the chief building official upon satisfactory demonstration by the appellant that the water conservation requirements stipulated herein are detrimental to health or

safety. The city council may waive the enforcement of the requirements of this division if the city council finds and determines that such enforcement creates a financial hardship upon any person.
(Code 1981, § 33-55; Ord. No. 2574, § 1, 11-21-1988)

Sec. 102-106. Waste of water.
(a) *Waste of water is prohibited.* Waste of water is defined as the intentional or nonintentional use of water for a nonbeneficial purpose, including, but not by way of limitation: continuous application of water to any lawn, turf or sodded area resulting in pooling or the flowing of water into the drainage or storm drainage facilities, including sidewalks, gutters, or streets; failure to repair any irrigation system that is leaking; and application of water intended for lawn irrigation to an impervious surface such as building exteriors, a street, sidewalk, or driveway. Notwithstanding the enforcement provisions set forth in subsection (b) of this section, the director may order a shut off of water service to a property if the director reasonably finds that an extreme waste of water is occurring on the property. The term "director" means the director of the utilities department for the city, or his designee.
(b) *Enforcement.* The director is herby authorized to enforce this section. The person billed for water service to a property, whether the person is the owner or an occupant of the property, shall be responsible for compliance with subsection (a) of this section and shall be subject to the following actions and penalties:
(1) Upon a first violation, the person billed will be issued a warning notice.
(2) Upon a second violation at the same property within a 12 month period from the date of issuance of the warning notice, the person billed will be issued a written violation and a charge of $100.00 will be added to the water bill for the property.
(3) Upon a third violation at the same property within a 12 month period from the date of issuance of the warning notice, the person billed will be advised in writing of the violation and a charge of $250.00 will be added to the water bill for the property.
(4) Upon a fourth or any subsequent violation at the same property within a 12 month period from the date of issuance of the warning notice, the person billed will be advised in writing of the violation and a charge of $500.00 will be added to the water bill for the property. In addition, the director may order the installation of flow restriction devices and/or a suspension of water service to the property. In the event that water service to the property is restricted or suspended, the person billed shall first be required to make a $500.00 deposit to the utilities department of the city prior to restoration of

full water service. The deposit shall be retained for 12 months from the date of its receipt. The deposit shall be forfeited if there are any further violations within the 12 month period from the date of the last violation. If, during the 12 month period, there are no further violations of this section, the deposit shall be returned to the person responsible for paying the bill for the property.

(5) Any charge imposed pursuant to this section may be appealed by filing a petition with the director no later than 30 days after having been first billed for such charge. The director may hold such hearing him, or designate another as a hearing officer with the authority to hold such hearing. The filing of a petition shall not stay payment for any charge during the pendency of the hearing. Any petition shall be in writing and shall set forth with particularity the reason for the appeal. Any hearing held pursuant to this section shall take place within the city at a date and time set by the director, but not earlier than 14 days nor later than 60 days from the date of receipt of the petition by the director, unless a different time and date is agreed to by the petitioner and the director. Hearings held pursuant to this section shall be held in accordance with the procedures set forth in section 2-171 et seq.

(6) In addition to the notice of violation served upon, or delivered to the person responsible for payment of the bill, a copy of such notice shall also be mailed to the owner of record of the real property served, if the owner's address differs from the subject property address. Failure to serve the property owner shall not relieve the person responsible for payment of the bill from the obligations or charges set forth in this section.

(c) *Restrictions on uses.* Restrictions on the hours of use, days of use, amounts of use and types and places of use may be placed upon users of water supplied by the city water system. The director shall determine the necessary and proper restrictions and shall cause such restrictions to be promulgated by administrative rule or regulation and duly enforced. The charges and penalties provided in this section shall apply to violations of restrictions on uses as well as for waste of water.

(d) *Administrative rules.* Procedures necessary to give effect to this section that are applicable to the public, and that are not otherwise specified in this section, are hereby authorized. Pursuant to section 2-141 et seq., the director is authorized and directed to promulgate such administrative rules as are useful, convenient or necessary to give effect to the terms and provisions hereof, including by way of illustration but not by limitation, restrictions on hours of irrigation, permissible schedules for outdoor use, length of time of irrigation, restrictions on types of outdoor uses, restrictions on car or fleet washing, uses on impervious surfaces, irrigation of common areas and parks, irrigation of golf courses, hand watering, exemptions and exceptions, or any

other related matter or activity dependant upon or utilizing water from the city water delivery system. Where city council has by resolution declared a drought, the director is authorized and directed to promulgate such administrative rules without utilizing the procedures set forth in section 2-141 et seq. In such event, the director shall publish such rules in a newspaper of general circulation in the city at least five days before the rules become effective.

(e) Consistent with, and subject to, the city's contractual obligations to water users of the city water supply system that receive untreated water or resell treated water to third parties, such users shall, to the extent permitted or otherwise required by contract, adopt rules and regulations consistent with the requirements placed upon the city by the Denver Water Board with respect to the conservation of water. The director shall be authorized to enforce the terms of such contracts as they may pertain to the conservation of water.

(Code 1981, § 33-56; Ord. No. 2574, § 1, 11-21-1988; Ord. No. 3755, § 3, 7-1-2002; Ord. No. 3760, § 3, 7-15-2002; Ord. No. 3877, § 1, 5-3-2004)

Sec. 102-108. Car washes.

(a) The following words, terms and phrases, when used in this division, shall have the meanings ascribed to them in this section, except where the context clearly indicates a different meaning:

Car wash installation means any area or business using in-bay automatic or conveyor equipment for cleaning and washing motor vehicles, whether as a part of another business operation or as a stand alone operation, of any type, on a commercial basis and shall include fleet and municipal in-bay automatic and conveyor car wash facilities.

Conveyor car wash installation means a system where the car moves through the facility on a conveyor belt while being cleaned.

In-bay car wash installation means a system where the car remains stationary while a machine moves back and forth over the vehicle to clean it.

Operator means the person, business, or municipal entity responsible for the operation of the car wash installation, whether as owner or lessee of said car wash installation, as indicated in the business license, sales tax or property records of the city.

Self-service car wash installation means a system where the customer washes the car themselves using a wand that dispenses water and cleanser.

(b) All in-bay automatic and conveyor car wash installations that obtain a certificate of occupancy or a temporary certificate of occupancy from and after June 1, 2003 that use water supplied by the city water system shall be required to be equipped with, and shall maintain in operation, a water

recycling system that will recycle not less than 50 percent of the water being used by such car wash installation.
(c) Any operator of a in-bay automatic and/or conveyor car wash installation that has obtained a certificate of occupancy or a temporary certificate of occupancy prior to June 1, 2003 shall be required to install, and maintain in operation, a water recycling system that will recycle not less than 50 percent of the water supplied by the city water system by such car wash installation as a condition of any permit granted by the city to:
(1) Enlarge the water tap, meter or service line in any such car wash installation; or
(2) Demolish, destroy or remove and then replace more than 50 percent of the gross square footage of the floor area of the car wash installation building as it exists on June 1, 2003, except for the purpose of replacing under floor heating equipment; or
(3) Expand the gross square footage of the floor area of the car wash installation building by more than 50 percent of the square footage of the car wash installation building as it exists on June 1, 2003.
(d) All self-service car wash installations shall be exempt from the provisions of this article.
(Code 1981, § 33-59; Ord. No. 3761, § 1, 2-3-2003)

Sec. 102-109. Irrigation water to landscaped common area.
(a) The annual allocation of water for irrigation of the total landscaped common area is included in the annual allocation of water acquired when the tap fee is purchased for the residential or nonresidential type of property as set forth in sections 102-34, 102-161(3) and 102-163(3). The city will permit installation of up to three service connections to the city water main for the common area irrigation system by the property owner or responsible caretaker association upon payment of connection costs, tapping and inspection fees as set forth in sections 102-44 and 102-164(a)(1) and (2) or section 102-166(a)(1) and (2). Each landscaped common area irrigation service connection will be assigned a service address and billing account in the name of the property owner or responsible caretaker association. The department of utilities prior to issuance of building permits must approve the landscape and irrigation plans.
(b) All determinations concerning qualification as landscaped common area, non-water conserving open space, water conserving open space or nonirrigated open space, and all determinations as to the size and type of irrigation tap required, shall be at the sole discretion of the director of utilities or his duly authorized representative, consistent with the provisions of this

article I. Any such determination involving area demarcations or calculations, or volumetric calculations, shall be made available to the user for inspection, upon request.
(Code 1981, § 33-61; Ord. No. 3202, § 4, 8-7-1995; Ord. No. 3262, § 7, 4-15-1996)
Sec. 102-110. Irrigation water demand for open space.
(a) For nonwater conserving open space, the annual volumetric water demand shall be calculated at 18 gallons per square foot per year for the purpose of establishing the size and cost of the irrigation tap to be purchased in accordance with sections 102-34, 102-164(b), and 102-166(b).
(b) For water conserving open space, the annual "volumetric" water requirement for irrigation shall be calculated at nine gallons per square foot per year for the purpose of establishing the size and cost of the irrigation tap in accordance with sections 102-34, 102-164(b), and 102-166(b).
(c) For open space that has no installed irrigation system and will not be irrigated, no water demand will be assigned.
(d) All determinations concerning qualification as landscaped common area, non-water conserving open space, water conserving open space or nonirrigated open space, and all determinations as to the size and type of irrigation tap required, shall be at the sole discretion of the director of utilities or his duly authorized representative, consistent with the provisions of this article I. Any such determination involving area demarcations or calculations, or volumetric calculations, shall be made available to the user for inspection, upon request.
(Code 1981, § 33-62; Ord. No. 3262, § 8, 4-15-1996)

Rebates and Incentives

Between 1990 and 1995 the City of Arvada provided rebates to customers who replaced non-conserving toilets with ULV toilets using 1.6 gallons or less water per flush. Over the five year period, 3,410 ULV's were installed. The project cost the City at total of $265,500, and saved 80.4 AF of water. In 2002 and 2003, the City implemented five rebate programs at a cost of nearly $400,000.

Table 12: Previous Rebate Programs

Rebate Name	Number of Participants		Cost	
Deep Root	648	14%	$6,477	2%
Soaker Hose	854	19%	$8,317	2%
Toilet	1,583	35%	$173,177	46%
Clothes Washer	716	16%	$89,500	24%
Landscape	700	16%	$99,952	26%
Total	**4,501**	**100%**	**$377,423**	**100%**

Rebate programs are quite costly in comparison to other water-saving measures. Incentives for buying eco-friendly products can lose their effectiveness as those products become widely available and prices drop. Many municipalities across the country are dropping their rebate programs in favor of more cost-effective measures, such as the Garden-in-a-Box and landscape seminars and consultations the City currently implements.

The City does offer reduced tap fees as an incentive to encourage conservation. As explained in the Landscape Efficiency section of the Plan, tap fees are reduced by 50% for the installation of water-conserving landscape. Additionally, our four-tiered billing system promotes conservation by offering a lower water rate as incentive for reduced water consumption.

All required measures and programs set forth by statute 37-60-126 have been considered by the City of Arvada.

Monitoring, Evaluating, and Revising the Conservation Plan

The City of Arvada will continue to monitor its water conservation activities throughout the year, ensuring that the programs set forth in this plan are being implemented efficiently and to maximum benefit. Water consumption trends and data from the leak detection program will continue to be monitored and evaluated on a monthly basis. The latest water conservation information will be provided to the public on an on-going basis by way of public outreach events, internet, and billing inserts. Budgetary confinements will be evaluated at the end of each year to determine if existing programs can be expanded or new programs added. The plan as a whole will be reviewed at the end of each year, with any pertinent revisions posted by June of the following year.

The City of Arvada has extensive public education programs and regulations in place that not only promote conservation, but also raise awareness of the importance of water conservation. The City's water rate structures reward efficient water use and discourage water waste. The City also has conservation resources available on its website that are continually updated and expanded.

By focusing on the aspects of water conservation that have proven effective, and improving upon those aspects with advances in technology, the City of Arvada has cultivated a realistic and cost-effective Water Conservation Plan that will enable the City to provide high-quality water to its customers now and in the foreseeable future.

The previous plan submitted in 2008 estimated a 10-year annual savings of 700 AF. We had projected an annual demand of 18,454 AF and a population of 117,559 by 2018. Actual demand in 2018 was 17,559 AF, and the population was 120,490. We surpassed our estimated savings by approximately 195 AF, annually, even with the unexpected population growth.

In compliance with the 60-day public comment period, notice was placed in the April 2020 issue of The Arvada Report, which is a bi-monthly newsletter published by the City of Arvada. It is distributed to all households, businesses, and City employees. The notice stated that an updated Water

Conservation Plan was available online for review and comment, and the location of the plan on the City's website was provided. Nine comments were received within the sixty days, which began on April 1, 2020 and ended on May 30, 2020.

In addition, Arvada's City Council adopted the updated Plan by resolution R21-054 in the April 5, 2021 City Council meeting. The City of Arvada is committed to the implementation of this plan and the resources necessary to carry that out.

In accordance with Colorado Revised Statutes 37-60-126, this Water Conservation Plan is scheduled for re-evaluation no later than October 2026, at which point existing conservation activities will be re-examined and new conservation activities evaluated.