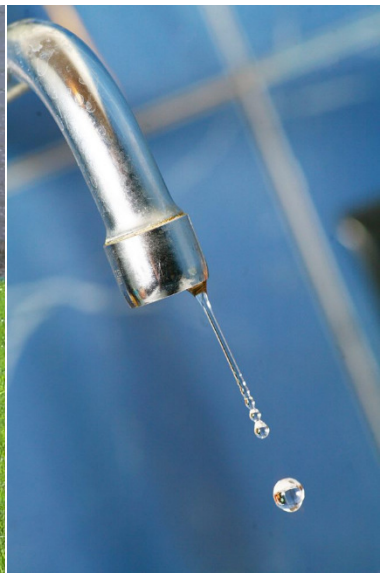
WATER CONSERVATION PLAN

Prepared by:

Peter Mayer, P.E.
Water Demand Management
www.waterdm.com

Ruth Quade
Water Conservation Coordinator
City of Greeley Water and Sewer Department
1100 10th Street, Suite 300
Greeley, CO 80631-3876
www.greeleygov.com/wc

Table of Contents

List of Tables

List of Figures

EXECUTIVE SUMMARY

Securing safe and sufficient water supplies for future generations of Greeley residents in the face of significant uncertainties such as drought and climate change is a major challenge. Successful stewardship of precious water resources is a benchmark by which future generations will judge the current citizens and water utility staff. This Water Conservation Plan for the City of Greeley has been developed to establish clear goals and to outline programs and measures to help meet the goals that will ensure a healthy and sufficient water supply for the future. Greeley will update the plan every five to seven years and as such, this is the first update to the 2008 Greeley Water Conservation Plan.

Greeley has established a goal of reducing demand by 9.3 percent directly through conservation program efforts over the period from 2015 to 2035 compared with projected future demand without conservation. The net impact of this program is an estimated cumulative savings of 156 acre-feet per year that will yield a total savings of 3,120 acre-feet of water by 2035. An analysis of estimated savings achieved through the current program suggests that this goal is attainable given the current level of conservation effort and may be exceeded.

Conservation has been included in Greeley's overall supply planning for over 20 years. Greeley developed its first water conservation plan in 1992. In 1997, Greeley hired a full-time Water Conservation Coordinator, who has managed the City's water efficiency efforts for the past 17 years. In that time the program has grown to encompass all customer sectors in the City. In 2014, the Water Conservation Program budget was over $500,000 making it one of the largest programs in Colorado. The Conservation Program addresses both indoor and outdoor water use through education, ordinances, direct outreach, rebates, and information. The Greeley Conservation Program implements social marketing as well as traditional marketing in campaigns that include advertisements on buses, print, radio, and local cable TV. Consequently, the Conservation Program has become one of the most visible and well publicized conservation efforts in Northern Colorado.

Greeley is also analyzing new programs to include modifying landscape codes which might limit how much turf can be installed and give larger landscaping credits for low water use trees, shrubs, and perennials. Parks and athletic field irrigation systems will be designed with conservation in mind and will be installed with 15-20 percent of the park planted in xeric plantings, in parking medians around buildings and entries into the park. City properties will demonstrate xeric plantings to show that conservation can be beautiful. Turf reductions will be studied and applied to HOA green spaces and commercial properties. Parking medians will no longer contain turf and detention ponds will no longer be planted with bluegrass and watered and maintained like parks.

This Conservation Plan provides details concerning each of these programs and explains how conservation is a key element of Greeley's overall supply planning. Greeley's Water Conservation Plan complies with Colorado Revised Statute § 37-60-126. An explanation of Greeley's compliance with the statute's requirements is presented on pages 43-47.

Greeley's Four Point Water Supply Plan

Water is a precious commodity in Colorado, and it is only going to become more precious as Greeley's population grows and more water is needed. The mission at Greeley Water and Sewer is to make sure that the community has a secure and reliable water supply. To meet this goal, the Four Point Plan was developed with the leadership of the Greeley Water and Sewer Board.

The elements of the Four Point Plan are:

- Strengthening infrastructure
- Continuing water acquisition
- Expanding storage
- Continuing water conservation

Strengthening Infrastructure

Greeley strives to keep the system in top shape through continuous maintenance, leak detection, repair, and pipe rehabilitation. More detail on Greeley's water loss control efforts is included in this plan.

New capacity to the system is added when needed. For example, Greeley is presently constructing a new pipeline from its Bellvue Water Treatment plant to Greeley.

Facilities are constantly upgraded to be as efficient as possible, such as the new liners installed to reduce leakage in treated water reservoirs.

Continuing Water Acquisition

Greeley needs more water to meet customer demands in the future. Current water supplies available for acquisition are decreasing while prices continue to increase. For this reason, Greeley actively pursues the purchase of additional water.

Expanding Storage

Additional storage is vital to fully utilize current and future water supplies. The cornerstone of Greeley's water storage plan is the enlargement of the existing Milton Seaman Reservoir on the North Fork of the Poudre River from 5,000 acre-feet to 53,000 acre-feet.

Continuing Water Conservation

Greeley is a leader among Colorado utilities in developing and implementing innovative and effective water conservation and demand management measures. This 2014 Water Conservation Plan provides details on Greeley's Water Conservation Program efforts of the past, present, and future.

INTRODUCTION AND SERVICE AREA CHARACTERISTICS

Securing safe and sufficient water supplies for future generations of Greeley residents in the face of significant uncertainties such as drought and climate change is a major challenge. This 2014 Water Conservation Plan for the City of Greeley establishes clear goals and outlines programs and measures to help ensure a healthy and sufficient water supply for the future. The Plan meets all State of Colorado Water Conservation Board (CWCB) planning requirements.

Greeley, originally known as Union Colony, was organized in 1870 by Nathan Meeker, the agriculture editor for Horace Greeley's *New York Tribune*. Meeker dreamed of founding a "utopian community based on temperance, religion, education, agriculture, irrigation, cooperation, and family values."

As of 2014, the City of Greeley covers over 47 square miles of Weld County. Greeley is the largest city in the county and is the county seat. The City's water supply system stretches more than 60 miles from the western-most raw water collection and storage facilities to the eastern-most reaches of its finished water distribution system.

Located on Colorado's high plains, Greeley's average annual precipitation is 12-14 inches per year. In the 21st century, the Greeley area anticipates one of the highest average growth rates on Colorado's Front Range at 2.25 percent along with greater demands on resources and infrastructure. Greeley's 2014 population is estimated to be 100,372. By 2050, demographers predict Greeley will be home to 241,900 people. Given this high level of anticipated growth, a sustainable water supply along with associated treatment, collection, and distribution systems, are of primary importance.

Water Supply and Reliability

Water System Profile

Greeley's water sources include direct river diversions, ownership in the Colorado-Big Thompson (C-BT) and Windy Gap projects, high mountain reservoirs, and rights in several irrigation companies. Greeley treats water at two treatment plants, the Bellvue plant located on the Poudre River and the Boyd Lake Plant located adjacent to Boyd Lake in the Big Thompson drainage. The City also owns and operates a non-potable system with associated ditch shares, storage, and wells.

Kodak, along with three nearby municipalities (Evans, Windsor, and Milliken), annually transfer yield associated with their water rights to Greeley for treatment and delivery.

Water Rights

Greeley draws raw water from four main river basins on both sides of the Continental Divide: the Cache la Poudre (Poudre), Big Thompson, Upper Colorado, and Laramie. This diversity of supply sources increases the reliability and security of Greeley's system. A map of the Greeley water supply system is shown in Figure 1.

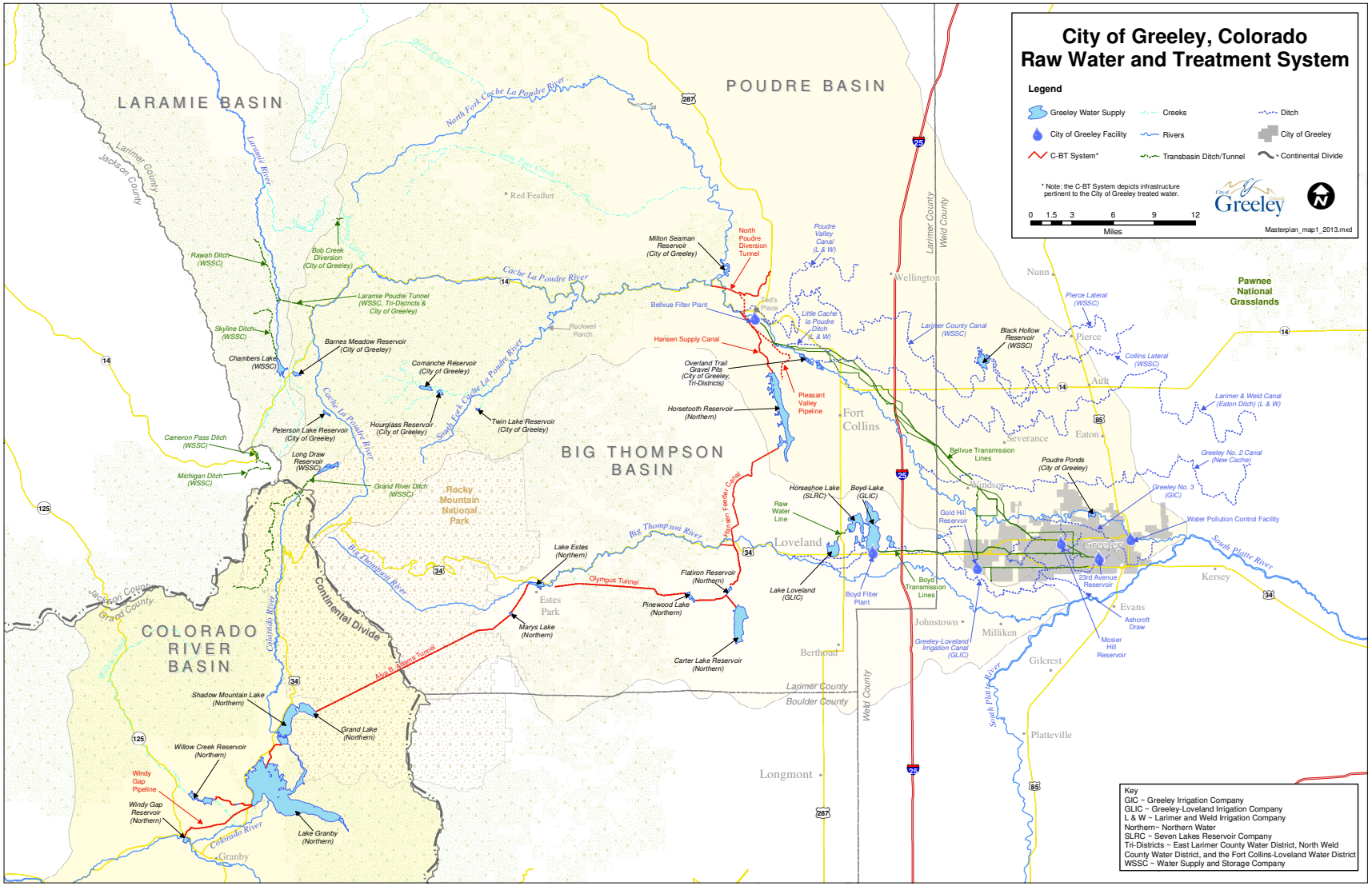


Figure 1: City of Greeley Water System (2014)

Cache la Poudre River

Greeley owns senior direct flow rights on the Poudre River. The direct flow rights consistently yield 9,000 acre-feet for treatment at the Bellvue Plant.

Figure 2: Cache La Poudre River

Milton Seaman Reservoir, on the Poudre River's North Fork, is the City's largest multi-year storage vessel within the Poudre basin (Figure 3). Milton Seaman Reservoir is primarily used as a drought storage vessel and in most years remains relatively full with about 5,000 acre-feet of available water supplies.

Other Poudre basin rights include storage rights in five high mountain reservoirs: Barnes Meadow, Peterson, Comanche, Hourglass, and Twin Lakes. The reservoirs capture water at high elevations from some of the Poudre River tributaries. However, Greeley's high mountain reservoir storage rights are junior and have low yields in drought years.

Figure 3: Milton Seaman Reservoir

A majority of Greeley's Poudre River water rights are treatable at Bellvue. However, some of Greeley's Poudre River water rights cannot be physically delivered to Bellvue. For example, Greeley's ownership in the Greeley Irrigation Company (GIC or the No. 3 Ditch) represents a supply located in the lower portion of the Poudre basin. These supplies are located too far downstream for treatment and thus are used for non-potable irrigation of Greeley's parks and golf courses. This reduces the amount of treated water used by the City.

Greeley also owns, and is in the process of acquiring, additional storage in the lower Poudre Basin. These storage facilities will reduce treated water demands and provide operational flexibility. For example, Poudre Ponds at Greeley are lined gravel pits located near the City that reuse, not physically but via river exchange, waste water effluent (effluent). Greeley uses the exchanged effluent to meet augmentation, non-potable, and return flow obligations.

Colorado River

Greeley also obtains water from two interrelated transmountain diversion projects – the Colorado-Big Thompson (C-BT) and Windy Gap projects (Figure 1). Raw water from these projects can be delivered to either of Greeley's two treatment plants.

Figure 4: Adams Tunnel East Portal of the Colorado-Big Thompson Project

The C-BT Project provides supplemental water to its service area in northeastern Colorado. The project boasts 800,000 acre-feet of active storage and a relatively senior water right on the Colorado River. Owned by the U.S. Bureau of Reclamation, it is operated by the Northern Colorado Water Conservancy District (NCWCD). With 22,565 units, Greeley is the largest municipal holder of C-BT rights.

The Windy Gap Project was planned and built between 1969 and 1985. Six C-BT stakeholders (Greeley, Loveland, Fort Collins, Longmont, Boulder, and Estes Park) cooperated to form a municipal subdistrict which oversees the Project and establishes the assessments for the existing Windy Gap shareholders.

Windy Gap consists of a diversion dam on the Colorado River, pump station, and a pipeline to deliver water to Lake Granby. The C-BT system conveys the water from Lake Granby to Windy Gap customers on the Front Range (Figure 4). The Windy Gap Subdistrict has a contract with the U.S. Bureau of Reclamation to allow the C-BT system to transport the water when there is unused capacity. In either a wet or dry year, Windy Gap does not yield. In a dry year, senior rights limit diversions and there may be little water to deliver. In a wet year, the C-BT system is at capacity and has no spare room to store or move Windy Gap water to the East Slope.

To firm the Windy Gap supply, additional storage is necessary. Chimney Hollow, a proposed 90,000 acre-foot East Slope reservoir, is the preferred alternative for the Windy Gap Firming Project. Greeley has committed to 7,000 acre-feet of storage space in this reservoir and will pay its proportionate share of the expected $275 million cost.

Big Thompson River

In the 1960s, Greeley began to acquire shares in three related agricultural water companies: the Seven Lakes Company, the Lake Loveland Company, and the Greeley-Loveland Irrigation Company (collectively the Greeley-Loveland Irrigation Companies (GLIC)). As the City grew westward over ground historically irrigated by GLIC water rights, Greeley accepted shares of GLIC for raw water dedication. Additionally, the City purchased numerous GLIC shares in the

early 1990s, some of which Greeley still leases back to the original owners for agricultural use. GLIC water rights are relatively junior and do not yield well during droughts.

Greeley can only treat its GLIC water supplies at the city's Boyd Lake Plant. Greeley also uses GLIC water to meet non-potable irrigation demands in an effort to conserve and minimize plant treatment and transmission costs.

Laramie River

Greeley owns 1/3 of the Laramie Poudre Tunnel Company, which yields about 1,100 acre-feet of water per year. The Tunnel water rights have been changed for municipal use and can be treated at Bellvue. Because they are transbasin rights, Greeley can reuse the water as many times as possible, usually through the reuse of effluent for augmentation demands. In addition, Greeley also owns a small interceptor ditch right in the Laramie River Basin that yields up to 300 acre-feet per year.

Drought Definitions and Greeley's Water Restriction Schedule

Greeley uses a 1-in-50 year critical drought (drought) for water supply planning. In 2006, a modeling analysis of the water system defined the amount of water Greeley would need to have in storage, given then current supplies and demands, in order to supply its citizens throughout the drought. This analysis indicated that a target storage level of 20,000 acre-feet would provide adequate storage throughout the drought.

Therefore, the City's Drought Emergency Plan involves maintaining system storage of 20,000 acre-feet to ensure water service through times of drought. When this target storage level is met, the Greeley Water & Sewer Board (Board) can declare an adequate water year in April which means normal watering restrictions for citizens. If storage drops below 20,000 acre-feet, watering restrictions are enforced with the intention of dropping demand 10 percent below the demand predicted by the population and climate conditions.

With the target storage level is met at the beginning of the drought, Greeley will be able to maintain an adequate storage level throughout the duration of the drought. An adequate storage level is defined as six months of Greeley base (indoor) treated water demand which is approximately equal to 25 percent of annual treated water demand for all purposes.

In order to respond to drought reducing Greeley storage levels below target storage, the City has developed a Drought Emergency Plan. This plan is implemented if the Board declares drought conditions. The Greeley Municipal Code (the Code) specifically states:

> *Drought levels: On the determination by the Greeley Water and Sewer Board, after an analysis including but not limited to the Colorado Big Thompson quota, the level of storage in Greeley reservoirs, snow pack and yield thereof, and the long-range weather forecast, that Greeley's water supply situation is "Adequate" or in a "Mild Drought," "Moderate Drought" or "Severe Drought," §14.08.290(c)*

Greeley implements watering restrictions every year, even during adequate water years. Once the Board has declared a drought, the City Council may implement additional watering restrictions in accordance with the Code. Table 1 summarizes the drought information in the Code.

Table 1: City of Greeley Watering Restrictions Adequate Supply – Severe Drought

Drought Levels	Adequate Year	Level I Mild	Level II Moderate	Level III Severe
	Number of Days Watering			
April 15-May 14	3	1	1	1**
May 15-June 14	3	2	2*	2**
June 15-August31	3	3	2*	0**
August 1-August 31 (mod-severe)	3	1	2	2**
September 1 - October 15	3	1	1	1**
	No watering 12 to 6 p.m. (10 a.m. to 6 p.m. proposed)	No watering 10 a.m. to 6 p.m.		
			*No new lawns between May 15 & August 31	**No new lawn variances allowed All fines doubled

Depending on the severity of drought, Greeley will implement other voluntary, and if necessary, mandatory limitations.

Greeley Firm Yield

Firm yield is the water demand, including return flow obligations that Greeley can meet throughout the drought. To determine Greeley's firm yield, the Greeley water system model was run with drought data set and increasing water demands. The point at which an increasing demand would create a potable water deficit defines Greeley's firm yield. To meet water demands in the drought, Greeley must supplement the annual yield of its water rights with water from storage in the C-BT system, the Greeley and Loveland system, Milton Seaman reservoir, and other high mountain reservoirs.

Assuming that all of Greeley's existing water supplies have been decreed for municipal use, and all the City's proposed small retiming facilities (gravel pits) have been built, and all supplies are operational, Greeley's potable firm yield is 38,700 acre-feet.[1] This is the potable demand that can be met at the tap in the specific hydrologic conditions contained in the modeled drought scenario. Furthermore, the City anticipates that it can meet 3,500 acre-feet of non-potable demand through the planning drought.

[1] 42,000 acre-feet at the plant less system and treatment losses.

Water Treatment

Greeley owns two water treatment plants, Bellvue and Boyd, with a combined treatment capacity of 62 million gallons per day (mgd). Both use conventional filtration and chemical treatment and have been upgraded to meet current regulatory requirements. Table 1 outlines treatment plant capacity as well as transmission capacity.

Bellvue Filter Plant

The Bellvue Filter Plant is located northwest of Fort Collins and has the capacity to treat 26.6 mgd. The plant consists of raw water settling ponds, rapid mix, flocculation, sedimentation, filtration, and disinfection. Treated water flows from Bellvue to Greeley by gravity. Operated year-round, Bellvue is the City's plant for meeting Greeley's base demand. The raw water entering the Bellvue plant has low turbidity and low hardness, thus making it easier to treat because it is a protected source water basing and has a high quality influent and effluent.

Over the last ten years, especially since the 2003 Water Master Plan, Greeley focused its planning on new Poudre Basin supplies. The Bellvue Filter Plant was extensively upgraded as a result of the Poudre River focus. Inlet piping to the raw ponds has been improved and toe drains were installed in 2008. The flocculation-sedimentation system has been upgraded with tilted-plate settlers. The filters were rebuilt with new piping, actuators, and controls. A new chemical feed building was constructed. A new clear well and solids thickening and dewatering system were built. Effluent piping and the laboratory were rebuilt. After a third-stage flocculation was added toward the end of 2008, the plant is rated at 32 mgd. Extensive testing over the last several years shows that the treatment system will meet or exceed all anticipated federal drinking water regulations.

Bellvue Plant Transmission

The parallel transmission lines from the Bellvue Filter Plant operate by gravity and have a combined capacity of about 23.8 mgd. The first transmission line is predominantly a 27-inch line which splits into two 20-inch lines at Interstate 25. The second transmission line varies between 38-inch, 30-inch, and 27-inch. A number of customers are served directly from these transmission lines although Greeley would like to eventually eliminate all such connections. Greeley is currently in the final phase of building a 60 inch transmission line which will eventually have capacity to transmit 70 mgd. Treatment and transmission capacity are shown in Table 2.

Boyd Lake Filter Plant

The Boyd Lake Filter Plant is located in east Loveland along the south shore of Boyd Lake reservoir. The plant has a capacity to treat about 38 mgd and is a conventional plant consisting of a raw water settling pond, rapid mix flocculation, sedimentation, filtration, and disinfection. The Boyd Lake Plant is used as a peaking plant to meet summer irrigation demands and is typically operated from April through October. The plant draws water from both Lake Loveland and Boyd Lake which are filled with C-BT and Big Thompson River water via irrigation ditches. The historical water sources for the Boyd Lake Water Filter Plant were irrigation water rights that were typically used from April through October. Raw water quality from Boyd Lake is not

as good of quality as the Bellvue Water Filter Plant. Extensive development in the basin present source water quality challenges. Treated water from the plant has also been the subject of several taste and odor complaints from customers over the years. Water must be pumped 18 miles to Greeley via two steel lines of 27 and 34-inch diameter.

Table 2 presents a summary of the Greeley Water Treatment and delivery System and the current capacity.

Table 2: Greeley Water System Summary

	Capacity	Comments
Raw Water	42,500 acre-feet (in 1-in-50-year critical drought)	Includes 3,500 acre-feet non-potable. Assumes all rights are decreed.
Bellvue Filter Plant	32-mgd peak capacity	Upgraded in 2012
Boyd Lake Filter Plant	38-mgd peak capacity	Upgraded and expanded in 2012
Bellvue Transmission	23.8-mgd maximum capacity	New line under construction (70-mgd)
Boyd Lake Transmission	40-mgd maximum capacity	Lines are 35 to 40 years old; water must be pumped to Greeley

BASELINE WATER USE

Of the total water demand Greeley currently serves, approximately 82 percent is used within Greeley, and the remainder is associated with customers located outside of Greeley. In-City treated water use by customer type is shown in Table 2. Residential uses account for approximately 62 percent of total water use within Greeley; the remainder is comprised of commercial, industrial, and park or golf course uses. Fifty-five percent of residential water use goes to landscaping; therefore, residential use shows a strong seasonal variation with nearly 75 percent of total City annual use occurring between May and October.

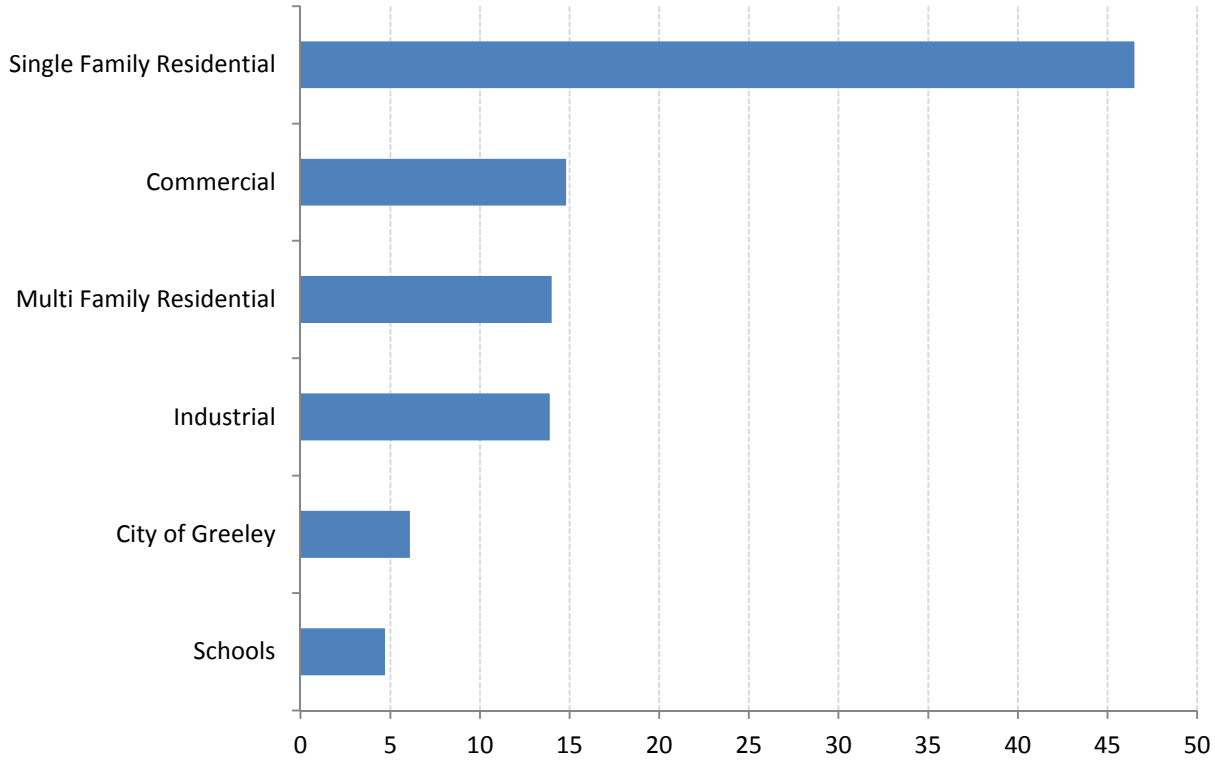


Figure 5: Percentage of in-City Potable Demand by Land Use Type 2013

Table 3: Potable Water Demand Breakdown for Inside City Uses (2013)

*ICI: Industrial, commercial, or institutional

Customer	Single-Family	Multi-family	Other Residential	ICI*	Total
Total Number of Accounts	20,749	1,994	806	1,732	25,281
Annual Billed Use 2013 (kgal)	2,521,516	930,371	200,834	2,740,297	6,393,018 (19,620 af)
Unit Use Annual (kgal/acct)	122	467	249	1,024	215

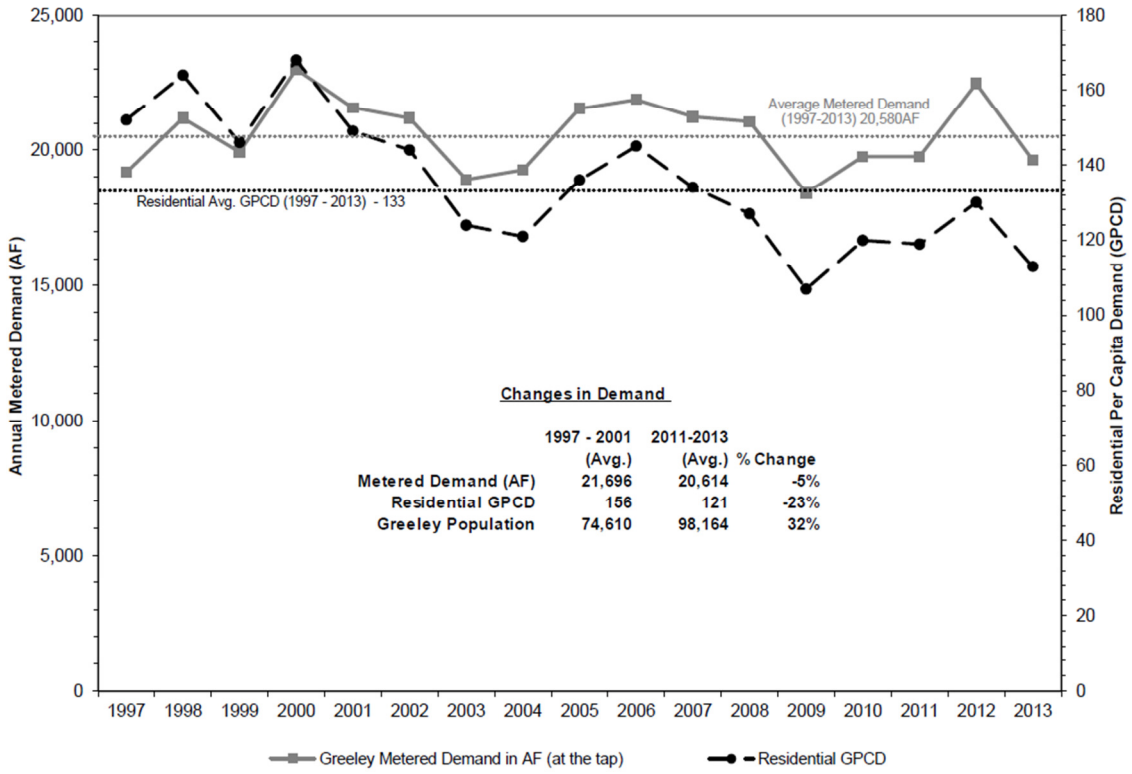


Figure 6: Annual and Residential Per Capita Demand in Greeley, 1997 - 2013

Figure 6 shows annual metered demand in Greeley from 1997 – 2013 along with the calculated residential gallons per capita per day (gpcd) for each of these years. This figure shows a 23 percent reduction in per capita residential demand, dropping from 156 gpcd in 1997-2001 to 121 gpcd from 2011-2013[2]. [1] Due to variations in precipitation, population densities, and landscaping, Greeley does not compare gpcd to other communities to assess water use and the effectiveness of its conservation program. Greeley uses gpcd as an internal comparison to demonstrate use reductions. Metered demand is essentially unchanged in sixteen years in spite of a 32 percent increase in population. Clearly, Greeley's water demand management efforts over the past 17 years have had an impact.

Figure 7 shows the annual metered demand for customers inside Greeley and outside Greeley along with Greeley's annual measurement of water loss. Demands outside of Greeley have stayed relatively stable over the past 16 years.

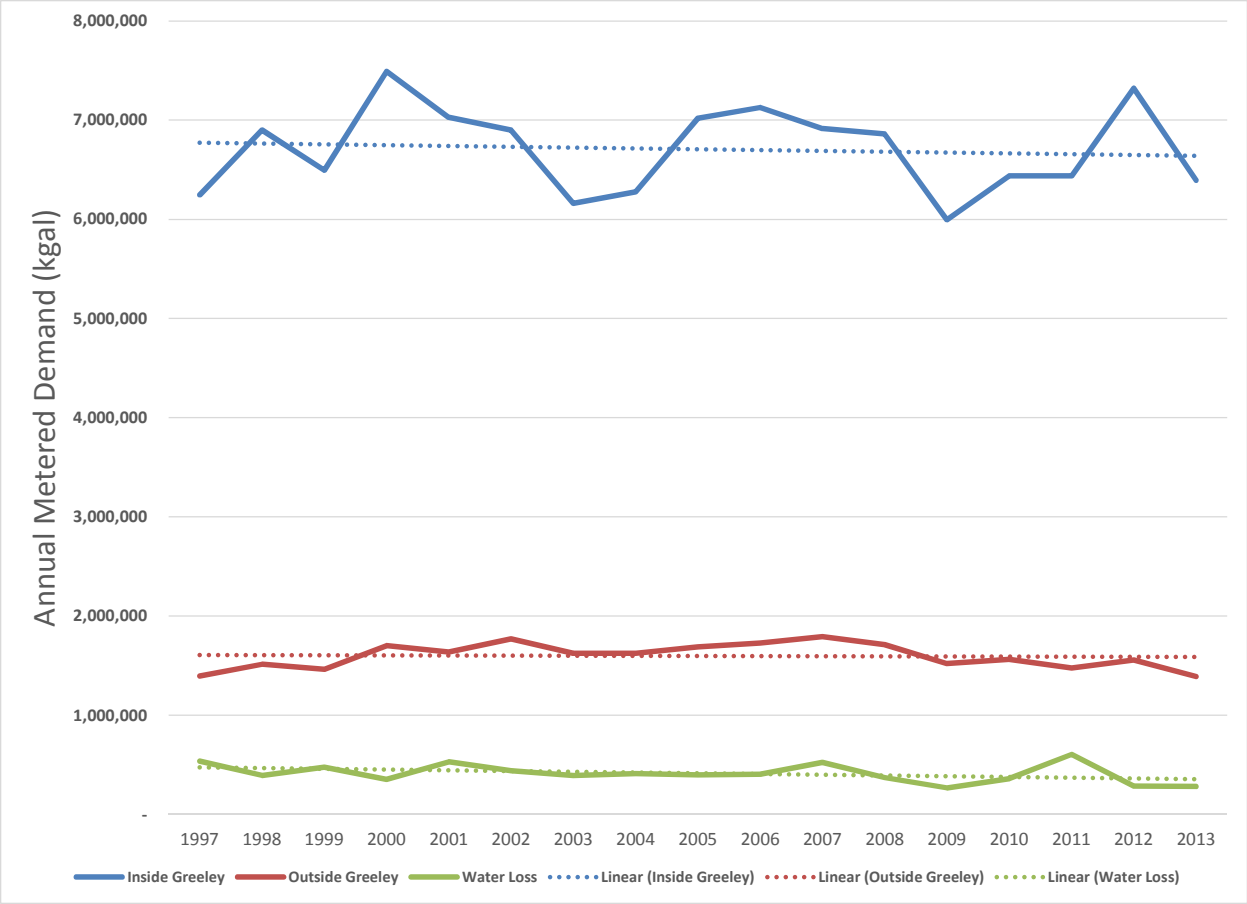


Figure 7: Annual Metered Demand Inside and Outside Greeley plus Water Loss, 1997-2013

System Water Loss

Greeley has an active water loss control, detection, and maintenance program that has held water loss (real and apparent losses) to below six percent in seven of the past ten years which is well below industry standards of 15 percent water loss. This is a low system loss for a system the size and age of Greeley's and is indicative of the effort the City has made in this area. System losses have declined in volume from 1997 – 2014. Greeley is committed to its water loss control, detection, and maintenance system and will continue to strive to maintain exceptional system efficiency. Greeley plans to begin annual implementation of an American Water Works Association (AWWA) water loss control audit in 2015.

Leak detection is done on an on-going basis. The goal of the Leak Detection Program is to survey a portion of the pipelines every year with a priority placed on areas that have been prone to leaks. Crews use a Metrotech Correlator and Leak Logger with a LD12 Listening Device connected to the water main from a fire hydrant, valve, or meter to identify leaks in the main. Any suspected leak sounds will be correlated to authenticate the existence of a leak, and once identified, crews begin repairs.

Greeley works diligently to maintain a high functioning and efficient water system by constantly upgrading and repairing the system. About 81 miles of Greeley's pipelines were installed

before 1950 and had no lining for protection against corrosion and deterioration. When these pipes age, the rust on the inside restricts flow, creates rusty water, and makes the pipes more susceptible to leaks. The technology exists to recondition these pre-1950 pipes while maintaining water service to customers. The Cement Mortar Lining (CML) process scrapes the pipes clean on the inside and lines them with cement mortar to prevent future buildup of rust. The CML process can be done at half the cost of replacing the old pipe with very little inconvenience to customers. The Water Department began pipe cleaning and CML in 1991 to improve water flow and water quality and to minimize leaks. In 2012, Greeley completed lining of all remaining pre-1950 pipe. Table 4 shows a summary of leak detection efforts from 1997 – 2013.

Table 4: Greeley Leak Detection Summary (1997-2013). This table demonstrates the commitment Greeley has to finding and fixing leaks within the distribution system before they become a bigger problem. (The data includes 156 miles of transmission mains)

Year	System Miles of Pipe	Annual # Leaks	Leaks per 100 Miles	Annual Miles Increase	Annual Percent Increase	Leak Detection Miles
2013	632.12	55	8.49	3.8	1.32	40
2012	618.82	58	9.3	2.32	.95	35.3
2011	626.5	53	8.6	5.8	.95	52
2010	610.7	55	9	1.80	.30	60
2009	608.9	42	6.9	-1.8	-0.29	76.3
2008	610.7	51	8.4	0	0	51
2007	610.9	77	12.6	6.39	1.06	36.6
2006	604.51	68	11.2	8.51	1.43	29
2005	596	68	11.4	12.4	2.12	23.5
2004	583.6	46	7.9	9.6	1.67	18
2003	574	54	9.4	11.7	2.08	31
2002	562.3	65	11.5	20.34	3.75	12
2001	541.96	47	8.6	15.21	2.89	20
2000	526.75	51	9.7	11.57	2.25	37
1999	515.18	54	10.5	12.96	2.58	61
1998	502.22	51	10.2	18.68	3.86	104
1997	483.54	34	7	5.84	1.22	32

By cleaning and lining the pipes, the Department strengthens the infrastructure, and the pipes are less likely to burst, waste water, and put customers out of service. Also, by being proactive on this project, there is less interruption of service due to line breaks. A tight and well-maintained water system is cost-effective because lost water cannot be used by the City or sold to customers.

Peak Day Demand

The peak day of water use for each year typically occurs, though not always, during July in Greeley. For example, in the last three years, peak day occurred on: July 26 in 2011 (45.3 mgd), June 26 (50.4 mgd) in 2012, and July 9 in 2013 (46.43 mgd). The overall water system, including treatment, transmission, and distribution, must be able to meet the peak day of use. Using the last 20 years of historical data, Greeley's peak day to annual demand ratio is 2:1. Peak demands from the years 2000 – 2013 as well as the treatment and transmission capacity of the system are shown in Figure 8.

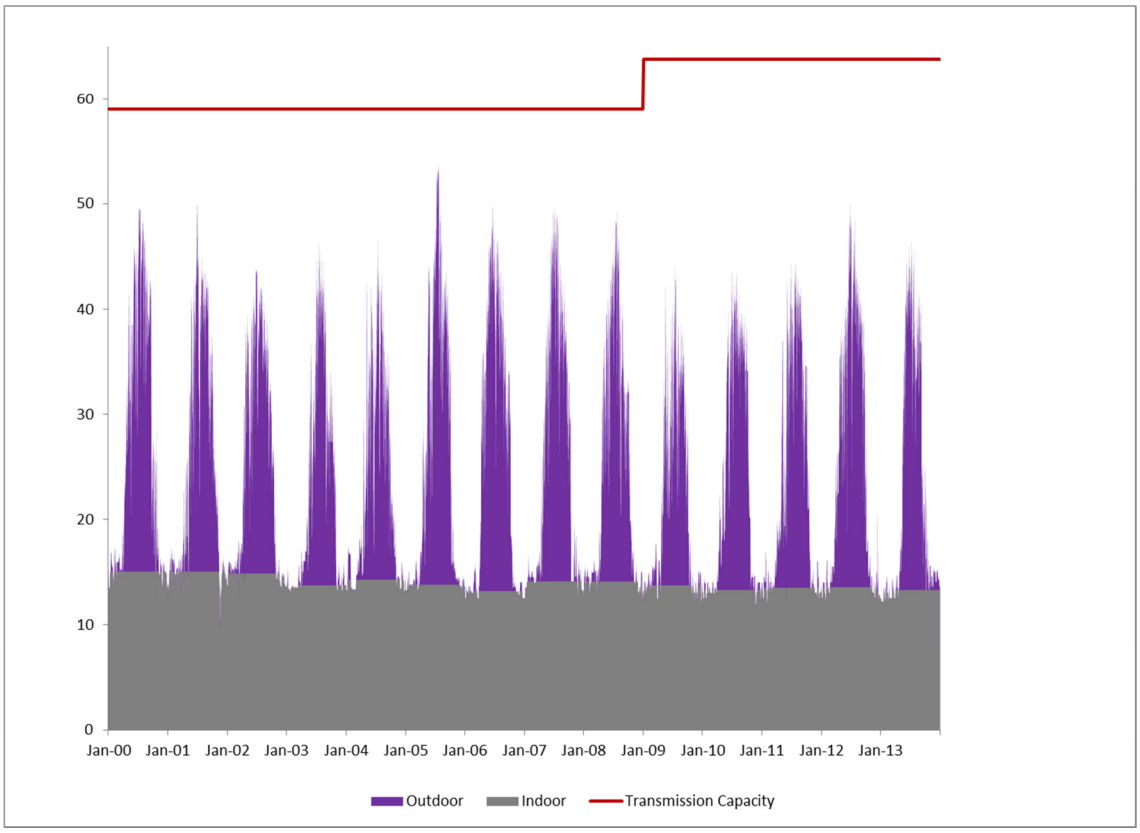


Figure 8: Greeley Peak Day Demands 2000 - 2013

Demand Forecast

Table 5 shows projected water demands for Greeley over the next 15 years. The focus of the Greeley Water Conservation Program is on in-city customers; hence, in-city demand will be the focus of this plan.

Table 5: Projected Demands for Greeley 2015 – 2035

Year	Potable demands at the tap (acre-feet)	Potable demands plus 7% loss (acre-feet)	Non-potable demands (acre-feet)	Total demand potable + non-potable (acre-feet)
2015	27,612	29,658	2,755	32,413
2020	30,502	32,763	3,164	35,927
2025	33,742	36,243	3,573	39,816
2030	37,382	40,153	3,982	44,135
2035	41,462	44,535	4,391	48,926

Between 2015 and 2035, Greeley expects 13,850 acre-feet of new potable demand. The future demand numbers in Table 5 include 2% treatment losses, 5% of distribution losses and 16% conveyance loss before the plant, accounting for all system losses and may not match customer category demand figures. An additional 1,636 acre-feet of new non-potable demand is forecast over the same period.

WATER RATES, COST, AND PRICING

Billing System and Water Rates

Greeley is examining the feasibility of implementing a customized tiered rate (water budget) structure similar to those implemented by the Centennial Water and Sanitation District and the City of Boulder, Colorado. The intent of this new rate structure would be to encourage efficiency and to discourage waste. A simple tiered rate structure such as is common throughout the Front Range would face resistance in Greeley because of the wide variation in lot sizes and Greeley's historic raw water dedication policies. Custom tiered rates (water budget) that account for the customer's lot size and water dedication are more suitable to Greeley. More information about the on-going water budget study is provided later in this document.

Greeley was one of the first Front Range communities to be fully metered. Currently, Greeley water charges are billed every month using a uniform rate structure. The rate structure is developed annually by a cost-of-service rate model. Customers are metered and pay for the water they use. Each bill is composed of two parts: a fixed minimum charge and an amount of water used charge. Charges depend on customer class and customer location. Inside City fixed charges for 2014 are shown in Table 6.

Table 6: Inside City – Service Charge

Meter Size	Inside City Fixed Minimum Charge
5/8"	$10.60
3/4"	$10.60
1"	$10.90
1-1/2"	$14.20
2"	$15.55
3"	$43.40
4"	$50.60
6”	$63.75
Non-Potable	$15.55

Inside City – Residential

The 2014 variable consumption rate is $4.04 per thousand gallons. The fixed minimum charge is based on meter size as shown in Table 6 . For example, if a customer uses 5,000 gallons of water in a one month period and has a 3/4" meter, the bill would be $30.80. The water-use charge is $4.04 per 1000 gallons. A fixed charge of $10.60 is added to the commodity charge of $20.20 for a total of $30.80.

Inside City – Commercial

The 2014 rate is $3.66 per thousand gallons. The fixed minimum charge is based on meter size as shown in Table 6.

Outside City – Residential

When Greeley built the transmission mains from Bellvue and Boyd to Greeley, many property owners received water taps in exchange for easements. These accounts are classified as Outside City. City Council has a policy against granting additional water taps outside the City without annexation. The 2014 variable consumption rate is $9.99 per thousand gallons for residential customers located outside of the City limits. The fixed minimum charge is based on meter size as shown in Table 6.

Industrial Rates

The rate for large industrial customers is also set by the cost-of-service rate model and depends primarily on maximum daily and peak hourly demands. A large industrial customer's 2014 variable consumption rate is $2.84 per thousand gallons.

Commercial and Industrial Surcharges

Commercial and industrial customers dedicate water to the City to cover the annual consumption based on their tap sizes and thus require an annual allotment of water. When annual use (based on billing records) exceeds the user's allotment, a raw water surcharge is assessed. The current surcharge is $5.91 per 1,000 gallons in excess of the annual allotment. The surcharge is based on the market price of C-BT water and is established annually.

Sewer Rates

Greeley sanitary sewer rates are also developed annually by a consultant using the cost-of-service rate model. Sewer service charges are billed every month and appear on the same statement as the water bill. The sewer bill is divided into two parts: a fixed minimum every billing period and consumption charge that is based on water use. The charges depend on customer classification which depends primarily on the strength of the waste to be treated.

Residential Single Family

In 2014, the typical single family homeowner will pay a fixed minimum of $11.55 on every sewer bill. The consumption charge is $1.75 per thousand gallons of water used per billing period but not to exceed the winter quarter consumption. This keeps the summer lawn water use from being charged as sewer flow.

Multi-Family

The 2014 rate consists of a fixed minimum of $11.55 per sewer connection plus $2.09 per thousand gallons for water usage for the billing period not to exceed the winter quarter water use.

Commercial and Industrial

Commercial and Industrial rates depend on the type of customer (e.g. whether the customer operates a restaurant, car wash, or mortuary, etc.) These rates are based on how much and how contaminated the wastewater is for each customer group.

PROPOSED WATER SUPPLY PROJECTS

Windy Gap Firming Project

In 1985, the Windy Gap Project water supply was completed by the Municipal Subdistrict of the NCWCD. The goal of the Windy Gap Project was to deliver an average of 48,000 acre-feet of water annually to project participants. However, since 1985, the project has not met such projections due to deficiencies in water delivery and lack of storage. The Windy Gap Firming Project has been proposed to firm the participants' yield by constructing storage for the project water. The preferred alternative for this storage is the 90,000 acre-foot Chimney Hollow Reservoir located southwest of Loveland. Greeley will firm the Windy Gap supply by subscribing to 7,000 acre feet of storage in the proposed reservoir.

Halligan-Seaman Water Management Project

The City of Greeley and City of Fort Collins are participating in the Halligan-Seaman Water Management Project (HSWMP) which proposes the enlargement of the existing Halligan and Seaman Reservoirs on the North Fork of the Cache la Poudre River. The HSWMP consists of two separate projects that are proceeding through a combined permitting process. Fort Collins plans to enlarge Halligan Reservoir from 6,400 acre-feet to 14,525 acre-feet in the near future. Greeley intends to enlarge Seaman Reservoir from its existing capacity of 5,000 acre-feet to 53,000 acre-feet by 2029.

The enlarged pools of both reservoirs will primarily be filled with senior agricultural water although both the cities of Fort Collins and Greeley will store some junior water rights when they are in priority. The senior agricultural water rights that the HSWMP participants own or will acquire for the enlargements have been historically diverted into agricultural ditches just a few river miles below the confluence of the Poudre main stem and the North Fork. Greeley anticipates that the project will increase its annual yield by approximately 6,600 acre-feet. The Seaman enlargement is intended to provide long-term storage which will provide protection from severe droughts. However, the City will also make annual releases from the reservoir in order to retime excess water supplies from the spring runoff to meet fall and winter demands.

The Halligan and Seaman Reservoirs are located 16 river miles apart. There may be an opportunity to provide ecological benefits to the North Fork by coordinated reservoir

operations and reallocation of storage. The HSWMP participants have solicited input from local stakeholders and environmental groups to evaluate this opportunity.

The HSWMP participants have requested permits to construct the reservoir enlargements from the U.S. Army Corps of Engineers (USACE). USACE is currently conducting all analyses necessary to complete an Environmental Impact Statement and Record of Decision for these projects.

Overland Trail Gravel Pits

Greeley and the Tri-Districts (Fort Collins-Loveland, East Larimer County, and North Weld Water Districts) are in a joint venture to purchase, develop, and line several gravel pits along the Poudre River north of Fort Collins. These pits will be used by Greeley to maximize the utility of existing water rights and to meet return flows in that reach of the Poudre. Greeley's 1,800 acre-foot portion of the pits is expected to be online by 2022.

Poudre Ponds Gravel Pit

Greeley will increase its lower Poudre storage by approximately 1,500 acre-feet by mining and lining a gravel pit in the north part of Greeley along the Poudre River. This storage facility will provide water for return flow and augmentation requirements owed by the City.

REVIEW OF CURRENT POLICIES AND PLANNING INITIATIVES

The following policies and planning initiatives are in place in Greeley:

1. Growth shall pay its own way without unduly affecting existing ratepayers.
2. Greeley will not enter into any additional open-ended outside service contracts.
3. During a severe drought, Greeley shall incrementally increase the severity of water restrictions as drought conditions intensify, considering factors such as water storage within Greeley's system and regional water systems (e.g. C-BT system) Greeley depends on for yield.
4. Greeley will develop non-potable systems which will be equal to or less than the cost of potable sources.
5. Greeley will maintain a strong water conservation ethic and will invest in additional cost effective water conservation.
6. Every year Greeley will create a new rolling ten-year gpcd average that will be used to project future water demands. The new average will include the last five years' worth of conservation measures and ensure any savings through conservation are part of Greeley's long term planning.
7. Construction of new treatment and transmission capacity shall begin when peak demands exceed 90 percent of existing capacity.

CITY OF GREELEY WATER DEMAND MANAGEMENT PROGRAMS AND MEASURES

Water conservation is one of the four key points identified in Greeley's future water supply plan. Greeley's Water Conservation Program is designed to address all areas of water demand across the City.

Greeley first imposed water restrictions in 1907 requiring residents to alternate watering days and avoid mid-day watering. This same ethic is in place today continuing Greeley's 107 year practice of proactive water demand management. This effort has successfully reduced costs, improved performance, and extended the service life of the water system.

The City has included conservation in overall supply planning for more than 20 years. Greeley developed its first Water Conservation Plan in 1992. In 1997, Greeley hired a full-time conservation coordinator, Ruth Quade, who has managed the City's water efficiency efforts for the past 17 years.

Greeley Conservation Program

Greeley's Water Conservation Program has grown since 1997 to encompass all customer sectors in the City. In 2007, the City's conservation program budget was increased to $500,000 making it one of the largest programs in Colorado. The conservation program addresses both indoor and outdoor water use through education, ordinances, direct outreach, rebates, and information. The Greeley Water Conservation Program implements an extensive social marketing campaign that includes advertisements on radio, in print, on buses, and cable TV. Consequently, the Greeley Water Conservation Program has become one of the most visible and well-publicized conservation efforts in Northern Colorado.

Colorado Best Practices

The Colorado WaterWise Guidebook of Best Practices for Municipal Water Conservation outlines 14 best water conservation practices. The guidebook was created by Colorado WaterWise with assistance from many water utility water conservation professionals and by a generous grant from the Colorado Water Conservation Board.
In an effort to have a well-rounded program, Greeley incorporates these best practices that are effective for its system into the water conservation program.

The measures below describe Greeley's current and ongoing Water Conservation Program:

Metering

Greeley became fully metered in 1997. The City was one of the first Front Range communities in Colorado to be fully metered. This allows the community's water use to be tracked, measured, and evaluated.

Since 2011, Greeley has offered customers the use of hand-held electronic water meter monitors to check water use. The units have a built-in magnet, so it can be conveniently located on a refrigerator door. These units have been promoted on a limited basis due to the small quantities of these meters that have been purchased although the outreach has been targeted to participants of the Water Budget pilot study (described on pg. 29 Rate Structure and Water Budgets), customers that inquire about high water bills, and others who are actively engaged in their home water use. The use of these monitors will be evaluated for ease of use, customer service, and ability for customers to watch water use in real time. Staff is currently evaluated several alternative methods to allow the customer options when evaluating their own water use.

Lawn Watering Restrictions and Planting Ordinance

Greeley introduced its first lawn watering restrictions in 1907 and imposed fines for violations.[3] At the time, the City's population numbered no more than 8,000, and in a remarkable feat of conservation continuity, those first rules still apply today to nearly 100,000 citizens. For example, daily lawn watering and watering during the heat of the day is forbidden. Greeley's lawn watering restrictions (the minimum applicable every year) are shown in Table 7.

Table 7: Greeley Mandatory (Adequate Year) Watering Restriction Schedule

	Single family residences & duplexes with **even** numbered addresses ending in: **0, 2, 4, 6, 8**	Single family residences & duplexes with **odd** numbered addresses ending in: **1, 3, 5, 7, 9**	**All others:** home owner association common areas, multi-family residences, apartments, businesses, government, non-profit, churches, commercial, industries, and institutions.
January 1 - April 14	No Lawn Watering	No Lawn Watering	No Lawn Watering
April 15 - December 31	Sunday, Tuesday, Thursday *No Watering* *12 p.m. to 5 p.m.*	Monday, Wednesday, Saturday *No Watering* *12 p.m. to 5 p.m.*	Sunday, Tuesday, Friday *No Watering* *12 p.m. to 5 p.m.*

City ordinance establishes the following watering restrictions in Greeley:

- Hand watering of brown spots in a lawn is allowed on any day. Greeley encourages customers not to hand water their lawns between 10 a.m. and 5 p.m. Trees, shrubs, flower and vegetable gardens may be watered at any time by hand, drip irrigation, low volume, bubblers or by weeping-type soaker hoses. Using a watering can or a hose with a restrictive nozzle is considered watering by hand. Hand watering does not include using a hose with a sprinkler or manually operating an irrigation controller.
- Occasional washing/hosing off vinyl siding, washing out roof gutters, washing in preparation for paint or staining is allowed within reason.

[3] A 1908 Greeley Tribune article reports "eight or nine prominent Greeley" citizens complained that their fines for sprinkling out of hours should go to the water works fund, not to the Police Magistrate.

- Home car washing is allowed with a restrictive nozzle hose and bucket and minimal runoff.
- New lawn watering variances are available with proper soil amendment (4 cubic yards per 1,000 square feet of lawn).
- Waste of water is prohibited at any time (listed in detail on page 34).

When landscaping a new home or planting seed or sod in an established yard, Greeley residents must get a variance to water during restricted periods. Greeley also requires residents to prepare the soil with compost (organic matter) before receiving a variance. Under a 2002 City ordinance, new lawns require proof of adequate compost. The program has the following rules:

- Sod and compost receipts must be provided to the City to verify the installation.
- Four cubic yards of compost must be used for every 1,000 square feet of sod put down.
- The compost must be rototilled, and the property owner must provide photos or tiller rental receipts as proof.
- City employees check to verify the new lawn and compost.
- The property owner must post a variance notice when the off-hour irrigation is occurring.

Toilet and Clothes Washer Rebates

In 2014, Greeley offered up to a $50 rebate for any brand new WaterSense labeled high-efficiency toilet (HET) equal to or less than 1.28 gallons per flush (gpf). In order to receive the full amount, the customer must take the old toilet to the City's recycling facility where it is destroyed and used for road base. A voucher from the recycling facility serves as proof of destruction. Greeley pays up to $75 for a 0.8 gpf toilet with the recycling voucher.

Greeley offers a rebate of $100 for the purchase of a high efficiency clothes washer. Only washers on the "qualifying list" are eligible for the rebate. The list is regularly updated and is available on the City's web site (www.greeleygov.com/rebates).

Greeley's rebate programs operate under the following rules:

Rebates are subject to available funds. The current budget is $85,000 annually.

- Clothes washers must be on qualifying list.
- For each year's rebate, products must be purchased between January 1 and December 31 of the year the customer requests the rebate. Applications must be submitted before January 7 of the following year.
- The original sales receipt must be attached to the application and include the date of purchase, price, brand name and model number.
- Products must be for use at an address that receives a City of Greeley water bill.

- The owner bears responsibility for installation.
- The City of Greeley reserves the right to inspect and verify the purchase and installation location of any appliance or device for which a rebate is provided.
- The rebate is for a maximum of two toilets per customer and one washer per address.

The rebate program began in July 2006. Since then Greeley has processed 1,971 toilet rebates and 3,030 clothes washer rebates to residential customers to date.

Irrigation Efficiency Rebates and Grants

Greeley offers a grant for schools, businesses, or Homeowners' Associations (HOAs) to replace turf with xeric plantings. A customer may apply for up to $1,500 per year and may apply up to three years in a row.

To participate in the irrigation rebate program, customers must first receive a City of Greeley Irrigation Audit.

During the irrigation audit, products may be suggested to help customers increase water use efficiency. These recommendations are personalized to the individual property. Products that are frequently recommended include:

- Smart Controllers
- Pressure Reducing Valves
- Rotary Nozzles

Commercial, Institutional, and Industrial Efficiency Incentives (CII)

Greeley encourages water efficiency in commercial, industrial, multi-family, non-profit and governmental properties by providing rebates for installation of water efficient appliances and fixtures. In addition to the rebate program, Greeley offers free indoor and outdoor audits to commercial properties and can help determine which products make sense for any organization.

Large scale projects with rebates totaling more than $1,000 must be pre-approved to ensure funds are available. Table 8 provides details on all of Greeley's commercial rebates and items that can be requested for free.

Table 8: Greeley CII Rebates and Incentives for 2014

Bathroom Rebates	
Toilet (0.8 gallons per flush or less) – MaP* test score of 500 and above strongly recommended	$50 or $75 w/recycling voucher
Toilet or Urinal (1.28 gallons per flush or less) -- MaP test score of 500 and above strongly recommended	$25 or $50 w/recycling voucher
Flush Valve Toilet or Urinal (1.28 gallons per flush or less) -- MaP test score of 500 and above strongly recommended	$125 or $150 w/recycling voucher
Bathroom Faucet Aerator	free by request
Leak Detection Dye Tablets (for tank type toilets)	free by request
Industrial Rebates	
Cooling Tower Conductivity Controller	30% up to $900
Cooling Tower Meter (replaced every 5 years)	$50
Kitchen/Restaurant Rebates	
Ice Machine (water cooled to air cooled)	$450
Dish Machine (high-efficiency)	25% up to $400
Refrigeration Condenser (water cooled to air cooled)	25% up to $400
Pre-Rinse Spray Valve (high-efficiency)	free by request
Restaurant Table Tents (serving water upon request)	free by request
Laundry Rebates	
Coin Operated/ Commercial Washer -- on qualifying list	$300
Clothes Washer -- on qualifying list	$100
Outdoor Rebates	
Irrigation Rebates --- vary, please see residential irrigation rebates for details	
Water Broom (replacing hose sprayers)	50% up to $100
Commercial Car Wash Spray Nozzle (up to 300 per year)	$1 each

*MaP is the maximum performance score for each toilet tested by an independent lab.

Water Efficiency Audits

Irrigation Audits

The Greeley Water Conservation Program offers free irrigation efficiency audits to customers interested in learning about ways to improve the efficiency and operation of their irrigation systems. Customers can request an appointment for an evaluation from the City.

The Irrigation Auditing Program has gradually modified each year since 2001 to meet the changing needs of customers. Demand for irrigation audits exceeded what the conservation program could support. In response to demand, a full time Conservation Irrigation Specialist was hired in 2007. This staff member now supervises the program and hires and trains the auditors.

Commercial Indoor Audits

In 2007, a Commercial Auditor was hired to assist commercial and industrial customers with their indoor water consumption. After auditing approximately 160 businesses, Greeley developed its commercial rebate program for these customers (described above) based on information learned from the audits.

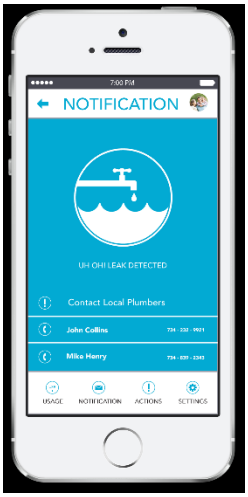
WaterInsight Pilot

Another pilot program that Greeley implemented to assist residential customers in learning more about their water use is using a software program called WaterInsight. To implement the program, Greeley teamed with San Francisco-based technology company WaterSmart Software in 2013 to determine the effectiveness of this program.

In this pilot program, WaterSmart provided 2,600 randomly selected residents with personalized Home Water Reports beginning in May 2013. These reports track household water use, compare household usage to their neighbors, and suggest targeted conservation techniques. Those in the pilot program can also sign up for the WaterInsight online portal to view water use, create a water savings plan, and update their information to get more accurate savings suggestions. Once the program is complete, Greeley will evaluate if WaterInsight is effective and if the program should be rolled out to all residential customers. As of the writing of this plan, the pilot is still ongoing and preliminary results show that those who received a printed home water report had a 5.8 percent cumulative water reduction. Residents in the pilot program with an e-mail copy of the report had a 2.6 percent cumulative water savings. Total savings for the one year pilot of WaterInsight software is 13.2 acre-feet of savings when compared to control households not getting the information.

Smart Meter Evaluation

Greeley staff is also looking into the feasibility of implementing an AMI/AMR (Smart Meter) system. Staff envisions a system that allows customers to view real time water use on a computer or a smart phone. This will prevent water waste by alerting customers sooner about high volume leaks and give customers an overall awareness of the water that they use in their homes.



Greeley will continue to provide ways for customers to be aware of their water use. The city hopes that an awareness of individual water use will help promote efficiency, enhance customer service, and empower customers to make informed water choices.

Rate Structure and Water Budgets

At the present time, Greeley has a uniform rate structure (described in detail on pg. 22). The City of Greeley is evaluating moving to a Water Budget Rate Structure. Greeley began a Water Budget Study in 2011. The project goal for the study was to evaluate the effectiveness of empowering customers with information to improve their water efficiency.

The purpose of the informational water budget program is to provide customers with a reasonable way to evaluate water use for their own property. This is particularly important information for customers who regularly exceed their water budget. The City expects this program will reduce excessive indoor and outdoor use.

The Water Budget provides individual households with a monthly estimate of projected water needs based on individual lot size and assumed persons per household. In 2010, plans were made to implement a water budget program over the next few years.

The first year of the program was completed in 2011. An informational Water Budget pilot project was conducted with approximately 250 volunteers. Most of the participants who completed the survey (94.6 percent) found the Water Budget to be helpful and increased the understanding of household water needs. A large percentage (75.5 percent) of the respondents would like additional information on how much water the lawn needs. The survey found that customers do not spend a lot of time looking at their water bill, but during the Water Budget pilot study that time increased, potentially making people more aware of their personal water use. An example of what each customer receives on their water bill illustrating the customer's individualized monthly water budget is shown in Figure 9. The bill also includes how much money the customer could have saved had they stayed in budget.

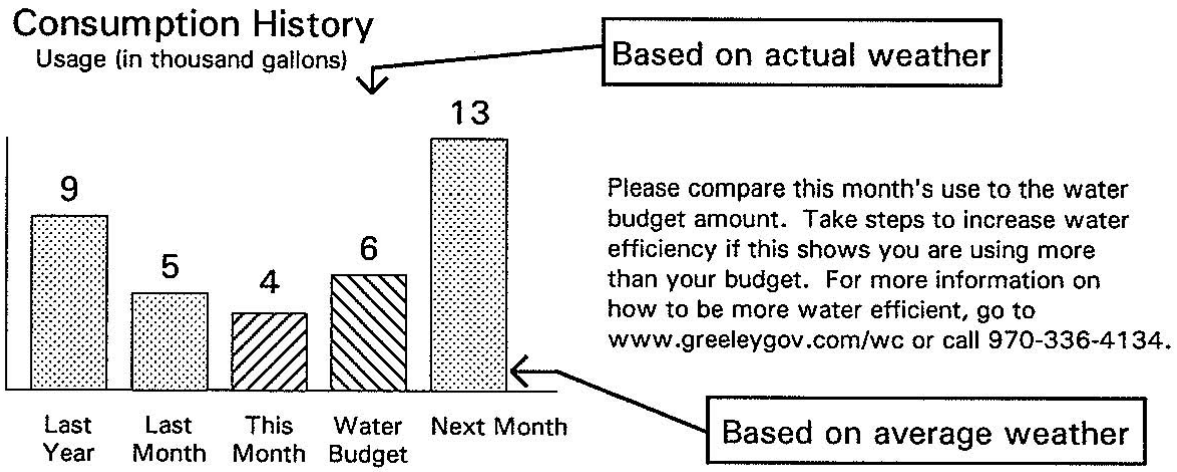


Figure 9: Example of Information Provided through Greeley's Water Budget Pilot

The program was expanded in 2012 to include a random sample of up to 1,000 residential customers in addition to existing volunteers. The water budget was modified to forecast the customer's water demand, based on historic averages, instead of calculating the previous month's water needs based on actual temperatures and rainfall as was done in 2011. The modified plan allowed customers to be aware of the water budget prior to their water usage. In 2013, the program was expanded to all residential customers citywide. Per customer feedback, the water budget is now based on actual weather data instead of historical weather data which was used in 2012.

Customers who use more water are in most need of water conservation messages and incentives. The City develops targeted communication pieces for customers who regularly exceed water budgets. This will give inefficient customers time to move toward efficiency before a higher rate is potentially attached for excessive use in the future.

Exceptionally high water bills are also flagged by utility billing. Water meter technicians go out to investigate and determine if it is a leak or if the conservation staff needs to be contacted.

The results of providing information to customers in the Water Budget study will continue to be evaluated, and if warranted, individualized tiered rates may be introduced to send a price signal to those customers who continue to use water well in excess of their actual need.

Commercial Efficiency Project

Greeley's water customers are separated into several different customer classes: residential-single family, residential, commercial, and industrial. These users are separate in the billing system. Greeley plans to focus on improving commercial water use efficiency by separating indoor and outdoor consumption allowing the City to better evaluate and inform these customers concerning their efficiency. To get started, a pilot project is planned to separate indoor and outdoor use at several existing commercial and industrial facilities.

The City is evaluating whether to extend this program by requiring separate meters for indoor and outdoor use for new commercial and multi-family developments.

Water Conservation Program Staff

A successful water conservation program needs people to guide water conservation efforts in the community. A great team is essential for the implementation and management of thriving water conservation programs. Customer service and a passion for conservation are a must when talking with water customers. There are currently three full-time employees, one part time employee and seasonal staff and volunteers dedicated to developing, implementing, and promoting water efficiency programs in Greeley.

In 1997, Greeley hired a full-time Conservation Coordinator who plans and manages water efficiency programs. The Conservation Coordinator researches and develops new programs and finds ways to continually improve existing policies and initiatives.

A part-time water conservation employee was hired in 2006. The Marketing Technician promotes water conservation in a variety of ways using public relations, marketing, and social media techniques. This position also guides efforts in water education projects for K-12 education.

In 2007, two water conservation specialists were hired. The Outdoor Water Conservation Specialist leads the irrigation audit program and consults on programs that are focused on proper irrigation methods. The Commercial Water Conservation Specialist helps businesses,

landlords, HOAs, schools, and industrial facilities implement water conservation technology and best management practices.

Seasonal employees assist in a variety of areas. This includes administrative assistant tasks such as customer service for Greeley's many incentive programs, data entry for rebates and variances, and assistance with special events. Seasonal staff and volunteers also assist with maintaining the Xeriscape Garden, responding to watering violations, checking soil amendment, and helping with irrigation audits.

Greeley's Water Waste Ordinance

An ordinance enacted in 2002 prohibits water waste of any kind in Greeley. Water utility staff members are empowered to enforce this ordinance and issue tickets with inclining fines for repeat violations.

The ability to ticket waste is important because a customer may be following the watering restrictions and still waste water. For instance, the customer is informed that water running in the gutter is not allowed (see photo below) even if the customer is in compliance with the watering schedule.

The ordinance defines waste in the following ways:

- It is unlawful for any person using City of Greeley water to use said water to allow or permit water to run to waste upon his or her premises, buildings, houses or lots, in through or out of any water closet, lavatory, urinal, bathtub, hose, hydrant, faucet, or other fixtures, appliances, or apparatus whatsoever or in any manner through neglect or by reason of faulty or imperfect plumbing or fixtures.

- It is unlawful for any person, partnership, company, corporation, or other entity using City of Greeley water to at any time use water to clean any hard surface upon or adjacent to the premises, building, house, or lot. For purposes of this section, hard surface includes but is not limited to driveways, sidewalks and streets, and street gutters.

- It is unlawful for any person, partnership, company, corporation, or other entity using City of Greeley water to allow either manually or automatically the sprinkling or watering of hard surface to allow excessive runoff of water from the premises, building, house, or lot and to allow the excessive pooling of water upon or adjacent to the premises, houses, or lots.

During times of drought, a water education team is assembled to closely monitor waste in the community. Water conservation staff also investigates water waste reported by concerned citizens or other City of Greeley staff.

Public Information and Education

Public information and education is an essential element of a vibrant and well-rounded utility-based water conservation program. Greeley's Water Conservation Program staff provides proactive public information and marketing for all water conservation programs. Every program has a significant portion of time and resources dedicated to education and information.

Each year a Water and Sewer Communications Plan is developed to help focus, monitor, and evaluate the department's outreach efforts. Conservation information and initiatives are an important part of Greeley Water and Sewer's overall public messaging.

A mix of media is important to any public outreach campaign. Different people rely on different information sources to get information. A 2011 City of Greeley resident survey showed that there are multiple places where people get information. This is why many different communications tactics must be utilized.

Face-to-Face Marketing

Communication research studies have shown that personal contact is often more persuasive in changing behaviors than advertising is. Greeley is steadfast in the belief that personal contact is the most effective element of its education program. Program staff strives to be visible in the community and to meet with as many citizens as possible. For example, staff spends one-on-one time with customers explaining compost requirements for installation of a new lawn, covering the water saving potential of a sprinkler system audit and tune-up, and answering questions when customers complete paperwork for a rebate. These are valuable and positive education opportunities that often lead customers to participate in additional programs.

Public Events

Educational opportunities are provided to teach children and adults appreciation of water, practical water conservation techniques, and help facilitate a community conservation ethic. Water conservation staff sponsors and participates in a broad array of events and educational activities to foster face-to-face interaction. Greeley participates in fairs, events sponsored by other organizations, and children's water festivals. These events offer ready-made outreach opportunities to a receptive audience. Added to those educational efforts are neighborhood meetings, speaking engagements, discussions with local civic groups, and classroom visits.

Media Relations

Information is sent to the media in the form of news releases. Water conservation staff sends out over 20 news releases each year in an effort to get news coverage. Staff also answers media inquiries about water conservation projects.

Paid Advertising

The Program has an advertising budget of $15,000. Larger projects are promoted through paid advertising in print, radio and online. With the increased costs of advertising, this budget is used thoughtfully and strategically to target those who may be interested in water conservation programs in Greeley.

Promotional Items

Various giveaway items are purchased to promote water conservation. These items are designed to keep water conservation in mind and are distributed at community events and in our office. This includes pens, water bottles, stickers with lawn watering suggestions, refrigerator magnets, and more. In 2013, the program printed water conservation tips on coffee sleeves for use at local coffee shops and coasters to be used at restaurants. Magnets are also purchased for City vehicles promoting irrigation audits. These items are frequently requested by other departments to put in goodie bags at their events.

Direct Mail

Approximately eight times per year, water conservation information is inserted into customer's water bills. Many of these flyers have forms that residents send back to sign up for conservation programs, including irrigation audits. Separate mailings are also targeted to groups to promote particular programs to a receptive audience or customers who are over the water budget.

Web and Social Media

Electronic communications is a relatively inexpensive and effective way to send messages to the public. The Water Conservation website is updated frequently to promote programs and the City maintains an active water conservation presence on Facebook (Figure 10) where residents can get water conservation information. On average three Facebook messages per week are sent about conservation. Information is also posted on the City's home page to promote conservation. In

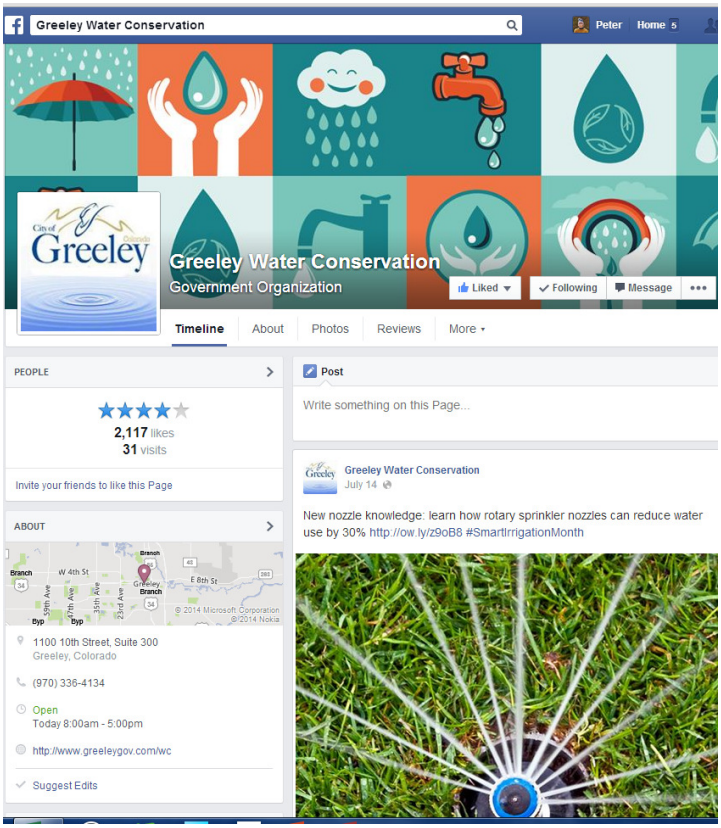


Figure 10: Greeley's Conservation Facebook Page

addition, a water conservation e-newsletter is published each month, and a water topic is included in every issue of the Greeley's City Scoop e-newsletter. Twitter is used to interact with the public and the larger water and environmental community. Water videos are also posted to YouTube. You can view the large selection of videos at www.greeleygov.com/Water/multimedia.aspx.

Community Relations

Making connections and partnerships in the community helps position Greeley's Water Conservation Program is an important resource and avenue for information in the community.

Staff members are involved with professional organizations, such as Rocky Mountain Section American Water Works Association Conservation Committee, Colorado State University Cooperative Extension Master Gardeners, American Water Resources Association, Colorado WaterWise, EPA WaterSense Promotional Partner, Alliance for Water Efficiency, Green Plumbers, Irrigation Association, Greeley Garden Tour, Greeley Chamber of Commerce, Latino Chamber, Real Estate Association, Poudre Learning Center, and the Association of Landscape Contractors of Colorado (ALCC).

School Education Program

Educating youth on water and conservation issues is important as it gives children and young adults an appreciation for water and an orientation towards protecting precious natural resources. Providing information for children also assists in conservation as they remind parents to use water wisely.

Figure 11: Children's Water Festival

Greeley co-sponsors the Children's Water Festival which hosts 1,200 children at Island Grove Regional Park. The water festival brings water professionals from around Colorado to provide presentations and activities about water, conservation, human health, and aquatic life. A wide range of curriculum areas are covered including language arts, math, science, social studies, visual arts, and health. The festival goals are to teach students that water is an essential, limited resource and that they can take action. The Festival is usually held during the last week of April.

The City of Greeley also co-sponsors The Confluence Institute. It is a 4-day training of K-12 teachers on water and conservation issues at the Poudre Learning Center. It provides teachers with resources and activities to use inside their classrooms. Teachers receive District Six credit and can receive Adams State University credit if they need it.

The Caring for Our Watersheds project is sponsored by the Poudre Learning Center and Agrium. Water conservation staff supports the project by judging projects and mentoring students through implementation. In this project, high school students must answer the question: "What can I do to improve my watershed?" They must research and develop a project that is implementable and solves a watershed issue. In 2013, the top three groups were mentored by City of Greeley staff.

In 2011, a group of students implemented a project to install 44 toilets in the older part of Greeley Central High School. This project ranked third in the competition, and the toilets were installed in June with the help of conservation staff and the rebate program. The Water Conservation Program continues to support Caring for Our Watersheds and helps implement projects when feasible.

Targeted Outreach

Many water efficiency messages are sent out to all water customers (e.g. in water bills or direct mail) since everyone uses water in one way or another. Other messages can be targeted to particular groups that address unique needs. For example, Greeley sends post cards to people who exceeded their water budget in one or more month. The water bill itself also informs customers of how much money they could have saved by using water efficiency in accordance with their water budget.

It is anticipated that Greeley's Water Conservation Program will continue to evolve and change over the next seven years, but the financial and human resource commitment from Greeley and the associated water savings are expected to remain strong.

New programs, analyses, and evaluations to be added to the existing Water Conservation Program

City of Greeley, Parks, Water System

- Re-landscape Greeley Parks: Parks will gradually reduce turf by 5-10 percent at existing parks and new parks will be designed to have 15-20 percent non-turf landscaping
- Xeriscape street medians rather than plant with turf
- Explore lining ponds at City golf courses to reduce leakage
- Re-landscape City facilities, City Hall, Annex, etc.
- Conduct annual IWA/AWWA desktop water loss audit
- Assist local golf courses in converting roughs to more natural, Colorado landscape creating wildlife habitat and work with courses to get Audubon designation

New Construction and Non-Residential Accounts

- Continue to evaluate revisions to landscape codes to enhance water efficiency
- Require separate meters for outdoor and indoor water use for new commercial customers with landscape larger than 1 acre
- Explore sub-metering for new commercial properties and retrofitting existing commercial (e.g. strip malls, Centerplace, etc.)
- Retrofit detention ponds (from bluegrass to native turf)
- Pilot project of a permeable paving demonstration for conservation and water quality
- Investigate WaterSense model home in Greeley
- Provide assistance to assure new GURA & Habitat for Humanity homes are WaterSense certified
- Provide scholarships for irrigation and landscaping professionals to get training and certification
- Offer Green Plumber training in Greeley to teach plumbers the benefits of WaterSense products, etc.

Existing Customers

- Provide low income assistance (elderly on fixed incomes) for irrigation system upgrades and retrofits
- Replace toilets of older large apartment complexes (east of 35th Avenue & older than 1993) with the Stealth toilet (0.8 gpf)
- Exchange showerheads
- Provide large HOA irrigation efficiency grants and Xeric grants (turf removal)
- Assist with water wise landscape design
- Do a pilot project for a xeriscape rebate for replacement of turf to residential customers to gauge interest in the program and evaluate cost and water savings
- Offer a scholarship to encourage youth from the Greeley community to study natural resources and engineering modeled after Big Thompson Watershed Forum and West Greeley Conservation District's scholarships

- Develop a team of community members to become conservation ambassadors to spread the word about conservation programs and City services in general as well as volunteer at educational events

Given that 55 percent of treated drinking water is used for landscape irrigation, (as much as 70 percent between April and October) it makes sense to focus conservation in making landscape irrigation more efficient while reducing high water demand plantings. There is a long window of opportunity to start changing the perception of what the landscape in Greeley could look like.

Some of these changes include changing the landscape codes which will limit how much turf can be installed and give larger landscaping credits for low water use trees, shrubs and perennials. Parks and athletic field irrigation systems will be designed with conservation in mind and will be installed with 15-20 percent of the park planted in xeric plantings, in parking medians around buildings and entries into the park. City properties will demonstrate xeric plantings to show that conservation can be beautiful. Turf reductions will be studied and applied to HOA green spaces and commercial properties. Parking medians will no longer contain turf and detention ponds will no longer be planted with bluegrass and watered and maintained like parks.

For existing customers, assistance will include design and rebates or grants for xeric plantings and turf removal.

CONSERVATION GOAL

In Greeley's 2008 Water Conservation Plan, a goal was established of reducing demand by 8.2 percent from 2010 to 2030 directly through its conservation program. The net impact of this program is an estimated savings of 144 acre-feet per year, every year which will yield a total savings of over 3,000 acre-feet of water by 2030. This 2014 plan affirms that Greeley continues to support this goal and is on track to achieve these savings. An analysis of estimated savings achieved through the current program, as described below, suggests that this goal is attainable. Indeed the goal may be exceeded, given the current level of conservation effort, particularly as Greeley implements the Water Budget Program.

Table 9: Annual Savings Compared to 2009 Conservation Goal

	Goal	2009	2010	2011	2012
Savings in acre-feet	144	182	135	184	191

Table 10 below shows a list of current and potential future water conservation program measures and presents an analysis of the estimated water savings achievable through the Greeley Water Conservation Program. [4]

[4] Where possible, water savings were measured using data from the Greeley billing system. In most cases, savings were estimated from published research and references are listed in the table. The estimates provided in this table are conservatively low, and it is possible that Greeley may achieve higher savings in the coming years.

Table 10: Greeley Water Conservation Program Matrix, Estimated Water Savings, and Source Citation

Current Program/Measures	# of Customers Impacted Per Year	Estimated Savings Per Account (kgal/year)	Estimated Total Savings Per Year (ACRE-FEET)	Comments	Citation
Mandatory watering restrictions (3 days per week - no watering from noon- 5 p.m.)	ALL	0		Existing program for 100 years. Unprecedented. Key benefits include: reduced peak demand, more regularized demand patterns, useful education tool, keeps water use and efficiency in public eye.	
Soil amendment ordinance	200	16.3	10	Estimate based on discussions with Ruth Quade.	"30 % less water is needed" - A1
Water Waste Ordinance	ALL		10	Estimate based on customer contacts and citations issued.	
HET toilet rebate ($50 - $75)	280	10	8.6	Based on average savings level determined at 95 % confidence level. 1,971 rebates have been processed since July 2006.	*Residential End Uses of Water* - AWWA, 1999; *EPA Residential Retrofit Study* - Aquacraft, 2004; *Handbook of Water Use and Conservation*, A. Vickers 2001.
Clothes washer rebate ($100)	430	5.5	7.3	Based on average savings level determined at 95 % confidence level and current clothes washer water use data	*EPA Residential Retrofit Study* - Aquacraft, 2004; *Handbook of Water Use and Conservation*, A. Vickers 2001; Consortium for Energy Efficiency
Indoor Commercial Water efficiency audits	200	29.1	17.9	Calculation based on data from Ruth Quade (assumes customers take advantage of retrofits).	
WaterInsight home water reports			13.2	Based on 5.8% reduction from paper reports and 2.6% reduction from emailed reports compared to control group.	WaterSmart Software Report to City of Greeley.
Conservation education program (indoor/outdoor). Includes: water budget pilot, public info and education programs, school program, and targeted outreach.	MANY/ALL	0.5	23.0	Estimate based historic demand patterns and education program implementation timeline. Assumes 50 % of customers save 500 gallons per year through educational efforts.	*"As We See It -- Education on Water Use Is Essential as Population, Demand Soar",* Fender, Douglas H. Journal AWWA, Vol. 95 Iss. 2, February 2003*; Handbook of Water Use and Conservation*, A. Vickers 2001.
Irrigation efficiency audits	300	20	18.4	Engineering estimate	

Current Program/Measures	# of Customers Impacted Per Year	Estimated Savings Per Account (kgal/year)	Estimated Total Savings Per Year (ACRE-FEET)	Comments	Citation
Water loss control	1	N/A	25	Based on a measured 1 % reduction in system loss between 97-01 and 02-07 (-6% vs. -5%) amounting to a 0.1% reduction per year. Reductions will likely taper off at the -3% to -4% levels, but the program effort is probably worthwhile to maintain such a low level of system losses.	Greeley water use data provided by water distribution staff
ESTIMATED ANNUAL SAVINGS FROM CURRENT PROGRAMS AND MEASURES			133.4	Does not include significant peak usage reductions resulting from watering restrictions which could be reducing coincident peak day demand by 30 - 40%.	
Natural Replacement					
Residential toilet replacement (1% per year)	140	9	3.9	Assumes 1% of residential customers per year replace toilets. Some apply for the available rebate and some don't.	*Residential End Uses of Water* - AWWA, 1999; *EPA Residential Retrofit Study* - Aquacraft, 2004; *Handbook of Water Use and Conservation*, A. Vickers 2001.
Residential CW replacement (3% per year)	430	5.5	7.3	Assumes 3% of residential customers per year replace their washer. Some apply for the available rebate and some don't.	*Residential End Uses of Water* - AWWA, 1999; *EPA Residential Retrofit Study* - Aquacraft, 2004; *Handbook of Water Use and Conservation*, A. Vickers 2001.
Commercial Industrial Institutional (CII) toilet replacement (1% per year)	250	10	7.7	Assumes 1% of CII customers will replace toilets each year. Water savings estimate is on the low side of scale. Savings are dependent upon usage frequency of the old and new fixture.	*Commercial and Institutional End Uses of Water* - AWWA, 2000; *A Practical Approach to Water Conservation for Commercial and Industrial Facilities,* Mohan Seneviratne, 2007; *Handbook of Water Use and Conservation*, A. Vickers 2001.
CII faucet replacement (1% per year)	250	5	3.8	Assumes 1% of CII customers will replace faucet aerators each year. Water savings estimate is on the low side of scale. Savings are dependent upon usage frequency of the old and new fixture.	*Commercial and Institutional End Uses of Water* - AWWA, 2000; *A Practical Approach to Water Conservation for Commercial and Industrial Facilities,* Mohan Seneviratne, 2007; *Handbook of Water Use and Conservation*, A. Vickers 2001.
ESTIMATED ANNUAL SAVINGS FROM NATURAL REPLACEMENT			22.7		

Current Program/Measures	# of Customers Impacted Per Year	Estimated Savings Per Account (kgal/year)	Estimated Total Savings Per Year (ACRE-FEET)	Comments	Citation
TOTAL ESTIMATED ANNUAL SAVINGS FROM CURRENT PROGRAM AND NATURAL REPLACEMENT			156.1	The amount represents approximately 0.62% of Greeley's total annual demand. The expected range of savings should be + or - 10% of the total (140 - 172 ACRE-FEET). When developing these savings into a long-term demand forecast changes in technology and program implementation rates must be considered.	

IMPLEMENTATION PLAN FOR GREELEY CONSERVATION PROGRAM

Greeley is actively implementing the conservation program described above. The program has evolved over the past 17 years under the guidance of the Water Conservation Coordinator. The Water Conservation Program continues to innovate and offer new programs while focusing on the growing needs of the community and water utility.

Monitoring and Evaluation

The entire suite of current conservation programs are regularly evaluated and judged against annual, seasonal, per customer, and per capita demands. For each program, Greeley will evaluate and monitor the program's progress towards the stated 9.3 percent water savings goal. Additionally, net and gross water savings are regularly evaluated. The water use trends presented earlier in this plan (Figure 5 and Figure 6) demonstrate that per capita water demands in Greeley have declined measurably since 1997.

Every year Greeley creates a rolling 10-year gpcd average that will be used to project future water demands. The new gpcd average will include all active conservation measures and ensure that any savings through conservation are part of Greeley's long-term planning. Water use will also be evaluated taking into account variations created by annual weather conditions. The monitoring and savings will be reported annually on all programs when there is at least a year's worth of consumption data. See Table 7.

Objective and actual conservation results achieved by each component of the plan will be quantitatively monitored and reported to management and the Water Board at least once a year. For example, consumption for those who have received a conservation incentive from the previous year(s) will be monitored and quantified similar to what has been done with the monitoring for the Parks Department.

Updating the Conservation Plan

Greeley will update the conservation plan every seven years per Colorado Water Conservation Board requirements unless significant changes occur within that time frame warranting an accelerated schedule. Greeley's previous Water Conservation Plan was approved in 2009. As part of this, all demand forecasts will be reevaluated at that time.

Conservation Plan Review Process, Public Participation, and Adoption

2008 Conservation Plan Review Process, Public Participation, and Adoption

On August 20, 2008, the City of Greeley Water and Sewer Board reviewed the plan and made comments after which the public comment period began. Public comments ended on October 20, 2008.

On August 21, 2008, the Greeley Water Conservation Plan was posted on the City of Greeley website www.greeleygov.com and hard copies were made available to any interested members of the community at City Hall (1000 10th Street) and the Water and Sewer Department at City Hall Annex (1100 10th Street).

A total of four public comments were received during the 60-day comment period. To the extent possible, comments were addressed in the revised conservation plan.

Public comments and proposed changes were presented to the City of Greeley Water and Sewer Board on November 19, 2008. The Greeley Water and Sewer Board formally adopted the 2008 Water Conservation Plan on November 19, 2008.

2014 Conservation Plan Review Process, Public Participation, and Adoption

On October 15, 2014, the City of Greeley Water and Sewer Board will review the plan and make comments after which the public comment period will begin. The public comment period will end on December 15, 2014. The plan will be posted on the City of Greeley website www.greeleygov.com and hard copies will be made available to any interested members of the community at City Hall (1000 10th Street) and the Water and Sewer Department at City Hall Annex (1100 10th Street, Suite 300).

Proposed changes reflecting public comments will be incorporated into the plan, where appropriate, from December 15 through December 30, 2014, with a final draft presented to the Greeley Water and Sewer Board for adoption on January 21, 2015 and presented to the Greeley City Council on February 3, 2015 for adoption.

The adopted plan will be sent to the Colorado Water Conservation Board for approval on February 4, 2015.

COMPLIANCE WITH STATE PLANNING REQUIREMENTS

Colorado Revised Statute § 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. Key elements that must be considered in development of the plan are listed as follows:

1. Water-saving measures and programs including: (I) water-efficient fixtures and appliances; (II) water-wise landscapes; (III) water-efficient industrial and commercial water-using processes; (IV) water reuse systems; (V) distribution system leak identification and repair; (VI) information and education; (VII) conservation oriented rate structure; (VIII) technical assistance; (IX) regulatory measures designed to encourage water conservation; (X) incentives to implement water conservation techniques including rebates.
2. Role of conservation in the entity's supply planning.
3. Plan implementation, monitoring, review, and revision.
4. Future review of plan within 5-7 years.
5. Estimated savings from previous conservation efforts as well as estimates from implementation of current plan and new plan.
6. A 60-day minimum public comment period.

The following section of the plan details Greeley's compliance with this statute.

Greeley Compliance

The City of Greeley developed this conservation plan in order to comply with C.R.S. § 37-60-126. Each element of compliance is documented below.

1. **Consideration of specific conservation measures**

   (I) *Fixture and appliances* – The current program includes residential and commercial toilet rebates and clothes washer rebates, sprinkler clocks, rain sensors and heads, free water conservation kits and general promotion of water efficient fixtures and appliances.

   (II) *Water-wise landscape* – The current program includes: rebate for controllers and components; Xeriscape Grant program offering matching money for schools and commercial properties; and Xeriscape education and demonstration gardens. A proposed revision of landscape codes to incorporate water conserving practices into all new landscaping is currently being evaluated.

   (III) *Commercial, Industrial and Institutional (CII) measures* – The current program includes: free audits; rebates for toilets, urinals, and clothes washers; air-cooled ice machines; conductivity controllers for cooling towers, etc.; hotel and restaurant conservation cards; CII benchmarking effort; see Appendix A for a complete list of commercial rebates.

   (IV) *Water reuse systems* – The water from the wastewater plant is used to satisfy augmentation, return flow, and non-potable demands (by exchange).

   (V) *Water loss and system leakage reduction* – The current program includes an active utility water loss and leak detection program. Customer's high bills are flagged and leak

investigation is implemented. Currently, Greeley is lining the in-town treated water reservoirs to tighten up the system. It is estimated that the rehab and lining of in-town treated reservoirs will cut leaks by 98 percent. Water mains in older areas of town are targeted every other year for rehabilitation with a cement mortar lining as a preventative measure.

(VI) *Information and public education* – The current program includes: various public information campaigns with bill stuffers and related informational materials; Xeriscape education; annual youth water festival; classroom presentations, workshops, classes, and presentations to customers, civic groups and anyone who requests a presentation. A large portion of the budget is dedicated to print, radio and other advertising and promotions.

(VII) *Water rate structure* – The current program is a billing system based on the cost of service for water; a water budget pilot program is providing feedback to City officials and staff on the best way to implement a custom individualized tiered rate (water budget). Greeley is moving forward with research and development of a water budget based rate structure for implementation in the next five to ten years. In the meantime, Greeley is providing water budget information to individual single family residential customers, so they can better manage their water use.

(VIII) *Technical assistance* – There were none requested for development of this plan.

(IX) *Regulatory measures* – The current program includes: watering restrictions, lawn permit ordinance, soil amendment ordinance, water wasting ordinance, and landscape ordinances.

(X) *Incentives* – A broad range of incentive and rebate programs are included in the measures described above as well as free products.

2. Role of conservation in Greeley supply planning.

Greeley has a $500,000 budget for conservation. The conservation program is well integrated into overall water supply planning and anticipated conservation savings are included in future demand projections. Water demand forecasts include the expected impacts of water conservation. Greeley is currently examining the potential impacts of the proposed water budget-based rate structure on future demands.

3. Plan implementation, monitoring, review, and revision.

Greeley has developed a careful plan implementation program along with monitoring mechanisms and scheduled review and revisions. Details of this effort are described in the preceding section of this document.

4. **Future review of plan within seven years.**

The City of Greeley intends to review and update the Water Conservation Plan every seven years.

5. **Estimated savings from previous conservation efforts and current plan.**

   The Greeley Water Conservation Program has accomplished significant demand reductions. Residential per capita use from 1997 to 2001 was 156 gpcd. From 2011 to 2013, gpcd decreased to 121 – a 23 percent reduction. Greeley intends to maintain these savings in the coming years. Greeley has established a goal of reducing demand by 9.3 percent directly through its conservation program efforts over the period from 2015 to 2035 compared with projected future demand without conservation.

6. **Public comment period.**

   The Greeley Conservation Plan approval process included the required 60-day comment period. The public participation process started October 16, 2014, through presentation of the draft plan to the Greeley Water and Sewer Board. A 60-day comment period ending on December 15, 2014, followed and was concluded with the adoption of the plan by the Water and Sewer Board on January 21, 2015, and City Council February 3, 2015. No public comments were received.

APPENDICES:

Resolution
Public Notice Announcement