NORTH WELD COUNTY WATER DISTRICT

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May 14, 2019

Mr. Ben Wade, CWCB
1313 Sherman Street, Room 721
Denver, CO 80203

RE: North Weld County Water District Municipal Water Efficiency Plan

Dear Mr. Wade:

North Weld County Water District (NWCWD or District) would like to submit a locally adopted Municipal Water Efficiency Plan for review and approval by the Colorado Water Conservation Board's Office of Water Conservation and Drought Planning. This letter is also intended to meet the Cover Letter Submittal Requirements for CWCB review.

Name and contact information:

North Weld County Water District
Attn: Eric Reckentine, District Manager
PO Box 56
Lucerne, CO 80646
T: (970) 356-3020
F: (970) 395-0997

List of organizations and individuals that assisted in plan development:

Clear Water Solutions, Inc.
Michelle Hatcher and Steve Nguyen

Quantity of retail water delivery and population for past five years:

Table 1: Water Demand by Customer Category

Customer Category	2011	2012	2013	2014	2015	2016	2017	*Average*
	Values in AF unless otherwise noted							
Wholesale-Muni	2,674	3,130	2,680	2,510	2,860	3,049	3,103	***2,858***
Wholesale-NonMuni	183	200	315	415	367	391	416	***327***
Commercial/Industrial	2,014	2,421	2,340	2,566	2,750	2,845	2,991	***2,561***
Residence	1,669	1,905	1,620	1,589	1,742	1,897	1,781	***1,743***
Bulk Water	649	335	272	104	229	514	809	***416***
Total Billed	7,190	7,990	7,227	7,185	7,949	8,696	9,100	***7,905***
Non-Revenue	644	477	430	476	797	551	313	***527***
Residential GPCD	165	187	156	147	156	164	142	***159***
Total Estimated Population	39,577	38,813	38,368	42,015	42,821	43,645	44,487	***41,389***
Total GPCD	177	195	178	163	182	189	189	***182***

Table 2: NWCWD's Population Growth

Year	Population	Growth Rate
2013	38,368	-1.1%
2014	42,015	9.5%
2015	42,821	1.9%
2016	43,645	1.9%
2017	44,487	1.9%
2018	45,348	1.9%
2019	47,615	5.0%
2020	48,568	2.0%
2021	49,539	2.0%
2022	50,530	2.0%
2023	51,540	2.0%
2024	52,571	2.0%
2025	53,623	2.0%
2026	54,695	2.0%
2027	55,789	2.0%

Public review and comment information:

The District held its public review period from February 16, 2019 to April 17, 2019. Notification was posted in the Fort Collins Coloradoan and the Greeley Tribune announcing the public review timeframe and that a draft Plan would be available for the public to review at the District's Office. The draft Plan was also posted on the District's website on February 13, 2019. During the public review period, the District received no comments on the Water Efficiency Plan.

NWCWD is pleased with the Water Efficiency Plan that has been developed and will commit the resources necessary, as they become available, for the implementation of the Plan.

Please let me know if you have any further requirements.

Sincerely,

Eric Reckentine,
District Manager

NORTH WELD COUNTY WATER DISTRICT

2018 MUNICIPAL WATER EFFICIENCY PLAN UPDATE

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EXECUTIVE SUMMARY

The North Weld County Water District (NWCWD *or* District) has provided water services to citizens, businesses, agricultural operations, and municipalities since 1962. NWCWD serves an area of over 325 square miles as shown in **Figure 1.1a,** Section 1.1. The District is located approximately 55 miles north of Denver. In 2017 the population was estimated to be nearly 44,500. The future population is projected to reach nearly 54,000 by 2027.

The District has developed this Municipal Water Efficiency Plan (Plan) update in accordance with the Water Conservation Act of 2004 and to meet the provisions of Colorado Revised Statute section 37-60-126. As part of CRS 37-60-126, a State-approved Plan will qualify NWCWD for continued funding from the Colorado Water Conservation Board (CWCB) and the Colorado Water Resources and Power Development Authority for water supply and delivery projects. The District has made a number of efforts in the last ten years to improve their water use efficiency and has implemented a number of steps and programs throughout that time. The District looks forward to its continued partnership with CWCB and the State to continuously improve its efficiency and conservation efforts.

The District receives its treated water from the Soldier Canyon Water Treatment Authority (SCWTA), which is jointly owned by the Tri-Districts: NWCWD, Fort Collins-Loveland Water District, and East Larimer County Water District. Water is delivered to the plant from Horsetooth Reservoir, which is part of the Colorado-Big Thompson Project. The Tri-Districts can also bring water to the plant through the jointly owned Pleasant Valley Pipeline. The District's distribution system includes storage capacity at SCWTA as well as five treated water storage facilities throughout the system. The system also includes seven pump stations, 16 control valves, and nine flow control master meters. In total, the District has over 730 miles of pipeline.

In 2017, NWCWD's customers utilized approximately 9,413 acre-feet (AF) of treated water. The District is expected to increase its annual water demand through new growth to approximately 11,812 AF of treated water (not including Non-Revenue water) over the planning period which extends to 2027. Water savings from this water conservation planning effort is estimated to save a total of 8,463 AF over the planning period. The savings from this planning effort will make a considerable contribution toward the water supplies needed to serve the 2027 demand.

This report documents NWCWD's water system, past and future water use, and the water efficiency planning process used in accordance with CWCB's Municipal Water Efficiency Plan Guidance Document.

Past and Current Water Efficiency Activities

NWCWD has implemented a variety of water efficiency activities since before 2009 when the first Water Conservation Plan was prepared. The water efficiency activities that have been historically implemented are shown in **Table ES-1**. Some of the savings from water efficiency activities were able to be quantified and are summarized in **Table ES-2**. The total estimated water savings from the activities listed in Table ES-2 is approximately 360 AF annually.

Table ES-1: NWCWD's Existing and On-going Water Efficiency Activities

Water Efficiency Activities
Foundational Activities
Metering
Automatic Meter Reading (AMR)
Meter Testing and Replacement
Meter Upgrades
Data Collection - Monitoring and Verification
Frequency of Meter Reading
Tracking Water Use by Customer Type
Upgrade Billing System to Track Use by Sufficient Customer Types
Tracking Water Use for Large Customers
Water Use Efficiency Oriented Rates and Tap Fees
Volumetric Billing
Water Rate Adjustments
Frequency of Billing
Inclining/Tiered Rates/Water Budgets
System Water Loss Management and Control
System Wide Water Audits
Leak Detection and Repair
Recycling WTP filter backwash
Planning
Master Plans/Water Supply Plans
Targeted Technical Assistance and Incentives
Giveaways: Residential Water Audit Kits
Education Activities
Bill Stuffers, Newsletters, Mass Mailings
Water Fairs announcements and participation in Water Festival
Website: Smart Watering Guidelines, Conservation/Water Efficiency Plan
Social Networking (Facebook & Twitter)

Table ES-2: Water Savings Estimates of Individual Activities

Historical and Current Water Efficiency Activities	Annual Water Savings for Past Five Years (AF)					Total Five-Year Water Savings (AF)	Average Annual Savings (AF)
	2013	*2014*	*2015*	*2016*	*2017*		
Foundational Activities							
Water Efficient Rate Structure/Water Budgets with Regular Updates	192	192	220	232	236	1,073	215
Recycling WTP Filter Backwash	130	130	149	157	160	726	145
Total Savings	322	323	368	389	396	1,799	360

The water savings for the remaining activities, whose savings are not analyzed in **Table ES-2**, are more difficult to quantify or had insufficient data. Therefore water savings of the remaining activities was estimated using demand data to compare historical annual per capita water demands before and after the implementation of the water efficiency activities. **Figure ES-1** shows the annual historical per capita water demands in relation to population. Although water usage varies considerably year to year, there is a clear trend of reduced water use as the District and its customers have made efforts to be more conservative and efficient. Much of the variability in water usage can be explained due to temperature and precipitation fluctuations.

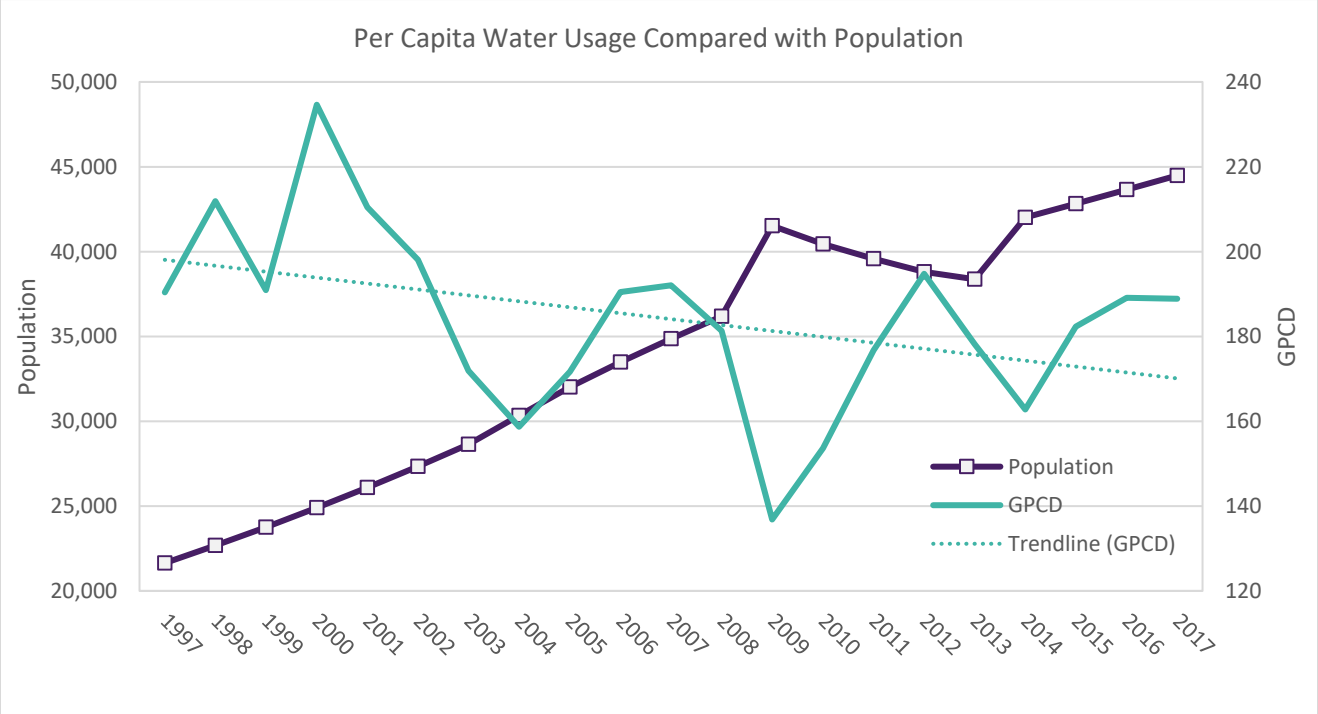

Figure ES-1: Population Compared with Per Capita Water Usage

Prior to the selection of the water efficiency activities, a preliminary set of goals has been developed to provide a means to screen and evaluate the selected activities. Goals from the District's 2009 Water Conservation Plan have been assessed and incorporated into the new goal development process. A meeting was initially held with District Staff to discuss water efficiency goals appropriate for NWCWD. The following preliminary goals were established by District Staff:

- In keeping with the savings goal established in NWCWD's 2009 Water Conservation Plan, the targeted water savings goal for this Plan will be to lower the total per capita water use by 10% over the ten-year planning period.
- The targeted ten-year water savings goal for the District's customer categories were as follows[1]:
    - Wholesale-NonMuni: 5%
    - Commercial/Industrial: 10%
    - Residence: 16%
    - Bulk Water: 2%
    - Non-Revenue Water: 15% (i.e., a 15% reduction of current 7% average)
- Develop a water efficiency program that can be implemented within District staffing constraints and with Staff approval.
- Implement water efficiency activities that are compatible with the District and their District Board representatives.

The success of the stated goals will be measured through monitoring of billing data, screening and evaluating activities that are acceptable to District Staff, and soliciting District Board and community feedback on water efficiency activities.

NWCWD used a four-phase process for selecting and fully evaluating water efficiency activities. The four phases include: 1) assessment; 2) identification; 3) qualitative screening; and 4) evaluation and selection. The initial screening of the water efficiency activities with District Staff resulted in selecting 18 candidate activities for further evaluation. Some of the activities have been combined within their SWSI Levels Framework to assist in evaluation and avoid double counting savings. The second screening was accomplished by evaluating each activity based on the following evaluation criteria: Staff and Board approval, Feasibility for customer base including acceptance and participation, Staff and financial resource limitations, and Legal authority. The following measures were eliminated in the second screening process:

- Slow the Flow Residential Irrigation Audits
- Indoor Residential Water Audits
- Residential and Commercial Ultra High-Efficiency Toilet Upgrade Service or High-Efficiency Toilet Rebate Program
- High-Efficiency Clothes Washer Rebate
- Giveaways: Residential Water Audit Kits – New
- Xeriscape Demonstration Garden

[1] Because the Wholesale-Muni customers are responsible for their own water supply planning and acquisition, it was determined that water savings evident from any activities that may affect this customer category would be out of the District's control and therefore are not included in the overall water savings calculated.

- Landscape Design (Xeriscape) and Maintenance Classes

The District may re-evaluate these eliminated measures for future planning efforts. The final 13 activities chosen are as follows:

- Meter Testing and Replacement/Meter Upgrades
- System Wide Water Audits
- Control of Apparent Losses (with Metering and SCADA)
- Automatic Meter Reading (AMR) and Automatic Meter Infrastructure (AMI) Installation and Operations
- Water Efficient Rate Structure/Water Budgets with Regular Updates
- Leak Detection and Repair Program - No Third Party
- Leak Detection and Repair
- Recycling Water Treatment Plant Filter Backwash
- Master Plans/Water Supply Plans
- Smart Watering Guidelines
- Giveaways: Residential Water Audit Kits
- Bill Stuffers, Newsletters, Newspaper Articles, Mass Mailings, Website updates, Social Media (Facebook and Twitter)
- Garden in a Box

Table ES-3 compares the anticipated water savings from the selected activities with the original goals and then adjusts the water savings goals for this Plan update. Over the ten-year planning period, the selected activities could potentially provide an overall water savings of 8,463 AF. The adjusted goals reflect what is believed to be obtainable by NWCWD's Staff. After the goals were adjusted to reflect the expected water savings, the estimated water use reduction is 11.9%. Therefore, NWCWD will target an overall reduction from their forecasted water use by 11.9% over the planning period because of implementation of this Plan.

Implementation and Monitoring Plan

The implementation plan defines the process necessary to carry out the selected water efficiency activities. Monitoring types of demand data can be beneficial in tracking the savings generated from implementing a water efficiency plan. Raw water delivered and treated water produced is monitored at the SCWTA on a daily basis. Other categories of raw and treated water are typically monitored on a monthly basis. Still, other categories are monitored and evaluated on a semi-annual or annual basis.

The demand data, which will be collected during the monitoring period of the plan, is presented in **Table ES-4**. Leann Koons (Operations Manager) will be chiefly responsible for coordinating the implementation of this Plan. The District also realizes that the most successful Plan is one that involves a team effort from many staff, other key personnel, and sometimes assistance outside of NWCWD's employees.

Table ES-3: Water Efficiency Goals Comparison

Water Use Categories:	Total Projected Water Use (2018 to 2027)	Reduction Goals for Planning Horizon		Adjusted Reduction Goals for Planning Horizon	
				Total Water Savings from Activities	Resulting Reduction
	(AF)	(%)	(AF)	(AF)	(%)
Wholesale-NonMuni	4,183	5.0%	209	298	7.1%
Commercial/Industrial	32,783	10.0%	3278	2,572	7.8%
Residence	22,318	16.0%	3571	3,113	13.9%
Bulk Water	5,187	2.0%	104	69	1.3%
Non-Revenue Water (1)	6,744	15.0%	1012	2,410	6.1%
Total Water Production:	71,215				
Total Demand Reduction:			8,174	8,463	
Total Percent Reduction:			11.5%		11.9%

(1) Note: Non-Revenue water is calculated differently from other categories. The percentage under "Resulting Reduction" is the estimated final percentage that Non-Revenue represents.

Table ES-4: Selection of Demand Data for Efficiency Plan Monitoring

Monitoring Data	HB 10-1051 Reporting Requirement					Selection			
	Annual	Monthly	Bi-Monthly	Daily		Annual	Monthly	Bi-Monthly	Daily
Total Water Use									
Total treated water produced (metered at WTP discharge)						X	X		X
Total treated water delivered (sum of customer meters)	√					X	X		
Raw non-potable deliveries									
Reclaimed water produced (metered at WWTP discharge)									
Reclaimed water delivered (sum of customer meters)									
Per capita water use						X			
Indoor and outdoor treated water deliveries						X			
Treated water peak day produced						X			
Reclaimed water peak day produced									
Raw water peak day produced/delivered									
Non-revenue water	√					X			

Monitoring Data *(cont.)*	HB 10-1051 Reporting Requirement					Selection			
	Annual	Monthly	Bi-Monthly	Daily		Annual	Monthly	Bi-Monthly	Daily
Water Use by Customer Type									
Treated water delivered		√				X	X		
Raw non-potable deliveries									
Reclaimed water delivered									
Residential per capita water use						X			
Unit water use (e.g. AF/account or AF/irrigated acre)						X			
Indoor and outdoor treated water deliveries						X			
Large users						X	X		
Other Demand Related Data									
Irrigated landscape (e.g. AF/acre or number of irrigated acres)									
Precipitation						X	X		
Temperature						X	X		
Evapotranspiration						X	X		
Drought index information									
Economic conditions									
Population						X			
New taps						X	X		

INTRODUCTION

North Weld County Water District (NWCWD *or* District) is a quasi-municipal corporation that was formed in 1962 to provide a reliable, long-term source of water to homes and businesses as well as agricultural and livestock operations in north Weld County. Before the District was formed, there was no public water supply; homeowners and businesses had to rely on irrigation or well water to serve their needs.

The District is located approximately 55 miles north of Denver. The vast majority of NWCWD's 325 square mile service area is within Weld County as shown in **Figure 1.1a**. The District's population in 2005 was estimated at approximately 32,000. In the ten years since that time, the population is estimated to have grown to nearly 44,500 in 2017. The future population is projected to reach 55,800 by 2027.

The District receives its treated water from the Soldier Canyon Water Treatment Authority (SCWTA), which is jointly owned by the Tri-Districts: NWCWD, Fort Collins-Loveland Water District (FCLWD), and East Larimer County Water District (ELCO). In 2017, the three Districts formed the treatment partnership into a Water Authority. Water is delivered to the plant from Horsetooth Reservoir, which is part of the Colorado-Big Thompson (C-BT) Project. The Tri-Districts can also bring water to the plant through the jointly owned Pleasant Valley Pipeline (PVP). The capacity of the treatment plant is currently at 50 million gallons per day (MGD) with plans to expand.

NWCWD is in a unique water service district with a large portion of its population residing within master metered Towns, yet these Towns are responsible for their own water supply planning and acquisition. The Towns then turn their water over to NWCWD for treatment and delivery. NWCWD does not have jurisdiction over the customers living within the Towns, so this was considered during the preparation of this Municipal Water Efficiency Plan (MWEP *or* Plan).

For this Plan update, NWCWD has completed the five steps of water efficiency planning as outlined in the *Municipal Water Efficiency Plan Guidance Document*; 1) profile of the existing water supply system, 2) profile of water demands and historical demand management, 3) integrated planning and water efficiency benefits and goals, 4) selection of water efficiency activities, and 5) implementation and monitoring plan. The District has made a number of proactive conservation efforts to date and will continue this commitment into the future.

There were several documents and sources reviewed in the development of this Plan update including NWCWD's 2009 Water Conservation Plan (WCP 2009), 2015 Annual Drinking Water Quality Report, 2007 Water System Master Plan

(2007 Master Plan), and NWCWD website. There are many acronyms, terms, and terminology that are commonly used in water efficiency and planning, and some additional terms are common in this geographical area; a list of terms and definitions is included in **Appendix A**.

NWCWD is committed to optimizing its water supplies and system through practical water conservation practices. The benefits may include delaying the purchase of costly water supplies and infrastructure upgrades and reducing wastewater flows and treatment. The purpose of this Plan update is to guide the District in the process of water efficiency planning and implementation. The planning horizon for this Plan is ten years, from 2018 through 2027. The District Board of NWCWD is committed to water resource sustainability and water efficiency. The District intends to do its part to preserve water for future generations. Both NWCWD Staff and its Board understand the needs and benefits to implement long-term water efficiency activities.

SECTION 1.0 – PROFILE OF EXISTING WATER SUPPLY SYSTEM

1.1 Overview of Existing Water Supply System

Service Area

The District has a service area that encompasses approximately 325 square miles and is shown in **Figure 1.1a**. The service area has the following approximate boundaries. The District's northern most boundary borders CR 98, nearly as far north as Nunn; the southernmost boundary borders CR 388, nearly as far south as Kersey. Over 97% of the District's service area lies within Weld County, with the western most boundary extending two miles west of the Weld/Larimer County line. The eastern most boundary borders Weld CR 67.

Within the service area, NWCWD delivers water to all or part of ten municipalities and communities including Ault, Eaton, Galeton, Gill, Lucerne, Nunn, Pierce, Timnath, Severance, and Windsor. The following are the six master meter towns served by NWCWD: Ault, Eaton, Nunn, Pierce, Severance, and a portion of Windsor. As Greeley has expanded within the District's boundaries, a few small developments in the northern portion of the City are also served by the District. Similarly, as Fort Collins continues to expand eastward into the District's boundaries, these developments are often served, at least initially, by the District. The District also has a master meter for water supplies to the Northern Colorado Water Association (NCWA). NCWA provides potable water to residents and business in and around Wellington, Colorado. NWCWD also provides potable water to the remaining Weld and Larimer County residents and businesses within its boundaries but not served within the above-named Towns and providers.

Due to unique demographics of the District, the exact population is difficult to determine. Districts like NWCWD are comprised of many different governing entities including portions of cities and towns (as mentioned previously) as well as rural county areas. Census data can be obtained for counties and municipalities, even regions, but data is not available for special districts. Population estimates were provided by District Staff.

To estimate the population for NWCWD, population and water tap data was obtained for most of the master metered towns and the rural county taps. The number of households was calculated from the tap data and multiplied by the average number of people per household; 2.7 people per tap (household) was used for this study. This number represents information provided by District Staff. Demographics from Weld County, as well as the more specific demographics of the communities of Ault, Eaton, Nunn, Pierce, Severance, and Windsor, were also analyzed to verify estimates. The population estimates for the past seven years are presented in **Table 1.1a**.

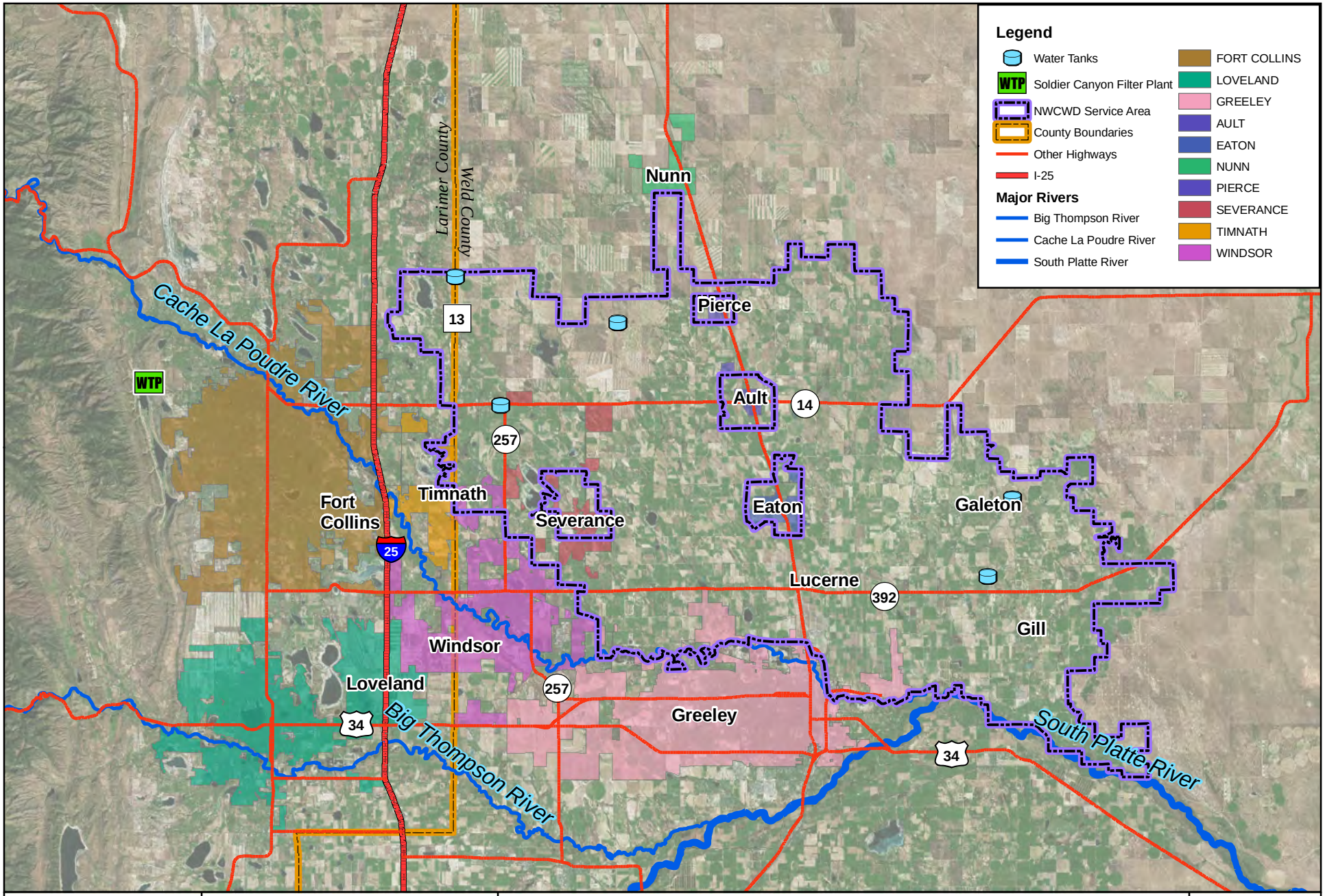

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Figure 1.1a
North Weld County Water District
Municipal Water Efficiency Plan

Date:	2-07-2019
Drawn By:	MLH
Scale:	As Shown
Job No:	14-190

Table 1.1a: District Population for Past Seven Years

Year	Population (1)	Growth Rate
2011	39,577	-2.2%
2012	38,813	-1.9%
2013	38,368	-1.1%
2014	42,015	9.5%
2015	42,821	1.9%
2016	43,645	1.9%
2017	44,487	1.9%

(1) Population estimated from number of taps, demographics, and other information available.

Water Supply

The District receives its treated water from the SCWTA, which is jointly owned by the Authority. Through this ownership, NWCWD is in a position to participate in cooperative water system projects, which lowers the incremental cost for all participants through economies of scale.

The SCWTA is a regional water treatment plant located below the Soldier Canyon Dam on the northeast side of Horsetooth Reservoir (depicted on the western edge of **Figure 1.1a**). The capacity of the treatment plant is currently at 50 MGD with plans to expand. Water is delivered to the plant from Horsetooth Reservoir, which is part of the C-BT Project. The District can also bring water to the plant through the jointly owned PVP, which is an eight mile long, 67-inch diameter, raw water supply pipeline shared by the Tri-Districts, Fort Collins, and Greeley.

NWCWD and other water suppliers in the region have worked cooperatively to provide high-quality water service to residents of northern Colorado. Other coordinated efforts similar to the PVP include gravel pits that the Tri-Districts have partnered with Greeley to purchase and develop for raw water storage. Water is also exchanged year round between the City of Fort Collins water treatment facility and SCWTA.

The District's water supply consists of C-BT units and native water rights from diversions off the Cache la Poudre River (Poudre River). The District owns 4,039 units of C-BT water. The C-BT system contains transbasin water that accumulates in the Colorado River Basin and is pumped from Lake Granby and flows through the Adam's Tunnel to the East Slope near Estes Park. Water is then distributed to several Front Range reservoirs. The C-BT system was constructed by the Bureau of Reclamation between 1938 and 1957 and is maintained by the Northern Colorado Water Conservancy District (Northern Water).

The District owns agricultural water rights that divert water from the Poudre River. They include shares in several ditch and reservoir companies. The companies, ownership, average and firm yield are presented in **Table 1.1b**. Many of these water rights are decreed for agricultural uses only, so they are exchanged on an annual basis for C-BT water when possible. When no C-BT water is available for exchange, the water rights are rented for agricultural use. North Poudre Irrigation Company (NPIC) owns 40,000 C-BT units, so its shares include a C-BT portion and a native agricultural portion. The C-BT water is delivered equally to the 10,000 shares within the NPIC system for agricultural, municipal, or industrial use.

In anticipation of the gradual disappearance of available C-BT water, the District committed funds to participate in the previously mentioned PVP. Construction of the pipeline began in April 2003 and was completed in the spring of 2004. The pipeline takes water from Munroe Gravity Canal to the Fort Collins treatment plant and SCWTA. The PVP is capable of delivering Poudre River water that is decreed for municipal and industrial purposes to the SCWTA.

Table 1.1b: NWCWD Water Supplies

Water Rights	NWCWD (no. of shares)	Average Yield (AF/share)	Dry-Year Yield (AF/share)	Avg Delivery (AF)	Dry-Year Delivery (AF)
Decreed or Available					
Colorado Big Thompson Project	4,039	0.7	0.5	2,827	2,020
North Poudre Irrigation Company	835.5	2.62	2	2,189	1,671
Divide Canal Company Class A	47	1.875	1.13	88	53
Water Supply and Storage Company	12.5	86.5	73.6	1,081	920
John R Brown (Case No 05W264)	0.33	286	286	94	94
Divide Canal Company Class B (Sand Creek)	0.335	367.7	220.6	123	74
Laramie-Poudre Tunnel	0.5	1,196	1,196	598	598
98CW435 PVP water right	0.33	-	-	-	-
00CW251 Overland Trail	0.33	-	-	-	-
Jackson Ditch	0.8182	201.5	182.8	165	150
Arthur Ditch	90.79055	3.4	1.6	309	145
Subtotal				7,475	5,725
Pending					
JR Brown	0.33	286	286	94	94
Subtotal				94	94

Water Rights *(cont.)*	NWCWD (no. of shares)	Average Yield (AF/share)	Dry-Year Yield (AF/share)	Avg Delivery (AF)	Dry-Year Delivery (AF)
Unchanged					
WSSC unchanged	1	86.5	73.6	87	74
Arthur Ditch	4	3.4	1.6	14	6
New Mercer Ditch	0.063	30.23	30.23	2	2
Larimer County No. 2	0.33	42.42	33.33	14	11
Subtotal				116	93
Potable Subtotal				7,685	5,912
Non-potable					
North Poudre AG	835.5	1.5	1	1,253	836
Timnath Reservoir (New Cache Reservoir)	10	3	2.375	30	24
Larimer and Weld Irrigation Company	4	21.5	0	86	0
Larimer and Weld Reservoir Company	4	17.25	7.5	69	30
New Cache la Poudre Irrigation Company	0.5	6	6	3	3
Non-potable Subtotal				1,441	892

Key Existing Facilities

The SCWTA can treat up to 50 MGD, and there is a total of over 8.75 million gallons (MG) of treated water storage at the five treated storage facilities (a total of eight tanks) throughout the NWCWD system. The system also includes seven pump stations, 16 control valves, and nine flow control master meters. The C-BT Project, as part of its system, has raw water storage; some additional raw water storage is also available to the Tri-Districts in the Overland Trail Ponds. More details will be discussed about the Overland Trail Ponds in Section 1.3.

The District owns and operates a water distribution network of over 730 miles of pipeline and associated facilities. The pipelines are well maintained with less than five breaks per year. The District continues to expand within its service area, and between 2008 and 2018, the District added over 1,200 taps and approximately 28 miles of additional waterlines.

The original pipeline from the SCWTA to the District's first tank site was constructed of reinforced concrete steel cylinder pipe and was installed between 1962 and 1963. Portions of this pipeline have been replaced with ductile iron pipe and one pump station has been added. The majority of the distribution pipes that have been installed in the District over the last 25 years have been made of PVC and some ductile iron.

As mentioned earlier, the District maintains over 730 miles of pipeline and delivers water to eight pressure zones. The system losses through the District's distribution system are estimated to be an average of 7.0% from 2011 to 2015. The system maintenance program includes annual flushing of water lines, periodic valve maintenance, and prompt leak repair. Due to the expansiveness of their service area, the District frequently reminds its customers to be on the lookout for water on the ground surface, as this can indicate distribution system water leaks. **Table 1.1c** shows the miles for each diameter of pipe, ranging from one inch to 48 inches. The eight pressure zones in the District cover different portions of the service area and maintain adequate pressure, fire flows, and enough storage to provide for one-24 hour period of peak delivery. **Table 1.1d** shows the approximate area of each of the pressure zones.

Table 1.1c: Water Transmission Pipe Lengths within District Service Area

Diameter (inches)	Approximate Lengths (miles)
5/8'' - 2''	137
2 1/2'' - 4''	199
6'' - 10''	265
12'' - 20''	82
24'' - 48''	47
Total	730

Table 1.1d: District Pressure Zones and Approximate Areas

Tank/Zone	Approximate Area (sq miles)	Notes
Tank 1	68	(Two tanks) Zone includes Windsor, Severance, Eaton, and Ault
Zone 2 (no tank)	20	Close proximity to Windsor and Greeley
Zone 3 (no tank) & Tank 4	60	(One tank) Zones include the Town of Galeton
Tank 5	54	(Two tanks) Zone includes the Town of Gill
Tank 6	51	(Two tanks) Zone includes the Towns of Pierce and Nunn
Tank 7	72	(One tank) Zone includes NCWA

Nearly every service connection on the District's distribution system, regardless of use, is metered. Only one connection is not currently metered, and that connection is only for emergency use and is presently shut off. Approximately 95% of the District customers' meters are equipped with Automatic Meter Reading (AMR) capabilities. All of the system meters are read at least once a month; this includes bulk water meters used by contractors that buy water from the District. With the AMR meters, NWCWD

has the capability of downloading readings in 15-minute increments. This capability is highly beneficial in researching potential leaks. For example, if a customer appears to have a spike in use, it may indicate possible problems. The District is confident in the design of the system to account for all water use.

1.2 Water Supply Reliability

Water supply reliability is the ability of the District's water supplies to meet the needs of its customers during times of stress. NWCWD is located in Weld County in the South Platte River Basin where the Statewide Water Supply Initiative (SWSI) 2010 identified a 58% gap between water needs and water supplies in the Basin by 2050. Water efficiency is one method the SWSI report identified for meeting this gap.

C-BT Water Reliability

The C-BT Project imports an average of over 200,000 acre-feet (AF) of water each year to many public and private water users along the northern Front Range and northeastern Colorado for agricultural, municipal and industrial uses. The system has approximately 740,000 AF of gross storage and consists of 310,000 units. There is approximately 2.3 times the storage than would be needed to deliver a 100% quota. This gives the C-BT system some drought reliability.

In over fifty years of C-BT project operation, the average yield has been 0.73 AF per unit and the commonly used average quota is 70%. The final yield has never been less than 0.50 AF per unit (50% quota) or more than 1.0 AF per unit (100% quota). The historical annual quota established by the Northern Water Board is shown on the following **Figure 1.2a**.

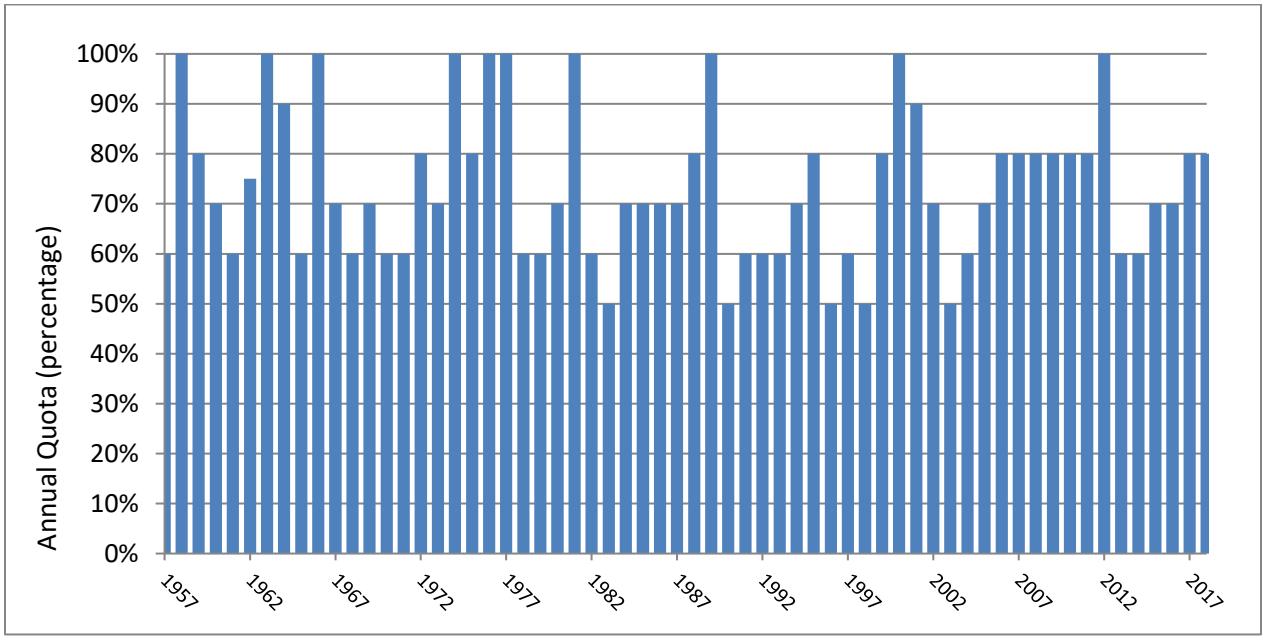

Figure 1.2a: Historical C-BT Quota

Northern Water defines a C-BT carryover program to C-BT Allottees, which allows C-BT owners to carry over unused C-BT from the previous year to the following year. Per the Northern Water's Annual Carryover Program Procedures:

> *The Board and District Staff will review the advantages and consequences of the Annual Carryover Program on a continuing basis. While the Board recognizes the Program's benefit to many C-BT Allottees, it may modify or discontinue the Annual Carryover Program at any time.*

Considering this procedure, a 50% quota is what most water provider's use as the firm yield for C-BT.

Other Factors that Potentially Impact Water Supply

The C-BT supplies are stored in Lake Granby on the western slope of Colorado. Should a fire occur in the area, water quality would be a major issue for NWCWD as well as other C-BT Allottees. There is still a tremendous amount of beetle kill to trees surrounding Lake Granby, Grand Lake, and the other storage facilities of C-BT. This beetle kill poses a potential increased risk to fire. NWCWD would be vulnerable to SCWTA's abilities to treat degraded water quality. NWCWD's water supplies would also be vulnerable in an extended drought. The District currently maximizes its carryover each year through Northern Water, but a multi-year drought would likely decrease or eliminate NWCWD's carryover account.

1.3 Supply-Side Limitations and Future Needs

Limitations with C-BT

Current C-BT supplies with other supplemental ditch rights are sufficient to meet NWCWD's water demands. To date, there have not been any potable supply shortages. However, it should be noted that the C-BT system was originally designed as a supplemental supply to native water rights. Each year, the amount of water delivered by the C-BT system (i.e., quota) was set based on demand. For example, in a dry year when water demands are highest, the quota would be set higher (i.e., 100%). Conversely, in a wet year, when native supplies are plentiful, the quota would be set lower (i.e., 50%). The years 2002 and 2003 were an exception when, for the first time in the system's history, the quota was set based on the limited supply in the C-BT system. To maintain this delicate balance, and to prevent speculative water purchases, Northern Water has set limits on the amount of C-BT water each entity can own in relation to its water demand and native supplies owned.

One key limitation with C-BT water is the fact that it is in great demand and is converting from agricultural (AG) ownership to municipal/industrial (M&I) ownership rapidly. The transition is illustrated in **Figure 1.3a**. At this current rate of acquisition, it is projected that few (if any) C-BT units will be available by the year 2040. Fairly recently, the oil and gas industry acquired a number of units of C-BT water when it went to the open market. The high demand and limited availability of C-BT water have driven up the price considerably in the last 15 years as can be seen in **Figure 1.3b**. Recent

acquisition of C-BT units were around $32,000 per unit. That translates to $64,000 per AF of firm yield. Another key limitation to C-BT water is the inability for the water to be reused due to current Northern Water policies. This second limitation curtails the possibility for efficiency activities that might help stretch the existing water supplies by reusing C-BT water for irrigation or other non-potable uses.

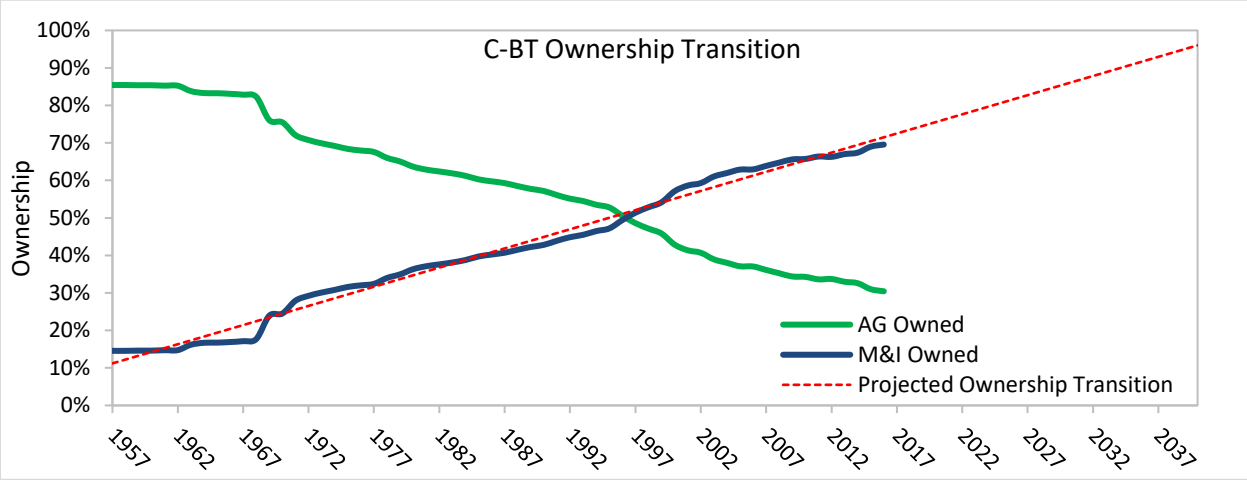

Figure 1.3a: C-BT Ownership Transition (1957 through 2014) and Future Transition

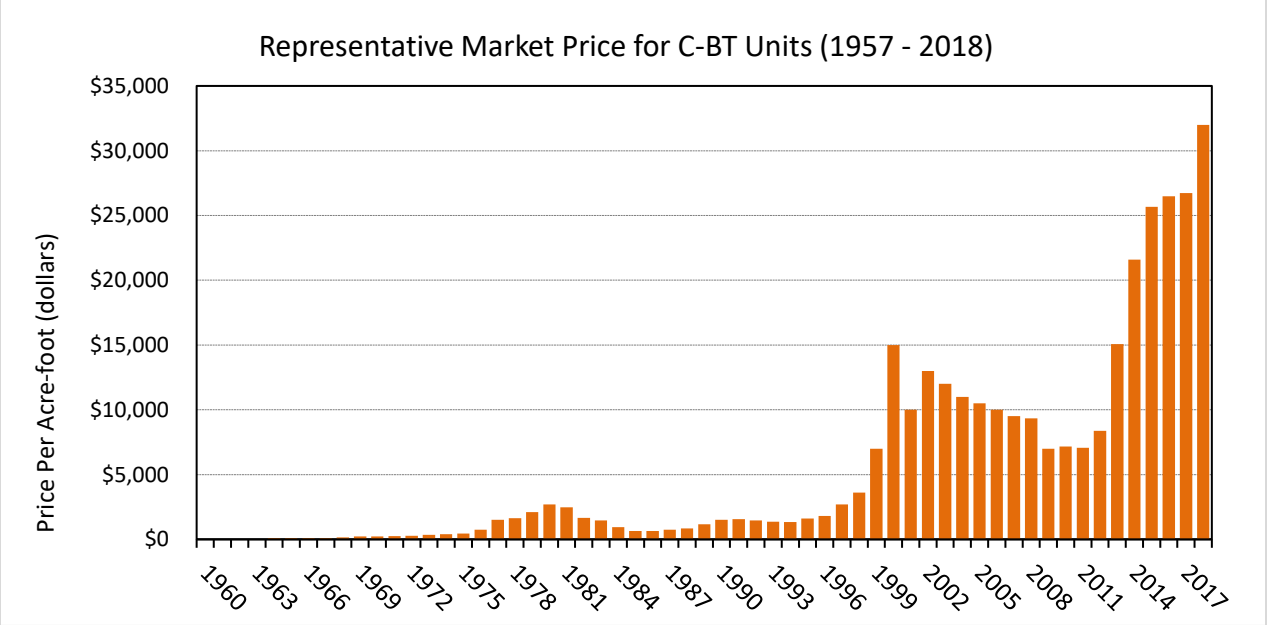

Figure 1.3b: Historical Price for C-BT Units

District System Limitations

Because the SCWTA is the only WTP to treat water for the District, the District is currently limited on where it can acquire future supplies. Only water that can be treated

by the SCWTA can be acquired unless NWCWD participates in the construction of future water treatment facilities.

Since the majority of the original pipelines from the SCWTA to the District were installed between 1962 and 1965 and consist mostly of steel and asbestos concrete, they may need to be replaced in the near future.

Future Needs and Planning Initiatives

A Water Master Plan was completed by the District in 2007. The 2007 Master Plan gave a general overview of the District and identified anticipated growth. It addressed system upgrades for distribution lines, storage tanks, and pumping facilities to meet the future demands. The 2007 Master Plan indicated that a build-out for the District could not be forecasted for numerous reasons including its vast size, complexities and varieties of economic markets, as well as planning and zoning decisions from other municipalities and Larimer and Weld Counties. The 2007 Master Plan identified some of the major difficulties the District faced in supplying additional water:

- Ensuring an adequate raw water supply
- Constructing additional facilities for the filtration of such water to meet or exceed the current water quality
- Providing a distribution system to supply adequate pressures for the additional demands including fire flows
- Maintaining the quality of the finished water throughout the distribution system

These difficulties remain essentially the same today.

Raw Water Storage

The District currently has limited raw water storage beyond that which is contained within the C-BT system. Variability in the yield of Poudre basin water rights, both year to year and month to month, will require NWCWD to continue to develop raw water storage for the following purposes: 1) to store water during peak flow months (May, June, and July) for use in months when the District's water rights yield little or no water, 2) to store water in years of surplus for use in years when a water supply deficit occurs, and 3) to store the historic return flow component of agricultural water rights converted to municipal use for year-round releases required to meet water court-imposed return flow obligations.

To better utilize its Poudre River water rights and increase the yield of those water rights, the Tri-Districts conducted a raw water storage needs assessment in 2005. NWCWD plans to obtain storage capacity at several locations along the Poudre River. The District considered the following criteria when planning these storage project locations: 1) availability for diversion at the PVP, 2) close proximity to SCWTA and 3) location downstream of the wastewater treatment facilities that will discharge reusable effluent that NWCWD can claim and capture.

Change of Use

Conversion of NWCWD's Poudre River and transmountain water rights from agricultural to municipal use requires detailed engineering analyses and applications to Water Court. The easiest change cases take at least three to five years before a decree is entered. The more complicated change cases can take much longer and cost hundreds of thousands of dollars. The engineering analyses required in Water Court applications that change the use of agricultural water focuses on the historical consumptive use of the crops grown with the water rights and return flows resulting from irrigation of those crops. Determination of the consumptive use and identifying the amount, location, and timing of return flows makes change cases increasingly complicated and costly. Within the next few years, additional applications may be submitted to change the use of water rights owned by the District. Even with these potential complications, the District continues to pursue opportunities to acquire additional shares of native Poudre River water as they become available from ditch companies.

NISP

Northern Water is acting on behalf of 15 Northern Colorado Front Range communities and water providers to apply for a federal permit to build the Northern Integrated Supply Project (NISP). NISP is a regional water supply and storage project that will provide the participants with 40,000 AF of firm yield for municipal water storage and supply. The planned facilities include Glade Reservoir, Galeton Reservoir, a pumping facility, a pipeline to deliver water for exchange with two irrigation companies, and needed improvements to an existing canal to fill Glade Reservoir. The project is currently in the National Environmental Policy Act permitting process. There are still a number of steps before the U.S. Army Corps issues its Final Environmental Impact Statement, and the process is complete. These steps must be accomplished before the project will be allowed to move beyond the permitting process. Although NWCWD is not participating directly in NISP, currently at least three of the Towns within its system are - Eaton, Severance, and Windsor.

Overland Trail Ponds

In 2005, Lafarge West Inc. agreed to sell property it had been mining for a number of years to the District and several other water suppliers (Fort Collins, Greeley, ELCO, and FCLWD). The Lafarge property is located near the Town of LaPorte on the south side of the Poudre River immediately west of Taft Hill Road. Even though Lafarge (now Martin Marietta) no longer owns the property, it continues to mine gravel from the site. The purchasers have begun to develop the Lafarge site and several nearby properties into a series of water storage reservoirs. When completed, the Overland Trail Ponds project will store approximately 4,700 AF. Existing and future gravel pits on land owned by the water providers will continue to be sealed and configured to divert water from the Poudre River when it is available. Water stored in the Overland Trail Ponds will be released back to the Poudre River to meet return flow obligations, exchanged for water diverted at the PVP, or pumped to SCWTA for treatment. Work on lining the existing gravel pits and installing the necessary infrastructure began in 2008. It will take approximately 20 years before all the property is completely mined and gravel pits are sealed.

SECTION 2.0 – PROFILE OF WATER DEMANDS AND HISTORICAL DEMAND MANAGEMENT

2.1 Demographics and Key Characteristics of the Service Area

The customer base for the District has historically been residential as well as small and large agricultural operations, the latter of which continues to have a significant presence. The dairy industry represents a very large portion of the commercial customers in the District and is forecasted to continue to grow both in existing establishments and new ones. The dairy growth seen and anticipated is largely due to the Leprino Foods cheese and dairy processing plant that opened in Greeley in 2011. The District's economical water rates and the land available within its borders have continued to encourage the growth in this particular segment.

NWCWD provides potable and fire protection water to a service area that encompasses approximately 325 square miles. The District provided service to approximately 4,838 taps in 2018. The demographics of the residential base have been continuously changing over the last few decades from very rural to more urban and suburban customers especially within the higher growth Towns and near the Cities of Fort Collins and Greeley. This transition has resulted in much higher landscape irrigation on individual lots as well as in neighborhood open spaces. The population of the District's service area in 2018 was estimated to be 45,348.

NWCWD breaks it customers into various categories and subcategories. Because of the unique demographics of the District and the customers it serves, the two largest categories are "Towns Use" (aka Wholesale-Muni) and "North Weld Only". Towns Use includes the communities that the District serves through its master meters (Ault, Eaton, Nunn, Pierce, Severance, a portion of Windsor, and NCWA). North Weld Only incorporates all other subcategories. These subcategories include Wholesale-NonMuni, Commercial/Industrial, Residence, and Bulk Water. The District also monitors its fire hydrants, but the water measured in this category has been extremely small.

Customer categories within the District are based mostly on anticipated water consumption when the accounts are originally set up. When a customer requests a tap from the District, the estimated volume of water that will need to be delivered is established, and the meter size is chosen accordingly. Although most commercial and industrial users fit within the Commercial/Industrial category, some utilize a much smaller amount of water, and therefore get categorized in the Residence category.

The District has eight potable water storage tanks throughout its system to provide a reliable supply to its constituents. In addition, all of the master meter Towns have one or more water tanks. The District also has a Supervisory Control and Data Acquisition (SCADA) system that measures the pressure throughout the system as well as tank levels and other essential data. The District is also anticipating the expansion of several subdivisions to its service area, especially those areas near the communities of Severance, Eaton, Windsor, and Timnath. During this planning period, the District is anticipating adding two to three new storage tank sites. New waterline connections and over ten miles of pipelines (12-inch or larger) are also slated for this planning period including a new connection for Windsor and a 30-inch pipeline and second master meter for Eaton.

2.2 Historical Water Demands

Annual Treated Water

NWCWD received an average of 8,432 AF from 2011 and 2017 of treated water from the SCWTA. **Table 2.2a** shows the annual treated water deliveries made to NWCWD for the last seven years.

Table 2.2a: NWCWD Water Delivery

Year	Annual Treated Water Deliveries (AF)
2011	7,834
2012	8,467
2013	7,657
2014	7,661
2015	8,746
2016	9,247
2017	9,413
Average	***8,432***

Annual Non-Revenue Water

Annual non-revenue water, or unaccounted for water, consists of unbilled authorized uses (e.g., hydrant flushing), apparent losses, and real losses. Apparent losses consist of unauthorized consumption, customer metering inaccuracies, and data handling errors. Real losses consist of leaks in the water distribution system where treated water does not reach the end user.

To estimate NWCWD's non-revenue water, we examined the difference in the annual treated water delivery, what was metered at the water taps and master meters throughout the District from 2011 to 2017. As presented in **Table 2.2b**, the data shows the non-revenue water for NWCWD averaged 527 AF during that time period, which is

6% of the treated water delivered from SCWTA. A loss rate this low is considered excellent by industry standards, especially considering the size of the District's distribution system.

Annual Treated Water Use by Customer Category

The largest category that the District serves is the Wholesale-Muni master meter customers at 34%. The Commercial/Industrial category also represents nearly a third of the water delivered at 30%. The Residence category ends up being the third largest user at nearly 21%. The District's average water demand for the past seven years for each customer category is shown on **Table 2.2b** and illustrated in **Figure 2.2a**. The total billed water usage has ranged from 7,185 to 9,100 AF and averaged 7,905 AF.

Also shown in **Table 2.2b** is the total and residential per capita water use expressed as gallons per capita per day (GPCD). Residential GPCD is calculated by dividing Residence billed water use by the estimated Residence population within the District. Residence population are residential customers within the District but not included within the master metered towns (Wholesale-Muni). Total GPCD is calculated by dividing total water use (Total Billed and Non-Revenue) by the total estimated population served by the District. Residential GPCD ranged from 142 to 187 GPCD with an average of 159 GPCD. Total GPCD ranged from 163 to 195 GPCD with an average of 182 GPCD.

Table 2.2b: Annual Treated Water Use by Customer Category

Customer Category	2011	2012	2013	2014	2015	2016	2017	*Average*
	Values in AF unless otherwise noted							
Wholesale-Muni	2,674	3,130	2,680	2,510	2,860	3,049	3,103	***2,858***
Wholesale-NonMuni	183	200	315	415	367	391	416	***327***
Commercial/Industrial	2,014	2,421	2,340	2,566	2,750	2,845	2,991	***2,561***
Residence	1,669	1,905	1,620	1,589	1,742	1,897	1,781	***1,743***
Bulk Water	649	335	272	104	229	514	809	***416***
Total Billed	7,190	7,990	7,227	7,185	7,949	8,696	9,100	***7,905***
Non-Revenue	644	477	430	476	797	551	313	***527***
Residential GPCD	165	187	156	147	156	164	142	***159***
Total Estimated Population	39,577	38,813	38,368	42,015	42,821	43,645	44,487	***41,389***
Total GPCD	177	195	178	163	182	189	189	***182***

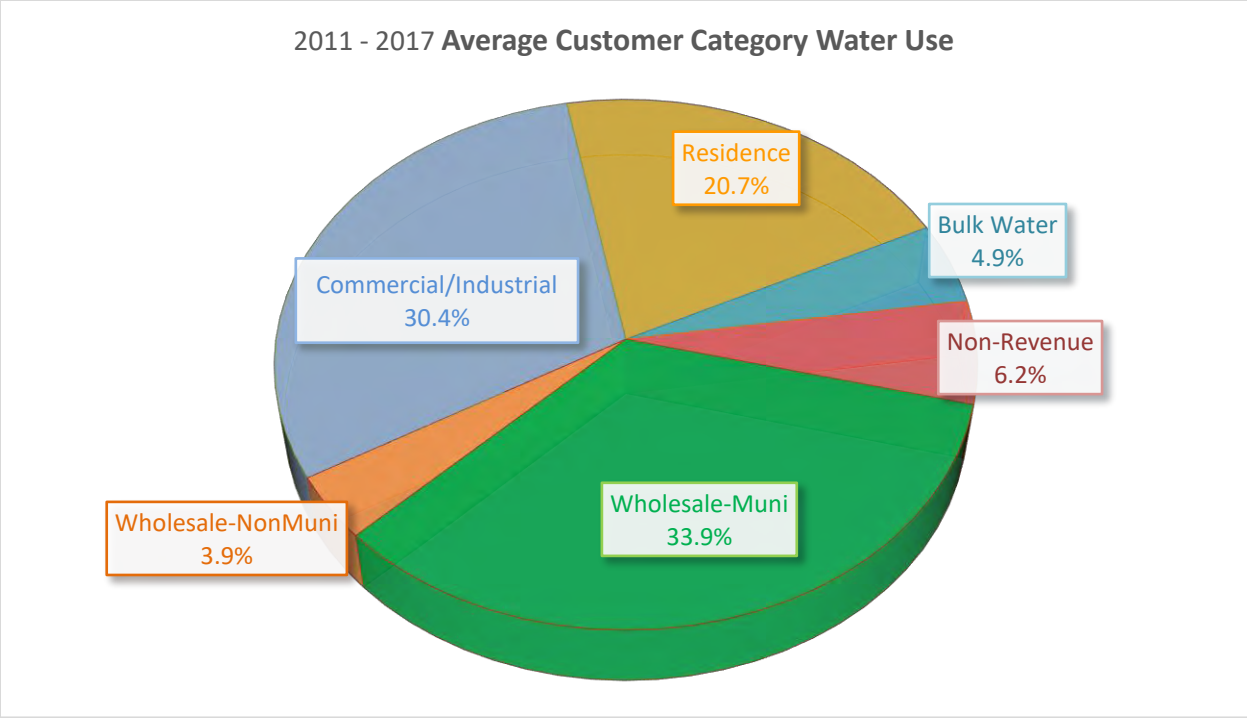

Figure 2.2a: Raw Water Usage (average of 2011 – 2017).

Customer Categories

Wholesale-Muni

The Wholesale-Muni is the largest consumer of raw water at an average of 2,858 AF per year (2011 – 2017); this represents over one-third (33.9%) of the total raw water supplied to the District. As mentioned previously, this category includes the following master metered communities: Ault, Eaton, Nunn, Pierce, Severance, a portion of Windsor, and NCWA. Each of these customers is responsible for their own water supply planning and acquisition.

Because the Wholesale-Muni customers are responsible for their own water supply planning and acquisition and the fact that the District does not have jurisdiction over these customers, this customer category is not included in the overall water savings calculated. Along with water planning, at least three of the Towns are proactively pursuing water conservation planning. Windsor has updated its own individual MWEP, Severance has recently completed a MWEP, and Eaton is in the process of updating their MWEP on file with CWCB.

Wholesale-NonMuni

The Wholesale-NonMuni is primarily comprised of the larger dairies. These customers consumed an average 327 AF of water per year (2011 – 2017) characterizing 3.9% of the total raw water supplied to the District. The unique aspect for Wholesale-NonMuni is that flow to these customers is controlled at an agreed upon set gallon per minute

rate, so that there is less stress on the District's system from large fluctuations that can occur on a daily basis with large users of this type. Most of the Wholesale-NonMuni customers are encouraged to and have at least 24 hours of storage on site. This not only helps level out the peak demands, but it also provides protection for the customer from experiencing any water shortages due to any line breaks in the area or other issues within the District's system. The typical configuration for these customers is to have the tank located in line between the District's meter and the rest of the customer's system, so the customer's tank gets filled first, and the customer draws off of their tank rather than directly from the District's connection.

Commercial/Industrial

Commercial/Industrial customers utilized an average of 2,561 AF of water per year (2011 – 2017), which makes up nearly a third (30.4%) of the District's overall raw water consumption. There are numerous farms, dairies, ranches, and other agricultural operations spread throughout the District's boundaries. These operations vary considerably in size and water demands, and therefore each account is tailored to the specific needs. Generally, these agricultural operations are very water efficient as large water bills affect the businesses profit margin. NWCWD will provide support for these customers with water efficiency activities as any opportunities arise.

Residence

The Residence category consumed an average 1,743 AF of water per year (2011 – 2017), which makes up less than a quarter (20.7%) of the total raw water usage for the District. It includes several different tap sizes and categories based on a customer's use and period of time when the District began supplying the customer with potable water and options chosen at the time of purchase such as a Conservation Blue tap which eliminates the Plant Investment Fee at purchase in lieu of a monthly usage based surcharge. The subcategories and brief descriptions for each are included in the following list.

Residential Only: The Residential Only taps are for rural residential lots with no outside watering. These are mostly reserved to one subdivision within the District that offers a non-potable irrigation system managed by the Homeowners Association. This tap option is no longer available for purchase outside that particular subdivision.

Standard Full: The Standard Full taps are for any customer seeking service from the District and have no restrictions. Standard Full taps are the most common residential type tap, but they also occasionally include some commercial customers that fall within the guidelines that the District has established for this category.

Standard ¾: Standard ¾ taps are restricted to customers that have a lot size greater than 0.2 acres but less than 0.33 acres or have verifiable irrigation rights or well permits for outside watering.

Standard ½: Standard ½ taps are restricted to a lot size less than 0.2 acres or a Board approved Commercial Enterprise or a Board approved irrigation system.

Bulk Water

Like the name implies, these meters are designated for consumption without the purchase of a meter. They are temporary uses typically including construction or oil and gas activities. The District supplies water from the various hydrants in the service area or a fill station located Southeast of Pierce, Colorado. The District supplied an average of 416 AF per year (2011 – 2017) for such uses or 4.9%. This amount is highly variable year to year, and much of it depends on demand for temporary use of water from hydrants.

Annual Non-Revenue Water

Every water distribution system has some degree of system loss. However, with the systematic surveillance and repairs, the losses can be kept to a minimum. With the current water balance and pressure reports, consistent surveillance from maintenance personnel, unaccounted system losses in the District are very low compared to other water providers of a similar size. Annual non-revenue water consists of unbilled authorized uses, documented system losses, and unaccounted losses. On average, from 2011 through 2017, 6.2% of the District's treated water at the SCWTA was lost. Even though this loss percentage is already fairly low, the District continues to make efforts to reduce the system losses and increase the efficiency of their water distribution.

Indoor and Outdoor Demands

Outdoor water usage is typically identified as those uses that are more seasonal in nature such as watering lawns and irrigating landscape which will often be significantly reduced during the colder winter months. To analyze the outdoor use, a baseline was first established by observing the winter months (typically November through March) for the last ten years of data (2008 – 2017). The total monthly use during those winter months was assumed to be associated with indoor use. The total winter monthly use was divided by the number of days in the associated months to arrive at an average indoor use per day. The indoor use for other months of the year (typically April through October) was calculated as the average indoor use per day multiplied by the number of days within the month. The outdoor use was then calculated as the difference between the total monthly use and the indoor monthly use. Part of the benefit in establishing indoor versus outdoor use is to identify where the District might focus its efforts for the water efficiency activities.

For the Residence customer category, the method described above worked well, and the average overall outdoor use was approximately 47%. This is fairly typical, although many water providers and communities see 60% or more outdoor use. The District may see a little bit lower due to many of the residential customers having wells on their properties; although most wells are not suitable for human consumption without treatment, they work well for irrigation needs. **Figure 2.2b** illustrates the District's Residence Indoor/Outdoor use.

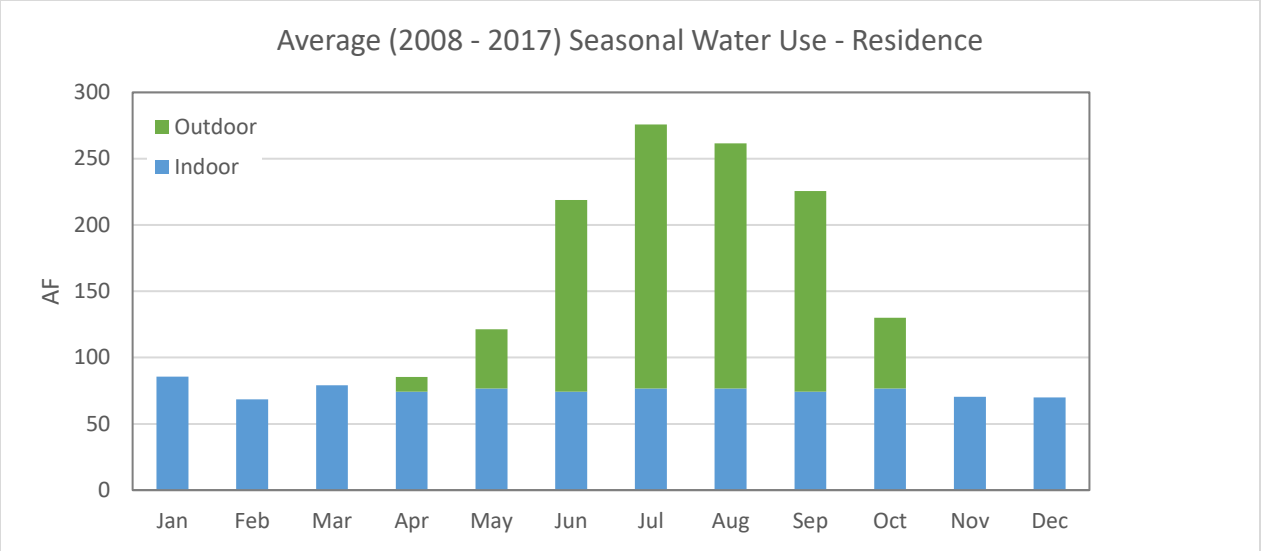

Figure 2.2b: Average Monthly Indoor and Outdoor Water Use – Residence Category

The District as a whole also follows a somewhat typical trend of seasonal use. **Figure 2.2c** illustrates the overall seasonal trends for the District. The main difference is that outdoor use has a much smaller percentage (approximately 25%) of overall use. It was observed that the second largest category, Commercial/Industrial, has very little seasonal variations. **Figure 2.2d** shows the remaining categories and their seasonal trends.

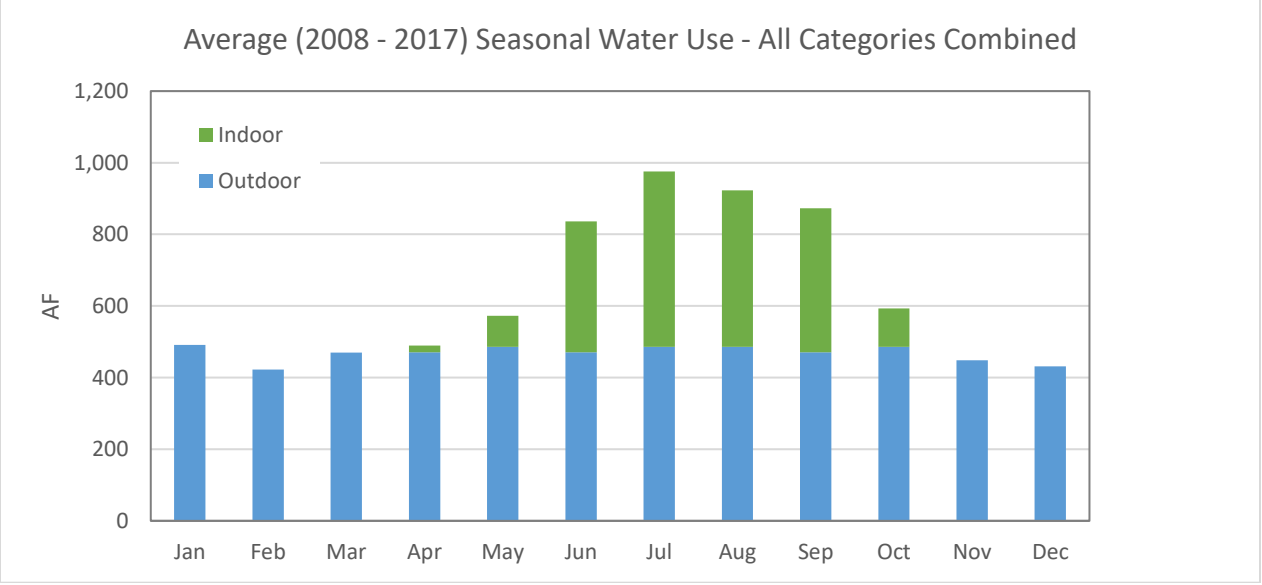

Figure 2.2c: Average Monthly Indoor and Outdoor Water Use – All Categories Combined

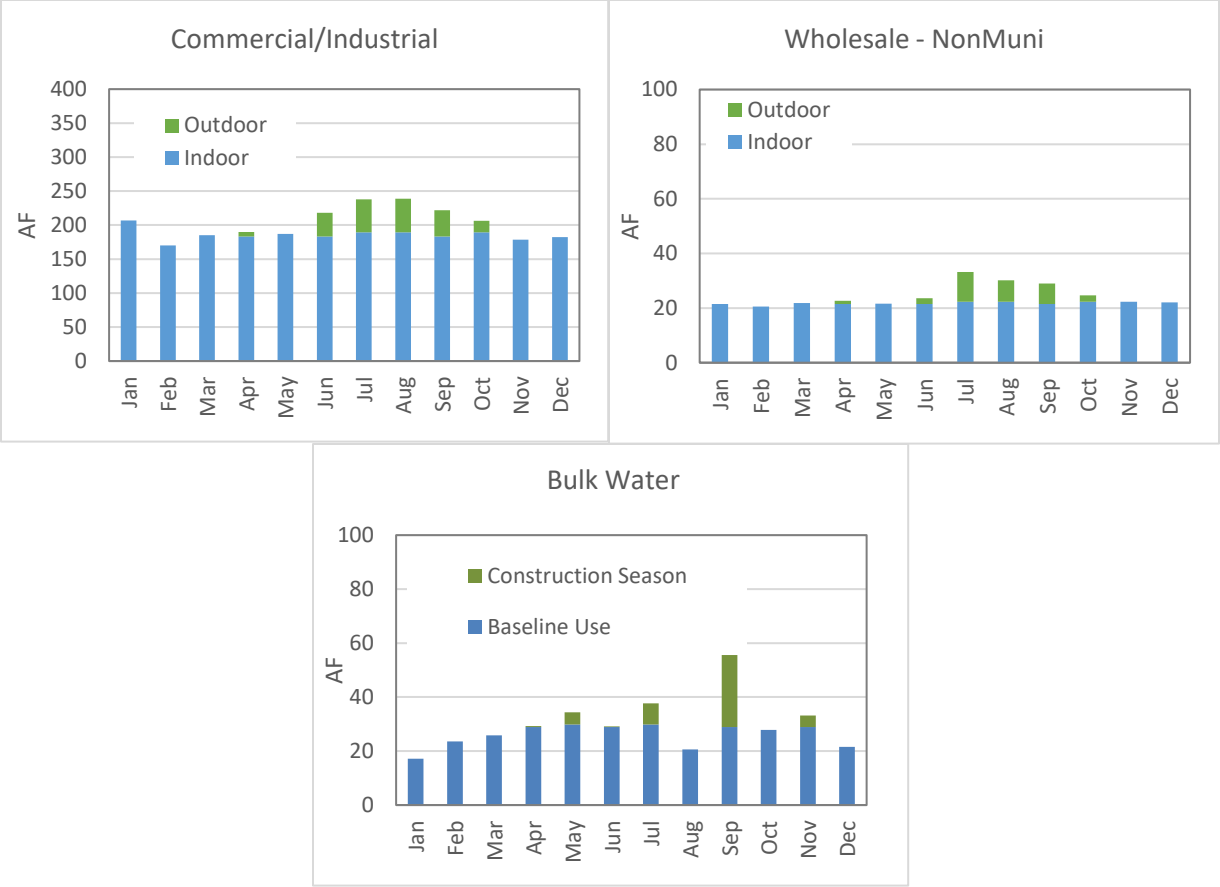

Figure 2.2d: Average Monthly Indoor and Outdoor Water Use – Remaining Categories

As mentioned before, the benefit to analyzing each category in this manner is to identify those areas that may realize the greatest water savings with implemented water efficiency programs. This analysis also assists in pinpointing the types of programs best suited to target those customers.

2.3 Past and Current Demand Management Activities and Impact to Demands

The initial estimated water savings goal for this Plan was to lower the per capita water use by 10%. The District revisited and revised this goal, as necessary, as it further analyzed the potential water savings that corresponded to the development of this Plan update.

Current Water Efficiency Measures

The District has several current and on-going water efficiency activities, some of them have existed for a long time, and others were implemented after the 2009 Municipal Water Efficiency Plan. **Table 2.3a** lists the existing and on-going water efficiency activities. Some of the savings from water efficiency activities were able to be quantified and is summarized in **Table 2.3b**. A brief description of those quantifiable activities is included after **Table 2.3b**.

Table 2.3a: NWCWD's Existing and On-going Water Efficiency Activities

Water Efficiency Activities
Foundational Activities
Metering
Automatic Meter Reading (AMR)
Meter Testing and Replacement
Meter Upgrades
Data Collection - Monitoring and Verification
Frequency of Meter Reading
Tracking Water Use by Customer Type
Upgrade Billing System to Track Use by Sufficient Customer Types
Tracking Water Use for Large Customers
Water Use Efficiency Oriented Rates and Tap Fees
Volumetric Billing
Water Rate Adjustments
Frequency of Billing
Inclining/Tiered Rates/Water Budgets
System Water Loss Management and Control
System Wide Water Audits
Leak Detection and Repair
Recycling WTP filter backwash
Planning
Master Plans/Water Supply Plans
Targeted Technical Assistance and Incentives
Giveaways: Residential Water Audit Kits
Education Activities
Bill Stuffers, Newsletters, Mass Mailings
Water Fairs announcements and participation in Water Festival
Website: Smart Watering Guidelines, Conservation/Water Efficiency Plan
Social Networking (Facebook & Twitter)

Table 2.3b: Water Savings Estimates of Individual Activities

Historical and Current Water Efficiency Activities	Annual Water Savings for Past Five Years (AF)					Total Five-Year Water Savings (AF)	Average Annual Savings (AF)
	2013	*2014*	*2015*	*2016*	*2017*		
Foundational Activities							
Water Efficient Rate Structure/Water Budgets with Regular Updates	192	192	220	232	236	1,073	215
Recycling WTP Filter Backwash	130	130	149	157	160	726	145
Total Savings	322	323	368	389	396	1,799	360

Water Efficient Rate Structure/Water Budgets with Regular Updates

Based on many studies, water rates (e.g., inclining and/or tiered) are one of the most effective ways to encourage efficient water use. Several recent studies indicate that water budgets have an even greater potential of encouraging additional savings on top of a typical price increase. NWCWD conducts an in-house rate study annually. The District utilizes software from the University of North Carolina, Environmental Finance Center to calculate appropriate rates for the customers and service connections that are provided. The District's customers are also on an annual water budget structure that is negotiated at the time a service connection is established. Budgets can also be adjusted when a customer's needs change. The rates that each customer pays remain constant from month to month until the accumulated total exceeds the set limit. When the limit is surpassed, the higher rates are triggered accordingly. This type of budget encourages careful planning and conservation throughout the year to avoid costly overruns as the year comes to a close. No matter what, the customers still only pay for the water they use (after the minimum base rate). A conservative estimate of the savings is presented in **Table 2.3b**.

Recycling WTP filter backwash

Water treatment facilities like SCWTA most commonly use carbon filters to remove organic solids from water in the treatment process. These filters become less efficient over time because of the solids collecting in them. Water is forced backward through the filters periodically to remove the solids and restore the efficiency of the filters. The SCWTA collects all of this backwash water in settling ponds adjacent to the plant. After settling, this water is drained from the top of the settling ponds and returned to the filter plant for treatment. Approximately 1.7% of the total water production is recycled backwash water that has been treated. Estimated water savings from this activity are included in **Table 2.3b**.

Water Savings Estimates Using Demand Data

Despite the resources available to estimate water savings, the savings of some activities, such as those that are highly dependent on human behavior (e.g., public education programs) are much more difficult to quantify and, in many cases, cannot be estimated with reasonable accuracy. Additionally, data was not collected for all the activities listed. For the activities that we were unable to quantify, demand data was used to estimate savings.

Related to the activities listed in both **Table 2.3a** and **2.3b**, **Figure 2.3a** illustrates a comparison of the population to the per capita water usage. The population of NWCWD has had a steady increase over the past 21 years. Although the GPCD water usage has varied considerably year to year, there appears to be a downward trend. As the District continues to collect data, this trend will likely become clearer. Much of the variability in the water usage can easily be linked to the fluctuations in the climate. As a comparison, both the average yearly temperature and total precipitation are shown for the same years in **Figure 2.3b**.

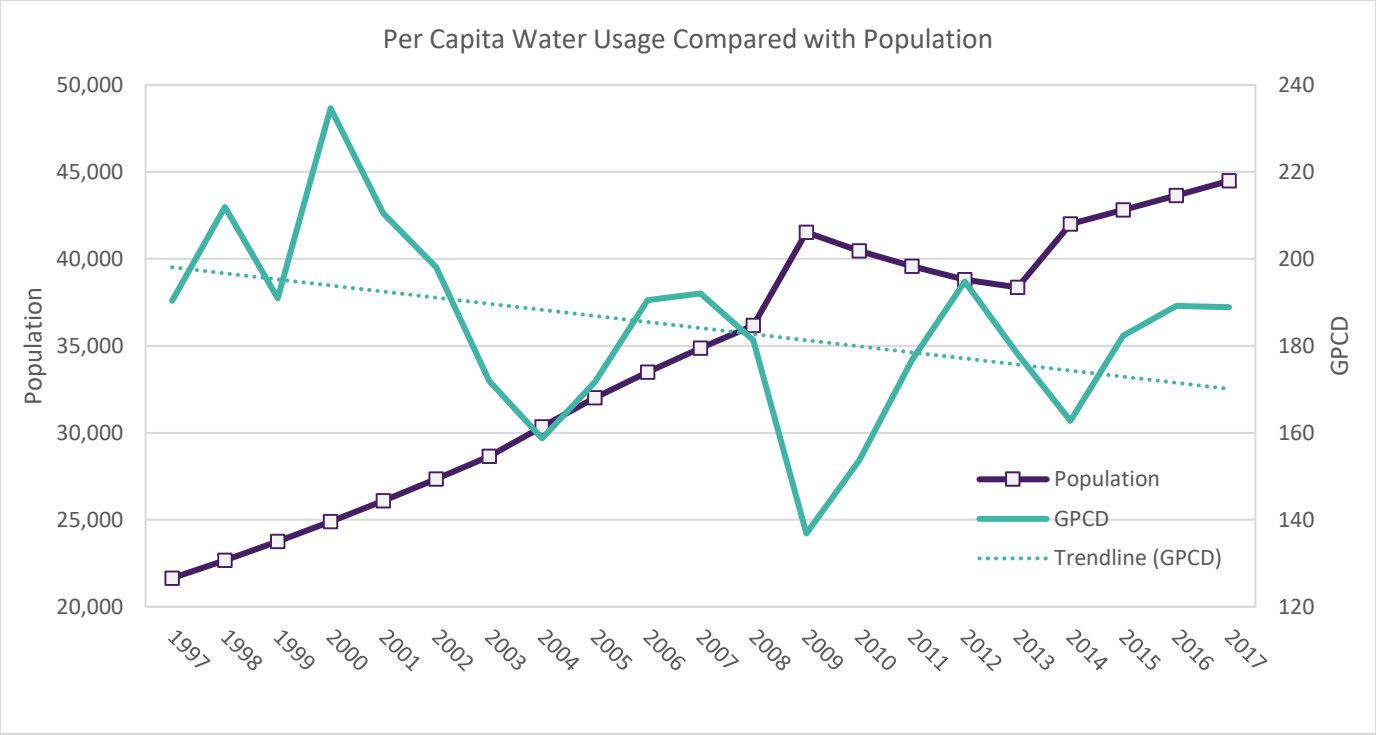

Figure 2.3a: Population Compared with Per Capita Water Usage

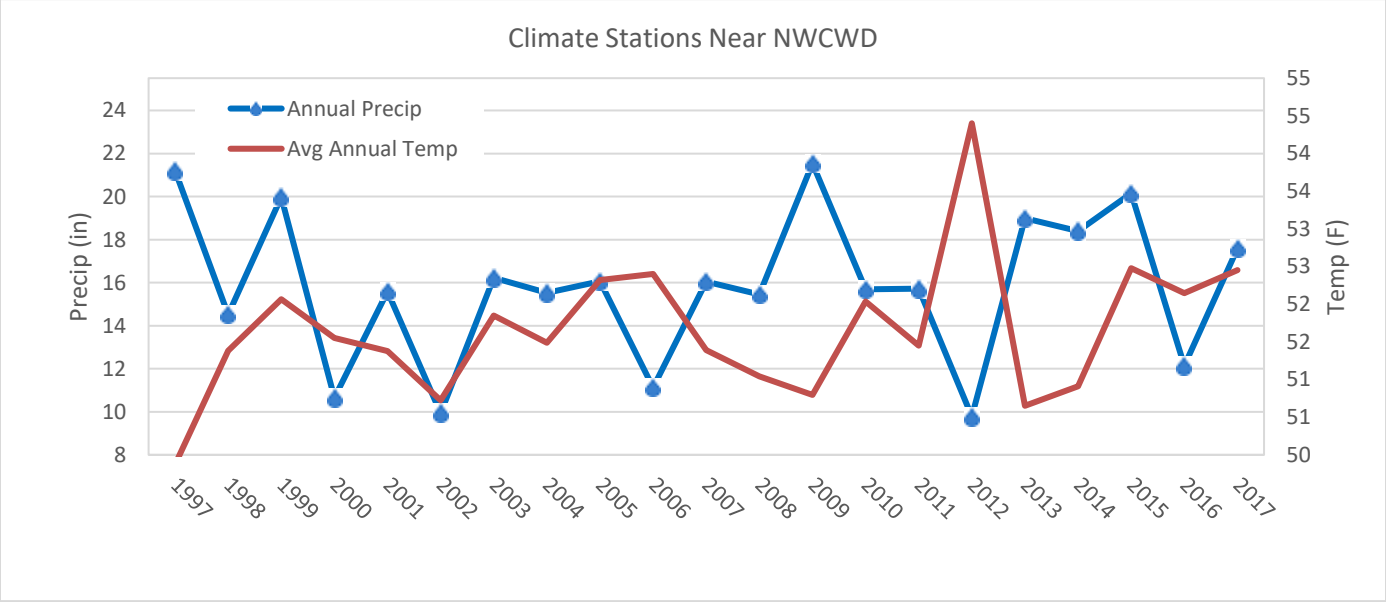

Figure 2.3b: Climate Data for Comparison with Water Usage

Land Use Efforts

NWCWD is a very unique water district that includes 12 entities including ten towns within two counties. NWCWD makes every effort to work with these entities but ultimately the District does not make land use planning decisions. The District will

continue to seek opportunities to work with these entities on land use and water planning.

NWCWD is currently investigating assessment of water use considering land use in conjunction with the Colorado State Integrated Urban Water Model. Unfortunately, this model doesn't account for agricultural use, which makes up a significant portion of the District's water use.

2.4 Demand Forecasts

Population projections were provided by NWCWD Staff, and are based on growth rates obtained for most of the master metered Towns and the rural county taps. Ault, Pierce, and Nunn are more rural in nature and are projected to grow at around 1%. Galeton, Gill, and Weld County are also projected at around 1%. NCWA and Eaton are projected to grow at 2.5%. Severance and Windsor are in areas of higher growth and are projected to grow at a rate between 3% and 5%. Overall, Staff estimates the District's population to grow at a rate of approximately 2.0%. **Table 2.4a** shows the estimated population for the last five years, current year, and the next ten years. Staff estimated a population of 45,348 total residents in 2018. An overall increase of approximately 2% per year is estimated to bring the total population of the District to nearly 55,800 by 2027.

Population projections were also substantiated from tap data and multiplied by the average number of people per household. District staff estimated 2.7 people per tap (household). Per household data was estimated from city and county demographics and other information available. **Figure 2.4a** further illustrates the past population and future growth of the District. As mentioned previously, an exact population count is difficult to obtain since census data is not collected for special districts.

Table 2.4a: NWCWD's Population Growth
(*Previous 5 years and 10 year future projection)*

Year	Population	Growth Rate
2013	38,368	-1.1%
2014	42,015	9.5%
2015	42,821	1.9%
2016	43,645	1.9%
2017	44,487	1.9%
2018	45,348	1.9%
2019	47,615	5.0%
2020	48,568	2.0%
2021	49,539	2.0%
2022	50,530	2.0%
2023	51,540	2.0%
2024	52,571	2.0%
2025	53,623	2.0%
2026	54,695	2.0%
2027	55,789	2.0%

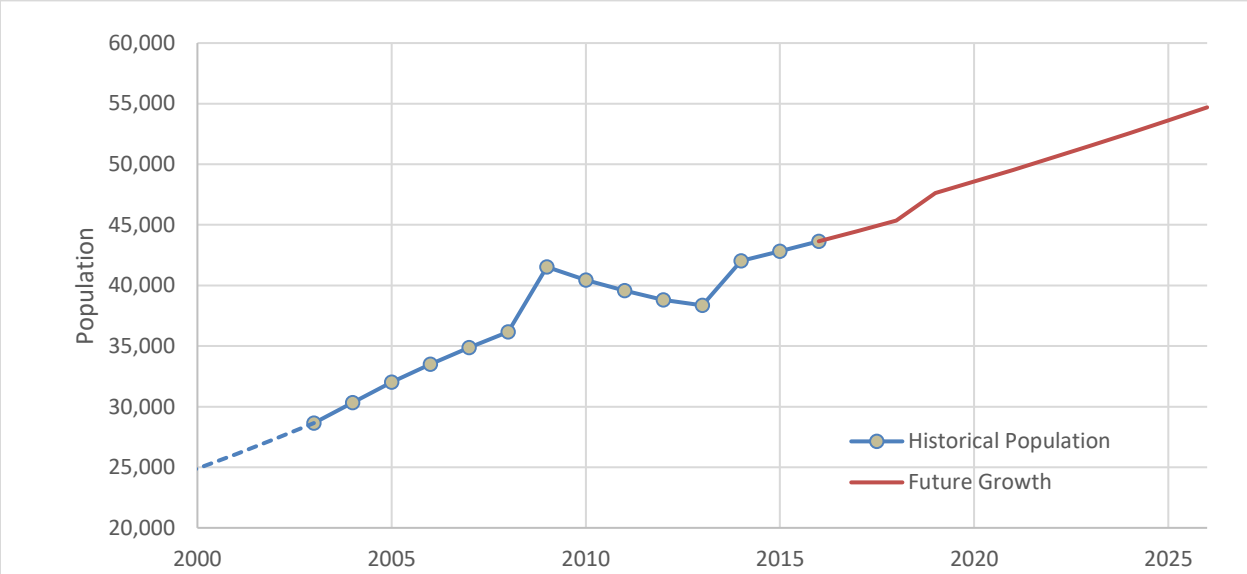

Figure 2.4a: NWCWD's Population and Future Growth

A conservative estimate of population for NWCWD was developed by the District Staff based on the general growth trend of the last several years that included the recent recession and economic recovery. A moderate growth rate is expected for the next few years as the economy continues to recover. There are limitations to water demand projections, and it is important to recognize that external factors such as growth rates can impact the projections. Projections are intended to be approximate forecasts that demonstrate general trends and not to be interpreted as exact targets or absolute predictions of what will occur.

As part of this Plan, a baseline demand forecast has been estimated. The baseline is unchanged from current use patterns, and therefore the baseline does not incorporate any future water conservation or efficiency activities. The demand forecast is shown in **Table 2.4b** and by customer category in **Table 2.4c**. Steady growth and demand is anticipated in all categories.

Table 2.4b: Demand Projections

Year	Population	Taps	Total Produced (SCWTA) (1) (AF)	Total Treated Water Demand (1) (AF)
2017	44,487	4,475	6,222	5,834
2018	45,348	4,838	6,347	5,950
2019	47,615	4,935	6,664	6,248
2020	48,568	5,033	6,797	6,373
2021	49,539	5,134	6,933	6,500
2022	50,530	5,237	7,072	6,630
2023	51,540	5,342	7,214	6,763
2024	52,571	5,448	7,358	6,898
2025	53,623	5,557	7,505	7,036
2026	54,695	5,668	7,655	7,177
2027	55,789	5,782	7,808	7,320

(1) Note: Total Produced and Total Treated Water Demands do not include Wholesale-Muni amounts.

Table 2.4c: Demand Projections for Customer Categories

Year	Total Treated Water Demand (1) (AF)	Wholesale-NonMuni (AF)	Commercial/ Industrial (AF)	Residence (AF)	Bulk Water (AF)
2017	5,834	365	2,859	1,946	464
2018	5,950	372	2,916	1,985	474
2019	6,248	391	3,062	2,084	497
2020	6,373	399	3,123	2,126	507
2021	6,500	406	3,185	2,169	517
2022	6,630	415	3,249	2,212	528
2023	6,763	423	3,314	2,256	538
2024	6,898	431	3,380	2,301	549
2025	7,036	440	3,448	2,347	560
2026	7,177	449	3,517	2,394	571
2027	7,320	458	3,587	2,442	583

(1) Note: Treated Water Demands do not include Wholesale-Muni amounts.

3.1 Water Efficiency and Water Supply Planning

Forecasted Modified Water Demands

A modified demand forecast that includes the impacts of the proposed water efficiency activities is shown in **Figure 3.1a** and summarized in **Table 3.1a**. Under the revised forecast, it is estimated that total demands for NWCWD in 2027 will be about 390 AF greater than they were in 2018. By the end of the planning period, it is estimated that NWCWD will see a savings of 846 AF annually. This represents 846 AF of savings over continuing current activities or implementing any new activities. NWCWD plans to accomplish this level of water efficiency by continuing successful programs already implemented (e.g., Recycling WTP Backwash) and implement new programs (e.g., Leak Detection and Repair Program). Projected water savings is expected to be seen by a steady reduction in per capita use. Overall treated water demand, however, will continue to increase.

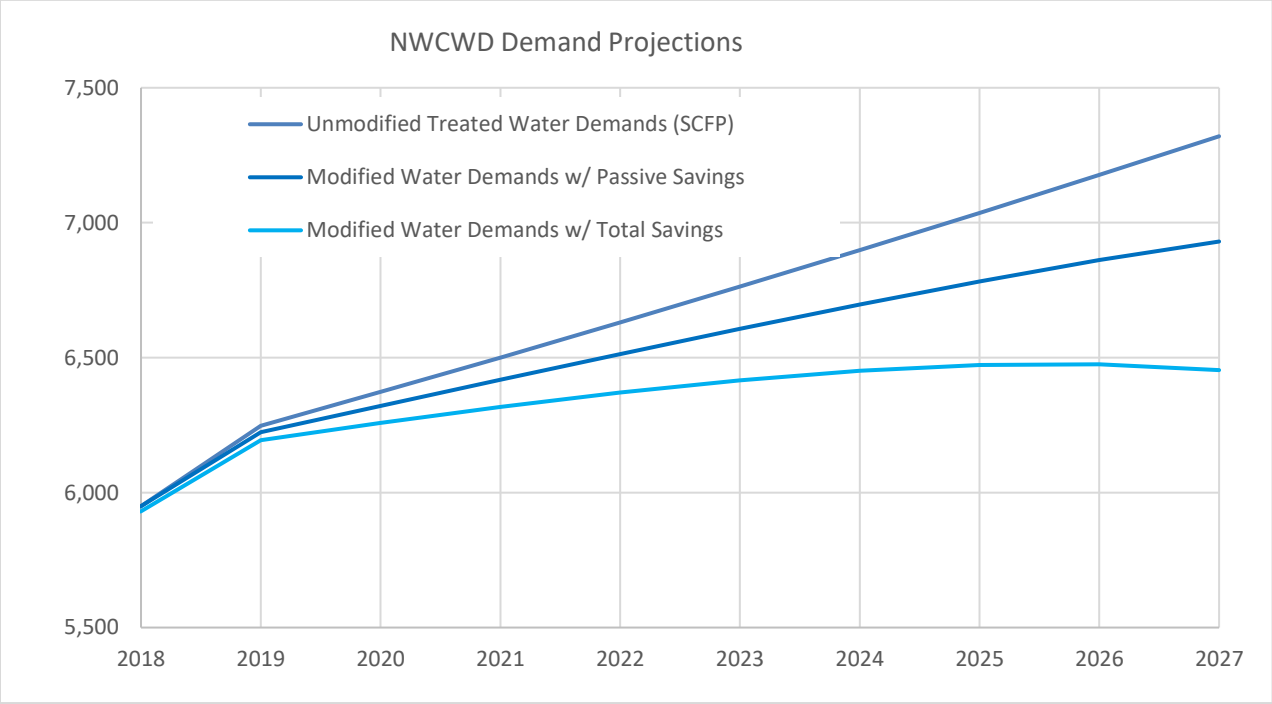

Figure 3.1a: Demand Projections with Modified Demands

Table 3.1a: Demand Projections – Unmodified and Modified

Year	Unmodified Treated Water Demands (at SCWTA) (AF)	Treated Water Demand with Passive Savings (AF)	Treated Water Demands with Combination Savings (AF)
2017	5,834	5,834	5,834
2018	5,950	5,950	5,930
2019	6,248	6,224	6,194
2020	6,373	6,321	6,258
2021	6,500	6,418	6,318
2022	6,630	6,514	6,371
2023	6,763	6,607	6,416
2024	6,898	6,697	6,451
2025	7,036	6,782	6,472
2026	7,177	6,861	6,475
2027	7,320	6,930	6,454
Savings		5.3%	11.8%
Difference between 2018 and 2027	1,370	980	524
Difference from Unmodified		390	846

(1) Note: Unmodified Raw Water Demand and Unmodified Treated Water Demand do not include Wholesale-Muni amounts.

3.2 Water Efficiency Benefits

Water efficiency planning is very important to NWCWD. The value of this water efficiency planning effort may include multiple benefits that will impact future water facilities and supply acquisitions. Conserving water will reduce demands and free up water supplies for increased growth and development. Additional water available will help cover shortages in droughts or other emergency situations. These benefits become even more valuable if a storage component is included. Smaller future demands will also help delay the need to purchase additional water supplies. An immediate benefit could come in the way of treatment costs; NWCWD will save on SCWTA treatment costs if their overall water consumption is reduced.

3.3 Water Efficiency Goals

Water efficiency goals are intended to lay out a set of targeted objectives that if accomplished, will result in the identified benefits. Prior to the selection of the water efficiency activities, a preliminary set of goals has been developed to provide a means to screen and evaluate the selected activities. Goals from the District's 2009 Water Conservation Plan have been assessed and incorporated into the new goal

development process. A meeting was initially held with District Staff to discuss water efficiency goals appropriate for NWCWD. The following preliminary goals were established by District Staff:

- In keeping with the savings goal established in NWCWD's 2009 Water Conservation Plan, the targeted water savings goal for this Plan will be to lower the total per capita water use by 10% over the ten-year planning period.
- The targeted ten-year water savings goal for the District's customer categories were as follows:
    - Wholesale-NonMuni: 5%
    - Commercial/Industrial: 10%
    - Residence: 16%
    - Bulk Water: 2%
    - Non-Revenue Water: 15% (i.e. a 15% reduction of current 6% average)
- Develop a water efficiency program that can be implemented within District staffing constraints and with Staff approval.
- Implement water efficiency activities that are compatible with the community and their District Board representatives.

The success of the stated goals will be measured through monitoring of billing data, screening and evaluating activities that are acceptable to District Staff, and soliciting District Board and community feedback on water efficiency activities.

SECTION 4.0 – SELECTION OF WATER EFFICIENCY ACTIVITIES

4.1 Summary of Selection Process

NWCWD used a four-phase process for selecting and fully evaluating water efficiency activities. The four phases include: 1) assessment; 2) identification; 3) qualitative screening; and 4) evaluation and selection.

Assessment, Identification and Qualitative Screening

Using the analysis performed and presented in Section 2.3, the District identified areas where water efficiency could be enhanced. With the water saving success of the Recycling WTP filter backwash and low non-revenue water due to a well maintained system and consistent evaluations, the District will continue these activities. In addition to these activities, NWCWD generally wants to focus on activities that assist with meeting their water efficiency goals.

We utilized Worksheets D-G from the Municipal Water Efficiency Plan Guidance Document to identify a list of water efficiency activities that are generally compatible with NWCWD's needs. A copy of Worksheets D-G can be found in **Appendix B** of this report. Other Worksheets from the Guidance Document utilized within the production of this Plan are also included in **Appendix B**.

The list of activities evaluated are organized according to the SWSI Levels Framework. The SWSI Levels Framework was developed as a component of the 2010 SWSI update to organize water efficiency activities into a model that assists municipalities and water providers in prioritizing and selecting activities. The framework may be represented as a cylinder consisting of the following four categories in **Figure 4.1a**.

SWSI Levels Framework includes the following levels of water efficiency activities:

- **Foundational Activities** – Focus on system operations and water efficiencies that are under NWCWD's direct control and can improve the effectiveness of the planning effort by ensuring sufficient metering and data tracking.
- **Targeted Technical Assistance and Incentives** – Covers activities that NWCWD and their customers can do to improve existing water efficiency.
- **Ordinances and Regulations** – Includes regulatory activities designed to encourage water efficiency.
- **Education Activities** – Educate the public on the benefits of water efficiency, inform customers on how they can reduce their water usage, and publicize water efficiency activities that NWCWD is implementing.

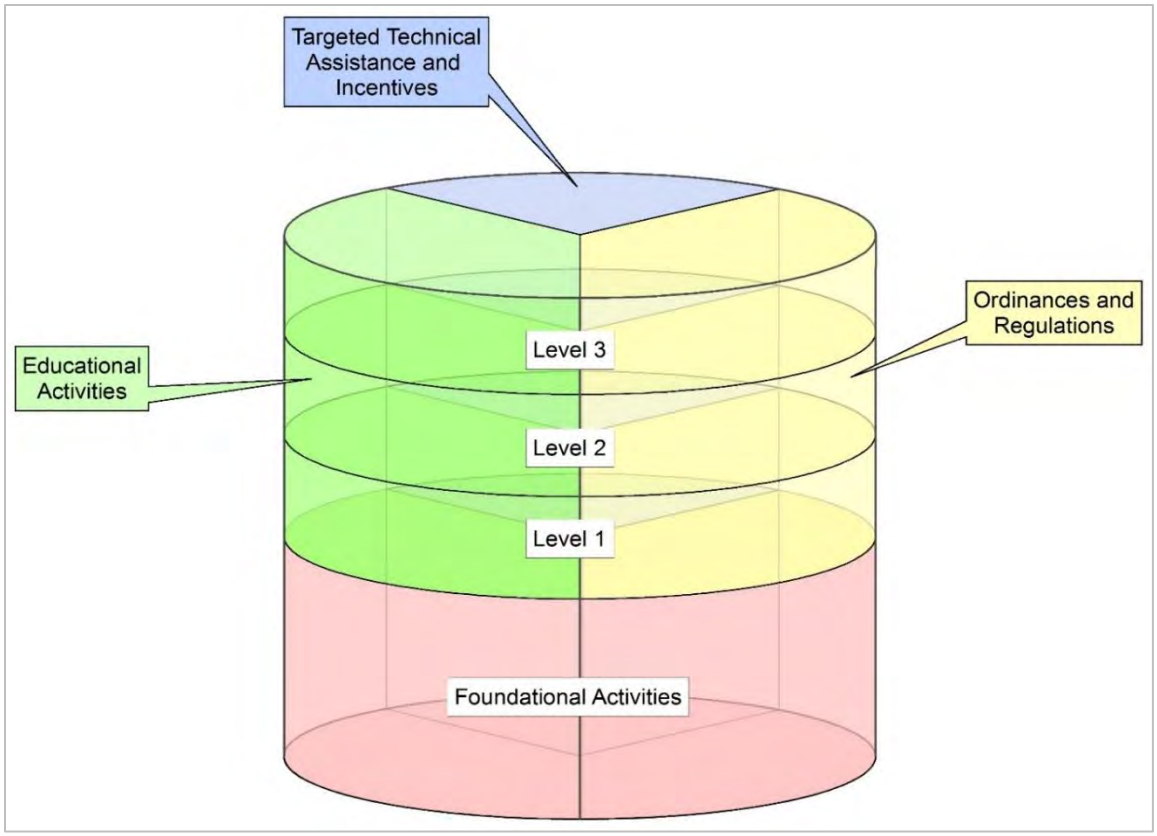

Figure 4.1a: SWSI Levels Framework

Further discussion regarding the SWSI Levels Framework is provided in subsequent sections.

District Staff developed qualitative screening criteria used to screen the preliminary list of activities. The screening criteria included: 1) Board approval, 2) Customer acceptance and participation, 3) Staff availability, and 4) Financial requirements. Activities not meeting the screening criteria were eliminated. The specific reason for the elimination of activities can be found in Worksheets D-G, located in **Appendix B**.

Evaluation and Selection

The evaluation and selection phase of the selection process involved the development of evaluation criteria, evaluation of the activities, and selection of the final activities for implementation. The evaluation criteria were similar to the screening criteria and included:

- Staff and Board approval
- Feasibility for customer base
    - Acceptance and participation
- Staff and financial resource limitations

- Legal authority (i.e., Being a District versus a municipality presents limitations for enforcing certain ordinances and codes.)

4.2 Evaluation of Candidate Activities

The initial screening of the water efficiency activities with District Staff resulted in selecting 18 candidate activities for further evaluation. Some of the activities have been combined within their SWSI Levels Framework to assist in evaluation and avoid double counting savings. The benefits and costs of the initially selected measures and programs are shown in **Table C1** in **Appendix C**. Details about the cost-benefit evaluation and information about each measure can be found in the following section with further detail available in **Appendix D**. The following activities were evaluated during the cost-benefit analysis.

Foundational Activities

- Meter Testing and Replacement Program (Meter Upgrades)
- System Wide Water Audits
- Control of Apparent Losses (with Metering and SCADA)
- Automatic Water Meter Reading Installation and Operations
- Water Efficient Rate Structure/Water Budgets with Regular Updates
- Leak Detection and Repair Program - No Third Party
- Leak Detection and Repair Program
- Recycling Water Treatment Plant Filter Backwash
- Master Plans/Water Supply Plans

Targeted Technical Assistance and Incentives

- Slow the Flow Residential Irrigation Audits(1)
- Indoor Residential Water Audits(1)
- Residential and Commercial Ultra High-Efficiency Toilet Upgrade Service or High-Efficiency Toilet Rebate Program(1)
- High-Efficiency Clothes Washer Rebate(1)
- Giveaways: Residential Water Audit Kits
- Giveaways: Residential Water Audit Kits – New

(1)Potential partnership with Windsor or other Towns/Communities

Ordinances and Regulations

- Smart Watering Guidelines

Educational Activities

- Bill Stuffers, Newsletters, Newspaper Articles, Mass Mailings, Website updates, Social Media (Facebook and Twitter)
- Xeriscape Demonstration Garden(1)
- Landscape Design (Xeriscape) and Maintenance Classes(1)
- Garden in a Box(1)

[(1)]Potential partnership with Windsor and/or other Towns/Communities

Comparison of Costs and Benefits

As shown in **Table C1**, **Appendix C**, the estimated cost for the evaluated activities varied from $0.01 per 1,000 gallons for the *"Recycling WTP Filter Backwash"* to $50.89 per 1,000 gallons for the *"Meter Testing and Replacement Program".*

4.3 Selection of Activities for Implementation

The second screening was accomplished by evaluating each activity based on the evaluation criteria discussed in Section 4.1. (Staff and Board approval, Feasibility for customer base including acceptance and participation, Staff and financial resource limitations, and Legal authority). The following measures were eliminated in the second screening process:

- Slow the Flow Residential Irrigation Audits
- Indoor Residential Water Audits
- Residential and Commercial Ultra High-Efficiency Toilet Upgrade Service or High-Efficiency Toilet Rebate Program
- High-Efficiency Clothes Washer Rebate
- Giveaways: Residential Water Audit Kits – New
- Xeriscape Demonstration Garden
- Landscape Design (Xeriscape) and Maintenance Classes

The District may re-evaluate these measures with future planning efforts. Details about the final 13 activities chosen can be found in the following descriptions.

<u>Foundational Activities</u>

- **Meter Testing and Replacement/Meter Upgrades**
  Large meters are tested every year; smaller meters are replaced every five years. Faulty meters account for apparent losses (i.e., losses due to meter inaccuracies) and real losses (also known as physical losses). As the larger meters are replaced, the new replacement meters are often tied directly into NWCWD's SCADA system. Approximately two years ago, the District began replacing the smaller meters with Sensus iPERL meters; these meters have the capability to be linked into an Automatic Meter Infrastructure (AMI) system once the District has a network in place.

- **System Wide Water Audits**
  By utilizing in-house System Wide Water Audits and paired with other measures (e.g., Metering), NWCWD identifies unmetered and unbilled treated water uses in order to assess where losses are occurring and how losses can be addressed. These losses are considered non-revenue water.

Additionally, NWCWD is participating in the Colorado Water Loss Initiative (CWLI). The focus of the program is the American Water Works Association's M36 water audit.

- **Control of Apparent Losses (with Metering and SCADA)**
  This is an existing measure that entails utilizing meters as well as the District's SCADA system to determine where system losses are occurring. The District monitors meters and SCADA information on a weekly or even daily basis.

- **Automatic Meter Reading (AMR) and Automatic Meter Infrastructure Installation and Operations**
  Approximately two years ago, NWCWD began retrofitting the smaller meters within their system with iPERL meters. These new meters will have the capability to be potentially tied into an AMI network. The District will be able to monitor customer usage more easily and provide real-time data. The AMI system will likely be first set up to communicate data directly to NWCWD offices; eventually the District may also upgrade the system to allow customers direct access to the real-time data. District Staff have already done some preliminary investigating into the different options of customer portals that are available that might work with the District's system.

- **Water Efficient Rate Structure/Water Budgets with Regular Updates**
  Water rates for the District are based on the traditional objectives in rate structure design including: 1) basing the rates on the actual cost of service, 2) providing adequate and stable revenues, 3) providing fairness or equitability among customer classes and volume users, and 4) ease of implementation and administration.

  The rates for the District, effective January 2018, are shown in an abbreviated form in **Table 4.3a** and are also included in **Appendix E**. Based on many studies, water rates (e.g., inclining and/or tiered) are one of the most effective ways to encourage efficient water use. Several recent studies indicate that water budgets have an even greater potential of encouraging additional savings on top of a traditional price increase. NWCWD conducts an in-house rate study annually. The District utilizes software from the University of North Carolina, Environmental Finance Center to calculate appropriate rates for the customers and service connections that are provided.

Table 4.3a: Tiered Rate Structure for NWCWD

Usage Classification	Base Rate	Annual Rate Structure per Kgal							
	0 - 6,000 gal	114K	171K	228K	456K	570K	627K	684K	912K
Standard - Full	$19.20	$3.20			$9.15 (3.20+2.00+3.95)				$7.15 (3.20+2.00+1.95)
Standard - 75%	$19.20	$3.20		$9.15 (3.20+2.00+3.95)				$7.15 (3.20+2.00+1.95)	
Standard - 50%	$19.20	$3.20	$9.15 (3.20+2.00+3.95)				$7.15 (3.20+2.00+1.95)		

As mentioned in Section 2.3, the District's customers are also on an annual water budget structure that is negotiated at the time a service connection is established. This type of budget encourages careful planning and conservation throughout the year to avoid costly overruns as the year comes to a close. No matter what, the customers still only pay for the water they use (after the minimum base rate).

- **Leak Detection and Repair Program - No Third Party**
  As mentioned in Section 2.3, the current leak detection program at NWCWD utilizes pressure reducing vaults, SCADA, in-house system wide water audits, and the billing database to track water use and leaks in the system. All known leaks in the distribution lines are repaired immediately. All new and replacement water lines are pressure tested after installation to ensure that they meet established guidelines for water loss. The District maintains more than 30 pressure reducing vaults which reduce the main line pressures thereby reducing the chance for leaks in the distribution system.

- **Leak Detection and Repair**
  The District is interested in investigating whether an outside consultant (e.g., American Leak Detection [ALD]) would offer enough benefit to offset the costs. ALD currently has many other municipalities and water districts in the area for which that they provide leak detection services. Several of their customers have seen some great benefits from their leak evaluations. ALD provides complete leak surveys on public and private water distribution systems using state-of-the-art equipment, including advanced correlation technology. They also provide a quick response to local emergencies such as main line breaks. The District sees many potential benefits to partnering with ALD.

- **Recycling Water Treatment Plant Filter Backwash**
  As mentioned in Section 2.3, water is flowed backward through the filters periodically to remove the solids during the filter cleaning process. The SCWTA collects all of this backwash water in settling ponds adjacent to the plant. After settling, this water is drained from the top of the settling ponds and returned to the filter plant for treatment.

- **Master Plans/Water Supply Plans**
  NWCWD plans to continue developing, updating, and evaluating these types of plans (i.e. Master Plans, Water Supply Plans, Capital Improvement Plans, and Water Efficiency Plans) that will improve its overall water efficiency and help plan for future use. As indicated in Section 1.3, NWCWD has a long history of implementing these types of plans.

Targeted Technical Assistance and Incentives

- **Giveaways: Residential Water Audit Kits**
  Self-guided residential water audit kits are designed with the following items: Dye tablets (for leak detection), a kitchen and bathroom faucet pressure reducer, and a toilet displacement device that doubles as a showerhead flow meter. Showerheads are also available upon request. The guidance offered in the instructions within the kit could lead the customer to take part in other conservation programs offered like Garden in a Box.

Ordinances and Regulations

NWCWD does implement voluntary time of day water restrictions and will continue this practice into the future. However, water savings was not evaluated with this planning effort. Water customers within annexed Town boundaries are asked to follow the ordinances and regulations for these entities.

- **Smart Watering Guidelines**
  NWCWD does not have specific restrictions. However, the District has posted Smart Watering Guidelines on their website that have several suggestions including the best time of day to water, avoiding watering during windy weather, watering frequency, and possible soil amendments.

Educational Activities

- **Bill Stuffers, Newsletters, Newspaper Articles, Mass Mailings, Website updates, Social Media (Facebook and Twitter)**
  The District has already made a number of efforts to educate their customers through various forms of media. Some of these include email blasts, bill stuffers, newsletters, newspaper articles, mass mailings, website updates (water efficiency and other information), and social networking (e.g., Facebook and Twitter). For ease of evaluating and avoiding overlap of the costs and benefits, these activities were combined into the one category. NWCWD realizes that other activities will be better received and utilized if its customers understand the objectives and motivations behind the District's decisions and changes.

- **Garden in a Box**
  NWCWD is interested in potentially partnering with Windsor, Severance, and other communities within or near their boundaries to offer assorted incentives to the various water customers. One of these initial efforts would be through the "Garden in a Box" program offered through the Resource Central (ReCen). ReCen offers multiple programs including "Garden in a Box", "Slow the Flow",

"Toilet Upgrades", and more. ReCen is a non-profit organization that offers many programs that can assist communities with conservation efforts. The benefit for a provider like NWCWD who may have limited resources is that ReCen helps to greatly reduce the planning efforts, startup costs, and labor that can be associated with getting efficiency activities up and running. ReCen has the programs (like Garden in a Box) already set up and in place, so the District will know exactly what the upfront costs will be. Additionally, ReCen hires and trains local technicians to provide the various services they offer, another value-added component of ReCen programs.

Garden in a Box: Each year ReCen offers an array of do it yourself Xeric garden kits, created by professional landscape designers for sun, shade, and everything in between. These plant by number gardens can have a significant conservation impact and are perfect for anyone who wants to beautify their yard while using less water than standard turf.

The 13 selected water efficiency activities and associated water savings were arranged within the targeted customer categories to more easily compare the anticipated savings to the original goals. Some of the measures contribute savings to more than one category. **Table 4.3b** (on the following page) shows the water savings for the selected activities, subtotaled for each category.

Table 4.3b: Combined Water Savings of Selected Water Efficiency Activities

Conservation Measures and Programs	Estimated Annual Water Savings (MG)	Estimated Total Water Savings over Planning Period (MG)
Non-Revenue Water		
Meter Testing and Replacement Program	2.2	22
System Wide Water Audits	1.1	11
Control of Apparent Losses (with Metering and SCADA)	1.6	16
Automatic Water Meter Reading Installation and Operations - Enhanced	1.2	12.0
Leak Detection and Repair Program - No 3rd Party	1.1	11
Leak Detection and Repair Program	11.0	110
Recycling Water Treatment Plant Filter Backwash	59.1	591
Master Plans/Water Supply Plans	1.2	12.0
Subtotal - MG	**78.5**	**785**
Acre-Feet	**241.0**	**2,410**
Wholesale-NonMuni		
Automatic Water Meter Reading Installation and Operations - Enhanced	0.1	1.5
Water Efficient Rate Structure/Water Budgets with Regular Updates	7.5	74.6
Master Plans/Water Supply Plans	0.7	7.5
Education Activities (Combined areas)	1.4	13.6

Conservation Measures and Programs *(cont.)*	Estimated Annual Water Savings (MG)	Estimated Total Water Savings over Planning Period (MG)
Subtotal - MG	**9.7**	**97.2**
Acre-Feet	**29.8**	**298**
Commercial Industrial		
Automatic Water Meter Reading Installation and Operations - Enhanced	8.8	87.7
Water Efficient Rate Structure/Water Budgets with Regular Updates	58.4	584.5
Master Plans/Water Supply Plans	5.8	58.4
Smart Watering Guidelines	0.1	0.8
Education Activities (Combined areas)	10.7	106.8
Garden in a Box	0.0004	0.021
Subtotal - MG	**83.8**	**838.2**
Acre-Feet	**257.2**	**2,572**
Residence		
Automatic Water Meter Reading Installation and Operations - Enhanced	8.0	79.6
Water Efficient Rate Structure/Water Budgets with Regular Updates	63.7	636.6
Master Plans/Water Supply Plans	4.0	39.8
Giveaways: Residential Water Audit Kits	0.00	0.3
Smart Watering Guidelines	0.3	3.5
Education Activities (Combined areas)	25.5	254.5
Garden in a Box	0.001	0.1
Subtotal - MG	**101.4**	**1,014**
Acre-Feet	**311.2**	**3,113**
Bulk Water		
Automatic Water Meter Reading Installation and Operations - Enhanced	0.19	1.90
Water Efficient Rate Structure/Water Budgets with Regular Updates	0.95	9.49
Master Plans/Water Supply Plans	0.95	9.49
Education Activities (Combined areas)	0.2	1.7
Subtotal - MG	**2.3**	**22.6**
Acre-Feet	**6.9**	**69**
Grand Total - (MG)	**276**	**2,758**
Acre-Feet	**846**	**8,463**

These savings were compared to the original goals set in Section 3. **Table 4.3c** compares the anticipated water savings from the selected activities with the original goals and then adjusts the water saving goals for this Plan.

Over the ten-year planning period, the selected activities provide an overall estimated water savings of 8,463 AF. The adjusted goals reflect the goals believed to be obtainable by NWCWD's Staff. After the goals were adjusted to reflect the expected water savings, the estimated water use reduction is 11.9%. Therefore, NWCWD will target an overall reduction from their forecasted water use by 11.9% over the planning period because of implementation of this Plan and the continuation of prior efforts.

Table 4.3c: Water Efficiency Goals Comparison

Water Use Categories:	Total Projected Water Use (2018 to 2027)	Reduction Goals for Planning Horizon		Adjusted Reduction Goals for Planning Horizon	
				Total Water Savings from Activities	Resulting Reduction
	(AF)	(%)	(AF)	(AF)	(%)
Wholesale-NonMuni	4,183	5.0%	209	298	7.1%
Commercial/Industrial	32,783	10.0%	3,278	2,572	7.8%
Residence	22,318	16.0%	3,571	3,113	13.9%
Bulk Water	5,187	2.0%	104	69	1.3%
Non-Revenue Water (1)	6,744	15.0%	1,012	2,410	6.1%
Total Water Production:	71,215				
Total Demand Reduction:			8,174	8,463	
Total Percent Reduction:			11.5%		11.9%

(1) Note: Non-Revenue water is calculated differently from other categories. The percentage under "Resulting Reduction" is the estimated final percentage that Non-Revenue represents.

SECTION 5.0 – IMPLEMENTATION AND MONITORING PLAN

5.1 Implementation Plan

The implementation plan defines the process necessary to carry out the selected water efficiency activities. A description of the steps the District will use to implement the water efficiency plan is presented in Worksheet J, **Appendix B**.

5.2 Monitoring Plan

Monitoring types of demand data can be beneficial in tracking the savings generated from implementing a water efficiency plan. Total treated water produced is monitored at SCWTA on a daily basis. Other categories of raw and treated water are typically monitored on a monthly basis. Still, other categories are monitored and evaluated on a semi-annual or annual basis. The demand data which will be collected during the monitoring period of the Plan is presented in Worksheets K, **Appendix B**. An abbreviated table of Worksheet K is presented in the following, **Table 5.2a.**

Table 5.2a: Selection of Demand Data for Efficiency Plan Monitoring

Monitoring Data	HB 10-1051 Reporting Requirement					Selection			
	Annual	Monthly	Bi-Monthly	Daily		Annual	Monthly	Bi-Monthly	Daily
Total Water Use									
Total treated water produced (metered at SCWTA WTP discharge)						X	X	X	X
Total treated water delivered (sum of customer meters)	√					X	X		
Raw non-potable deliveries									
Reclaimed water produced (metered at WWTP discharge)									
Reclaimed water delivered (sum of customer meters)									
Per capita water use						X			
Indoor and outdoor treated water deliveries						X			
Treated water peak day produced						X			
Reclaimed water peak day produced									
Raw water peak day produced/delivered									
Non-revenue water	√					X			

Monitoring Data *(cont.)*	HB 10-1051 Reporting Requirement					Selection			
	Annual	Monthly	Bi-Monthly	Daily		Annual	Monthly	Bi-Monthly	Daily
Water Use by Customer Type									
Treated water delivered		√				X	X		
Raw non-potable deliveries									
Reclaimed water delivered									
Residential per capita water use						X			
Unit water use (e.g. AF/account or AF/irrigated acre)						X			
Indoor and outdoor treated water deliveries						X			
Large users						X	X		
Other Demand Related Data									
Irrigated landscape (e.g. AF/acre or number of irrigated acres)									
Precipitation						X	X		
Temperature						X	X		
Evapotranspiration						X	X		
Drought index information									
Economic conditions									
Population						X			
New taps						X	X		

Leann Koons (Operations Manager) will be chiefly responsible for coordinating the implementation of this Plan. The District also realizes that the most successful Plan is one that involves a team effort from many staff, other key personnel, and sometimes assistance outside of NWCWD's employees.

SECTION 6.0 – ADOPTION OF NEW POLICY, PUBLIC REVIEW, AND FORMAL APPROVAL

6.1 Public Review Process

A public review process is required for all State approved plans. Since NWCWD has had a municipal water efficiency program in place since 2009, the public is likely familiar with the efficiency concepts and activities. For this water efficiency planning process, the public was notified of the 60-day comment period from February 16, 2019 to April 17, 2019 and how to submit comments. The Plan was available on NWCWD's website and in its office for review. No public comments were received during the 60 day comment period. Copies of public notice announcements are provided in **Appendix F**.

6.2 Local Adoption and State Approval Process

The NWCWD Board adopted the Plan at the Board meeting on May XX, 2019, and the Plan was submitted to CWCB following the Board Meeting.

CWCB provided written notification of approval, conditional approval or disapproval within 90 days of submittal (or input date). Conditions for conditional approval or disapproval were addressed (if necessary). Research and set up of programs can begin upon approval and implementation of the selected measures will begin in the summer/fall of 2019 continue throughout the planning period. The Cover Letter prepared for CWCB, CWCB's Approval Checklist, and CWCB's formal Approval Letter are included in **Appendix G**.

6.3 Periodic Review and Update

The District plans to review and update this water efficiency plan every seven years. The next update is scheduled to be completed in 2025.

APPENDIX A

Definition of Terms

DEFINITION OF TERMS & TERMINOLOGY

This section provides an overview of many acronyms, terms, and terminology that are commonly used in water efficiency and water planning. Some additional terms are included that are common in this geographical area. Please note that this is not a comprehensive list of all terms and definitions. Other important terminology is reserved for discussion within the document. Not all of the following terms are used within the main body of this document.

AF	Acre-foot: The amount of water it would take to cover one acre of land to a depth of one foot; approximately 325,851 gallons.
AMI	AMI stands for Advanced Metering Infrastructure. AMI meters, also known as Smart meters are updated, digital versions of the traditional electrical meter attached to the outside of a home or business. These new meters not only measure how much water (electrical and other meters are also common) is used, but also at what times during the day. More advanced Smart meters are also designed to transmit pricing and water information from the utility company to the consumer (two-way communication). Utility companies who provide their customers with Smart meters are able to implement a variety of water reduction and saving programs, helping reduce the cost of providing water to a community.
AMR	AMR stands for Automatic Meter Reading. It is an older technology that only collects electrical energy consumption and transfers that data from the electric meter on the home to the utility (one-way communication). Typically AMR meters are a “drive-by” type that require the utility to be in close proximity in order to read the meter. (also see AMI)
Average day demand	Average daily treatment plant production divided by the total tap equivalents served
BMP	Best Management Practice
Build-out	Theoretical maximum development of city, town, district, or service area
C-BT	Colorado Big Thompson

C-BT quota	The percentage set by the NCWCD Board of Directors each water year which determines the amount of ac-ft per unit of CBT, i.e. 70% quota equals 0.7 ac-ft per CBT unit.
ReCen	Resource Central: ReCen is a non-profit organization that provides a number of services (e.g., indoor residential water audits, sprinkler audits, xeriscape garden pre-made box kits, etc.). Water providers can partner with ReCen for these various services if the provider does not have the staff to institute a program by themselves. https://conservationcenter.org/
CWCB	Colorado Water Conservation Board
Demand management	The implementation of water efficiency activities to reduce water deliveries (demands) and or improve efficiencies within the distribution system. For purposes of this document, demand management refers to both system and customer water demands. Demand management is used interchangeably with water efficiency.
Demand-side	The distribution and consumption of treated water supplies for domestic purposes or the delivery and use of reclaimed water or untreated raw (i.e. ditch water, groundwater) for non-potable purposes such as irrigation or industrial processes.
Dual water supply systems	Water supply systems that use a combination of treated water to meet potable water needs and reclaimed water and/or non-treated water (i.e. untreated ditch water and groundwater) to meet non-potable water needs.
ELCO	East Larimer County Water District
EQR or ERU	Equivalent residential unit: a number related to the volume of raw water needed to serve an average dwelling unit housing. See also SFE.
ET controllers	Evapo-transpiration controllers adjust the amount of water applied from sprinkler systems based on soil moisture and weather conditions.
ET	Evapo-transpiration: The rate at which water is removed from the soil by evaporation and from plant surfaces by transpiration.
FCLWD	Fort Collins-Loveland Water District

Firm yield	Also referred to as "Firm Annual Yield" – the yearly amount of water that can be dependably supplied from the raw water sources of a given water supply system
GMA	Growth Management Area
GPCD	Gallons per capita per day: A measure of efficiency to determine the approximate amount of water that each resident within an area utilizes each day.
Maximum day	The largest amount of water used in a single day.
MG	Million gallons
MGD	Million gallons per day
MWEP	Municipal Water Efficiency Plan
NCWCD	Northern Colorado Water Conservancy District. More often referred to as Northern Water
NEPA	National Environmental Policy Act
NISP	Northern Integrated Supply Project
Non-potable use	Water that is not treated and used for irrigation or other uses than potable.
Non-revenue water	Annual non-revenue water (previously referred to as unaccounted for water) consists of unbilled authorized uses (i.e. hydrant flushing), apparent losses, and real losses. Real losses consist of leaks in the water distribution system that does not reach the end user. Apparent losses consist of unauthorized consumption, customer metering inaccuracies, and data handling errors.
NPIC	North Poudre Irrigation Company
NWCWD	North Weld County Water District
Peak hour	The largest amount of water used in a single hour – typically occurs on the Maximum Day.
Phreatophytes	Species of plants and trees that consume groundwater through their root zones below the water table such as Cottonwood and Russian Olive trees.

PIF	Plant Investment Fee, fee charged for on-going maintenance cost of infrastructure replacement and repair.
Potable use	Water that is treated to drinking water standards for municipal use, including residential and commercial use. The District's CBT water is used for potable use.
SCADA	Supervisory Control And Data Acquisition: A system typically in place to monitor the meters, tanks, and flows of the various components. Information is then conveyed to the main offices or other location where it can be interpreted and made available for decision makers.
SCFP	Soldier Canyon Filter Plant
SFE	Single Family Equivalent, a unit of measure used in planning to adjust water use for multi-family dwellings, such as townhomes or condominiums, to a single residential equivalent. See also EQR or ERU
Supply-side	Water supply operations and facilities that include the diversion, extraction, storage, and transmission of untreated water.
SWSI	State Wide Supply Initiative
System water demand	Volume of water necessary to meet customer water needs within a certain period of time. System water demand is typically measured at the point of discharge from the water treatment plant and includes non-revenue water. In dual water supply systems, system water demand may also include the distribution and delivery of non-potable water (i.e.: reclaimed water and untreated ditch and groundwater) to meet irrigation needs.
TE	Tap Equivalent, unit of measure often used by providers to adjust water use for larger taps such as multi-family or commercial, to a single residential tap equivalent of 5/8".
Water efficiency	Water efficiency includes the practices, techniques, and technologies that extend water supplies either directly through water savings or through substituting alternative supplies such as reuse. For purposes of this document, water efficiency is inclusive of water conservation and is used instead of "water conservation." The term water efficiency captures the essential objective of a local plan which is to improve the efficiency of a municipal demand and water supply system. Water efficiency includes both system demands and customer water demands.

	Note: CWCB's former 2005 Water Conservation Plan Development Guidance Document and other literature on conservation and water use efficiency distinguish supply-side and demand-side water use efficiency. These resources generally characterize demand-side as technical efficiencies (e.g. water efficient toilets) and behaviors (e.g. taking shorter showers) that save water at the end use/water user level. Supply-side refers to water efficiency at the system level such as the repair of pipeline leaks and water reuse. For purposes of this Plan, the distinction between these water efficiency encompasses both supply and demand side efficiencies.
Water efficiency activities	Traditionally water efficiency activities have been referred to as water conservation measures and or water conservation programs. For purposes of this document, measures and programs are replaced with water efficiency activities. Water efficiency activities encompass all efforts to either save water or improve efficiencies within a water supply system.
WCP	Water Conservation Plan. CWCB's previous designation for (Municipal) Water Efficiency Plans
Wind and rain sensor	A device that is connected to the irrigation system controller that will temporarily shut off irrigation when a pre-determined amount of rain or wind is detected.
WSSC	Water Supply and Storage Company
WTP	Water treatment plant
WWTP	Wastewater treatment plant

APPENDIX B

Municipal Water Efficiency Plan Guidance Document Worksheets

WORKSHEET A - WATER SUPPLY LIMITATIONS AND FUTURE NEEDS

Limitation and/or Future Need [1]	[2] Yes	[2] No	Comments on Limitation or Future Need [3]	How is Limitation or Future Need Being Addressed [4]
System is in a designated critical water supply shortage area	✓		SWSI	Water Efficiency Planning
System experiences frequent water supply shortages and/or emergencies		✓		
System has substantial non-revenue water		✓		
Experiencing high rates of population and demand growth		✓	Generally there is a relative steady growth. Some Towns (e.g., Windsor and Severance) are experiencing higher rates of growth than the more rural areas	
Planning substantial improvements or additions	✓			Several new miles of pipeline, two (possibly three) new tank sites, four additional housing subdivisions, new (additional) connection with Windsor
Increases to wastewater system capacity anticipated		✓	Most master meter communities have their own wastewater treatment. Other customers have their own septic systems.	
Need additional drought reserves		✓	District was able to handle the 2002 drought without major issues.	
Drinking water quality issues		✓	None	
Aging infrastructure in need of repair		✓	System is relatively new. Pipelines are replaced as the need arises.	
Issues with water pressure in portions of distribution system	✓		Small area near Tank No. 1	Customers with the affected area are required to have pumps to compensate for reduced pressure. Customers are also encouraged to have a regulating pressure tanks in addtion to the pumps.

Instructions:
[1] This column provides a list of limitations/future needs related to planning and operating the water supply system.
[2] Enter an "X" to show whether or not the system exhibits the limitations/future needs.
[3] Include any comments regarding the limitations/future needs that may be useful to consider in the planning process.
[4] If applicable, include how the limitation/future need is being addressed.

WORKSHEET D - IDENTIFICATION AND SCREENING OF FOUNDATIONAL ACTIVITIES

Water Efficiency Activities for Screening [1]	State Statute Requirement [2]	Identification		Carry to Evaluation [6]	Reason for Elimination [7]
		Existing/ Potential Activity [3]	Targeted Customer Category [4]		
Metering (BP1)	V, VII				
Automatic Meter Reading Installation and Operations	V, VII	**E**	All Categories [a]	**X**	
Submetering for Large Users (Indoor and Outdoor)	V	**P**	Wholesale-NonMuni		May re-evaluate with future planning efforts
Meter Testing and Replacement	V	**E**	Non-Revenue	**X**	
Meter Upgrades	V	**E**	All Categories [a]	**X**	Evaluation will be combined with meter testing and replacement
Identify Unmetered/Unbilled Treated Water Uses	V	**E**	Non-Revenue	**X**	Evaluation will be combined with system wide water audits
Data Collection - Monitoring and Verification (BP2)					
Frequency of Meter Reading	VII	**E**	All Categories		Activities not specifically evaluated in cost/benefit analysis because it is difficult to quantify savings
Tracking Water Use by Customer Type	VII	**E**	All Categories		
Upgrade Billing System to Track Use by Sufficient Customer Types	VII	**E**	All Categories		
Tracking Water Use for Large Customers	VII	**E**	All Categories		
Area of Irrigated Lands in Service Area (e.g. acres)	VII	**P**	All Categories		Labor intensive and cost prohibitive
Water Use Efficiency Oriented Rates and Tap Fees (BP1)	VII, VIII				
Volumetric Billing	VII, VIII	**E**	All Categories [c]	**X**	Included in Water Efficient Rate Structure/Water Budgets with Regular Updates
Water Rate Adjustments	VII, VIII	**E**	All Categories [c]	**X**	
Frequency of Billing	VII	**E**	All Categories [c]		Activity not specifically evaluated in cost/benefit analysis because it is difficult to quantify savings
Inclining/Tiered Rates	VII, VIII	**E**	All Categories [c]	**X**	Included in Water Efficient Rate Structure/Water Budgets with Regular Updates
Water Budgets	VII, VIII	**E**	All Categories [c]	**X**	
Tap Fees with Water Use Efficiency Incentives	VII	**E**	Residence		May re-evaluate with future planning efforts
System Water Loss Management and Control (BP3)	V				
System Wide Water Audits	V	**E**	Non-Revenue	**X**	
Control of Apparent Losses (with Metering)	V	**E**	Non-Revenue	**X**	
Leak Detection and Repair	V	**E/P**	Non-Revenue	**X**	
Water Line Replacement Program	V	**E**	Non-Revenue		Water lines are relatively new and are replaced or resized as needed. Difficult to quantify savings.
Recycling WTP Filter Backwash	V	**E**	Non-Revenue	**X**	
Planning (BP2)					
Integrated Water Resources Plans		**E**	All Categories	**X**	
Master Plans/Water Supply Plans		**E**	All Categories	**X**	
Capital Improvement Plans		**E/P**	All Categories		Activities not evaluated in cost/benefit analysis because it is difficult to quantify savings. No current CIP or Feasibility Studies are being undertaken
Feasibility Studies		**E**	All Categories		
Staff (BP4)					
Water Conservation Coordinator		**P**	All Categories		Staffing and budget constraints

Instructions:

[1] This column provides a list of possible activities & identifies the Best Practice activity as defined in the Colorado WaterWise Guidebook of Best Practices (BP) for Municipal Water Conservation in Colorado. List additional activities identified through the planning process.

[2] This column identifies, by roman numeral, the elements that correspond with the best practices and that shall be fully considered in the planning process per Colorado State Statute 37-60-126.

[3] Specify whether the activity is "Existing" or a "Potential" activity to carry through screening by entering an "E" or "P", respectively.

[4] As applicable, specify which customer category (residential, commercial, etc.) is/would be impacted by the activity.

[5] Enter screening criteria based on qualitative goals developed in Step 3 and insert an "X" for activities that meet the listed screening criteria.

[6] Based on the screening process, indicate which activities will be carried onto the evaluation phase with an "X".

[7] If eliminated via screening, comment on why.

[a] All categories except Wholesale-Muni

[b] All categories except Non-Revenue and Wholesale-Muni

WORKSHEET E - IDENTIFICATION AND SCREENING OF TARGETED TECHNICAL ASSISTANCE INCENTIVES

Water Efficiency Activities for Screening [1]	State Statute Requirement [2]	Identification					Carry to Evaluation [7]	Reason for Elimination [8]
		Existing/ Potential Activity [3]	SWSI Framework Levels [4]			Targeted Customer Category [5]		
			Level 1 Municipal Uses	Level 2 Customers with the Largest Water Use	Level 3 Customer Type(s) in Service Area			
Installation of Water Efficient Fixtures and Appliances	I							
Indoor Audits	I	**P**	X	X	X	Residence	X	
Toilet Retrofits	I	**P**	X	X	X	C&I, Residence	X	
Urinal Retrofits	I	**P**	X	X	X	C&I		Predicted low partication.
Showerhead Retrofits	I	**E**	X		X	Residence	X	Included in: Giveaways: Residential Water Audit Kits
Faucet Retrofits (e.g. aerator installation)	I	**E**	X	X	X	C&I, Residence		
Water Efficient Washing Machines	I	**P**	X		X	Residence		Predicted low partication, lack of Staff availability.
Water Efficient Dishwashers	I	**P**	X	X	X	Residence		
Efficient Swamp Cooler and Air Conditioning Use	I	**P**	X	X	X	C&I, Residence		
Low Water Use Landscapes	II							
Drought Resistant Vegetation	II	**P**	X	X	X	C&I, Residence		Potentially re-evalute for future planning efforts.
Removal of Phreatophytes	II	**P**	X	X	X			Few present in raw water supply channels. Extensive evaluation of other irrigated areas has not be conducted.
Irrigation Efficiency Evaluations/Outdoor Water Audits	II	**P**	X	X	X		X	
Outdoor Irrigation Controllers	II	**P**	X	X	X		X	Included in: Slow the Flow Residential Irrigation Audits
Irrigation Scheduling/Timing	II	**P**	X	X	X			
Rain Sensors	II	**P**	X	X	X			
Residential Outdoor Meter Installations	II	**P**	X	X	X			
Xeriscape	II	**P**	X	X	X		X	Included in: Garden in a Box. May be expanded in future
Other Low Water Use Landscapes	II	**P**	X	X	X			
Irrigation Equipment Retrofits	II	**P**	X	X	X		X	Included in: Slow the Flow Residential Irrigation Audits
Water- Efficient Industrial and Commercial Water-Using Processes	III							
Specialized Nonresidential Surveys, Audits and Equipment Efficiency Improvements	III	**P**	X	X	X	C&I		Most of the C&I customers in the area are dairies or agriculture in nature. Although some may be able to benefit from some general water-efficiency activities. Each dairy and business is very unique in size and operation, and therefore it is difficult to address their needs through a single program.
Commercial Indoor Fixture and Appliance Rebates/Retrofits	III	**P**	X	X	X			
Cooling Equipment Efficiency	III	**P**	X	X	X			
Restaurant equipment	III	**P**	X	X	X			
Incentives	X							
Toilet Rebates	X	**P**	X	X	X		X	
Urinal Rebates	X	**P**	X	X	X			Predicted low partication.
Showerhead Rebates	X	**P**			X		X	Included in: Giveaways: Residential Water Audit Kits
Water Efficient Faucet or Aerator Rebates	X	**P**	X	X	X		X	
Water Efficient Washing Machine Rebates	X	**P**			X			Predicted low partication.
Water Efficient Dishwasher Rebates	X	**P**			X			
Efficient Irrigation Equipment Rebates	II, X	**P**	X	X	X			
Landscape Water Budgets Information and Customer Feedback	II, X	**P**	X	X	X			
Turf Replacement Programs/Xeriscape Incentives	II, X	**P**	X	X	X		X	Included in: Garden in a Box. May be expanded in future
Give-aways	X	**E**	X	X	X		X	

Instructions:

[1] This column provides a list of activities & if applicable, identifies the Best Practice activity as defined under *Colorado WaterWise Guidebook of Best Practices (BP) for Municipal Water Conservation in Colorado* . List additional activities identified through the planning process.

[2] This column identifies, by roman numeral, the elements that correspond with the best practices and that shall be fully considered in the planning process per Colorado State Statute 37-60-126.

[3] Specify whether the activity is an "Existing" or "Potential" activity to carry through screening by entering an "E" or "P", respectively.

[4] Specify which level the historical/potential activities fall under by entering an "X" in the appropriate column.

[5] As applicable, specify which customer category (residential, commercial, etc.) is/would be impacted by the activity.

[6] Enter screening criteria based on qualitative goals developed in Step 3 and insert an "X" for activities that meet the listed screening criteria.

[7] Based on the screening process, indicate which activities will be carried on the evaluation phase with an "X".

[8] If eliminated via screening, comment on why.

WORKSHEET F - IDENTIFICATION AND SCREENING OF ORDINANCES AND REGULATIONS

Water Efficiency Activities for Screening [1]	State Statute Requirement [2]	Identification					Qualitative Screening [6]				Carry to Evaluation [7]	Reason for Elimination [8]
		Existing/ Potential Activity [3]	SWSI Framework Levels [4]			Targeted Customer Category [5]	*Anticipated Board Approval*	*Anticipated Customer Acceptance & Participation*	*Staff Availability*	*Financial Requirements*		
			Level 1 Customer Type(s) within the Existing Service Area	Level 2 New Development	Level 3 Point of Sales on Existing Building Stock							
General Water Use Regulations	IX											
Water Waste Ordinance (BP 5)	IX	P	X			All Categories [a] [b]						See Notes: [c]
Time of Day Watering Restriction	IX	P	X									
Day of Week Watering Restriction	IX	P	X									
Water Overspray Limitations	IX	P	X									
Landscape Design/Installation Rules and Regulations	IX											
Rules and Regulations for Landscape Design/Installation (BP 9)	IX	P	X	X		All Categories [a] [b]						See Notes: [c]
Landscaper Training and Certification (BP 8)	IX	P	X	X								
Irrigation System Installer Training and Certification (BP 8)	IX	P	X	X								
Soil Amendment Requirements (BP 9)	IX	P	X	X								
Turf Restrictions (BP 9)	IX	P	X	X								
Irrigation Equipment Requirements	IX	P	X	X								
Outdoor Water Audits/Irrigation Efficiency Regulations (BP 10)	IX	P	X	X								
Outdoor Green Building Construction (BP 8,9)	IX	P	X	X								
Indoor and Commercial Regulations	IX											
High Efficiency Fixture and Appliance Replacement (BP 12)	IX	P	X	X	X	All Categories [a] [b]						See Notes: [c]
Commercial Cooling and Process Water Requirements (BP 14)	IX	P	X	X		C&I						
Green Building Construction (BP 12)	IX	P	X	X		C&I						
Indoor Plumbing Requirements (BP 12)	IX	P	X	X		All Categories [a] [b]						
City Facility Requirements (BP 12)	IX	P	X			N/A						
Required Indoor Residential Audits (BP 13)	IX	P	X	X	X	Residence						
Required Indoor Commercial Audits (BP 14)	IX	P	X	X	X	C&I						
Commercial Water Wise Use Regulations (Car Washes, Restaurants, etc.)	IX	P	X	X	X	C&I						

Instructions:

[1] This column provides a list of possible activities & if applicable identifies the Best Practice activity as defined under Colorado WaterWise Guidebook of Best Practices (BP) for Municipal Water Conservation in Colorado. List additional activities identified through the planning process.
[2] This column identifies, by roman numeral, the elements that correspond with the best practices and that shall be fully considered in the planning process per Colorado State Statute 37-60-126.
[3] Specify whether the activity is an "Existing" or "Potential" activity to carry through screening by entering an "E" or "P", respectively.
[4] For current/historical activities, specify which level the activities fall under by entering an "X" in the appropriate column.
[5] As applicable, specify which customer category (residential, commercial, etc.) is/would be impacted by the activity.
[6] Enter screening criteria based on qualitative goals developed in Step 3 and insert an "X" for activities that meet the listed screening criteria.
[7] Based on the screening process, indicate which activities will be carried on the evaluation phase with an "X".
[8] If eliminated via screening, comment on why.

Notes:

[a] All categories except Wholesale-Muni & Bulk Water
[b] All categories except Non-Revenue
[c] Because of the unique type of provider NWCWD is, as a District (vs. a municipality), it is difficult to monitor and/or enforce regulations. Many of the Towns that the District serves have or have the capability of putting these types of regulations in place.

WORKSHEET G - IDENTIFICATION AND SCREENING OF EDUCATION ACTIVITIES

Water Efficiency Activities for Screening [1]	State Statute Requirement [2]	Identification					Qualitative Screening [6]				Carry to Evaluation [7]	Reason for Elimination [8]
		Existing/ Potential Activity [3]	SWSI Framework Levels [4] Level 1 One-Way	Level 2 One-Way with Feedback	Level 3 Two-way communication	Targeted Customer Category [5]	*Anticipated Board Approval*	*Anticipated Customer Acceptance & Participation*	*Staff Availability*	*Financial Requirements*		
Customer Education (BP6)	VI											
Bill Stuffers	VI	E	X			All Categories [a]	X	X	X	X	X	
Newsletter	VI		X									
Newspaper Articles	VI		X									
Mass Mailings	VI		X									
Web Pages	VI		X	X								
Water Fairs	VI		X	X								
K-12 Teacher and Classroom Education Programs	VI	E/P		X	X	All Categories [a]	X	X				Lack of Staff availability. May reevaluate at a later time.
Message Development/Campaign	VI	E	X			All Categories [a]	X	X	X	X	X	
Interactive Websites	VI	P	X	X	X	All Categories [a]	X	X				Included in general Education Activities.
Social Networking (e.g. Facebook)	VI	E	X	X	X	All Categories [a]	X	X	X	X	X	
Customer Surveys	VI	P		X		All Categories [a]						Lack of Staff availability. May reevaluate at a later
Focus Groups	VI	P			X							
Citizen Advisory Boards	VI	P			X							
Technical Assistance	VI											
Customer Water Use Workshops	VI	P		X		All Categories [a]	X	X				Lack of Staff availabilty. Some concern about participation from customers.
Landscape Design and Maintenance Workshops	VI	P		X								
Xeriscape Demonstration Garden	VI	P	X	X								
Water Conservation Expert Available	VI	P		X	X	All Categories [a]						Lack of Staff availability.

Instructions:
[1] This column provides a list of possible activities & if applicable identifies the Best Practice activity as defined under Colorado WaterWise Guidebook of Best Practices (BP) for Municipal Water Conservation in Colorado. List additional activities identified through the planning process.
[2] This column identifies, by roman numeral, the elements that correspond with the best practices and that shall be fully considered in the planning process per Colorado State Statute 37-60-126.
[3] Specify whether the activity is an "Existing" or "Potential" activity to carry through screening by entering an "E" or "P", respectively.
[4] For current/historical activities, specify which level the activities fall under by entering an "X" in the appropriate column.
[5] As applicable, specify which customer category (residential, commercial, etc.) is/would be impacted by the activity.
[6] Enter screening criteria based on qualitative goals developed in Step 3 and insert an "X" for activities that meet the listed screening criteria.
[7] Based on the screening process, indicate which activities will be carried on the evaluation phase with an "X".
[8] If eliminated via screening, comment on why.

Notes:
[a] All categories except Non-Revenue and Wholesale-Muni

WORKSHEET J - IMPLEMENTATION PLAN

Selected Water Efficiency Activities [1]	Historical Period of Implementation [2]	Estimated Period of Implementation [2]	Implementation Actions [3]	Entity/Staff Responsible for Implementation [6]	Coordination and Public Involvement [7]
Foundational Activities					
Meter Testing and Replacement Program (Meter Upgrades)	Unknown - present	ongoing		Engineering; Maintenance	
System Wide Water Audits	2009 - present	ongoing		Operations Manager	
Control of Apparent Losses (with Metering and SCADA)	2009 - present	ongoing		Operations Manager and Engineering	
Automatic Water Meter Reading Installation and Operations	2010 - present	ongoing		Engineering; Maintenance	
Water Efficient Rate Structure/Water Budgets with Regular Updates	Unknown - present	ongoing		Operations Manager and Billing	
Leak Detection and Repair Program - No Third Party	Unknown - present	ongoing		Engineering; Maintenance	
Leak Detection and Repair Program		2019 - ongoing	Contact ALD	Operations Manager and Engineering	Coordinate with ALD
Recycling Water Treatment Plant Filter Backwash	Unknown - present	ongoing		SCFP	
Master Plans/Water Supply Plans	2009 - present	ongoing		Various Staff	
Targeted Technical Assistance and Incentives					
Giveaways: Residential Water Audit Kits	2009 - present	ongoing		Operations Manager and Front Desk	
Ordinances and Regulations					
Smart Watering Guidelines	2011 - present	ongoing		Website Coordinator	
Education Activities					
Bill Stuffers, Newsletters, Newspaper Articles, Mass Mailings, Website Updates and Interactive Website, Water Fairs and classroom activities, Social Networking (Facebook & Twitter)	varies - present	ongoing		Operations Manager, Website Coordinator, and other Various Staff	
Garden in a Box		2019 - ongoing	Contact Windsor and/or ReCen	Operations Manager	Coordinate with Windsor and/or ReCen

Instructions:
[1] Provide the list of water efficiency activities selected for implementation during Step 4.
[2] Provide period in which activity is going to be implemented.
[3] Include information on specific actions necessary to implement the activities (e.g. advertise rebates to public).
[4] Indicate timing of when the action are scheduled to be implemented (e.g. when leaks will be repaired, when rebate program will start, etc.).
[5] Insert anticipated annual costs.
[6] Specify which entity/staff responsible for implementing the activities.
[7] If applicable, comment on necessary coordination among staff/other entities and how the public will be involved. This includes educational campaigns, feedback, direct participation in certain actions, etc.

[8] Add any additional comments.

WORKSHEET K - SELECTION OF MONITORING DEMAND DATA FOR MONITORING PLAN

Monitoring Data [1]	HB 10-1051 Reporting Requirement [2]				Selection [3]				Entity/Staff Responsible for Data Collection and Evaluation [4]	Comments [6]
	Annual	Monthly	Bi-Monthly	Daily	Annual	Monthly	Bi-Monthly	Daily		
Total Water Use										
Total treated water produced (metered at SCFP WTP discharge)					X	X		X	SCFP Manager	
Total treated water delivered (sum of customer meters)	√				X	X			SCFP Manager	
Raw non-potable deliveries					X	X			SCFP Manager	
Reclaimed water produced (metered at WWTP discharge)										
Reclaimed water delivered (sum of customer meters)										
Per capita water use					X				Engineering/Admin.	See within main body of text
Indoor and outdoor treated water deliveries					X				Engineering/Admin.	See within main body of text
Treated water peak day produced					X	X			SCFP Manager	
Reclaimed water peak day produced										
Raw water peak day produced/delivered					X				Engineering/Admin.	
Non-revenue water	√				X				Engineering/Admin.	
Water Use by Customer Type										
Treated water delivered		√			X	X			Engineering/Admin.	
Raw non-potable deliveries										
Reclaimed water delivered										
Residential per capita water use					X				Engineering/Admin.	See within main body of text
Unit water use (e.g. AF/account or AF/irrigated acre)					X				Engineering/Admin.	See within main body of text
Indoor and outdoor treated water deliveries					X				Engineering/Admin.	See within main body of text
Large users					X	X			Engineering/Admin.	Dairy Farms
Other Demand Related Data										
Irrigated landscape (e.g. AF/acre or number of irrigated acres)										
Precipitation					X	X			Engineering/Admin.	
Temperature					X	X			Engineering/Admin.	
Evapotranspiration					X	X			Engineering/Admin.	
Drought index information										
Economic conditions										
Population					X				Engineering/Admin.	
New taps					X	X			Engineering/Admin.	

Instructions:
[1] This worksheets provides a list of possible demand data. Add additional demand data provider would like to monitor.
[2] Specifies annual reporting requirements per HB 10-1051.
[3] Select demand data provider plans to use to monitor effectiveness of water efficiency activities by inserting an "X" in appropriate boxes.
[4] Specify staff/entity responsible for data collection and evaluation.
[5] Specify the timing and/or set schedule in which data will be collected and evaluated.
[6] Add any additional comments.

APPENDIX C

Additional Tables

Table C1: Water Effciency Activity Evaluation

Water Efficiency Activities for Evaluation	Existing/Potential Activity	Targeted Customer Category	Review of Qualitative Screening			Evaluation							Final Selection	
			Qualitative Goals			Projected Water Savings				Quantitative Goals				
			Benefit in Water Savings	*Staff Approval and Availability*	*Board and Public Approval*	Total Water Savings over the Planning Period (AF)	Average Annual Water Savings (AF/yr)	Cost per 1,000 gal saved	Projected Implementation Costs over Planning Period Including Lost Revenue	*Helps to Achieve Overall Savings Goals*	*Low Cost w/ Significant Water Savings*	*Beneficial to Community*	Selected for Implementation	If Eliminated, Reason Why Eliminated
Foundational Activities														
Meter Testing and Replacement Program (Meter Upgrades)	E	Non-Revenue	X	X	X	**67.44**	**6.74**	**$50.89**	**$1,118,310**	X		X	**Y**	
System Wide Water Audits	E	Non-Revenue	X	X	X	**33.72**	**3.37**	**$1.82**	**$20,000**	X		X	**Y**	
Control of Apparent Losses (with Metering and SCADA)	E	Non-Revenue				**50.58**	**5.06**	**$13.95**	**$230,000**	X		X	**Y**	
Automatic Water Meter Reading Installation and Operations	E	All Categories except Wholesale-Muni	X	X	X	**560.58**	**56.06**	**$3.11**	**$477,762**	X		X	**Y**	
Water Efficient Rate Structure/Water Budgets with Regular Updates	E	All Categories [a]	X	X	X	**4,005.51**	**400.55**	**$0.01**	**$8,250**	X	X	X	**Y**	
Leak Detection and Repair Program - No Third Party	E	Non-Revenue	X	X	X	**33.72**	**3.37**	**$2.00**	**$22,000**	X	X	X	**Y**	
Leak Detection and Repair Program	P	Non-Revenue	X	X	X	**337.22**	**33.72**	**$1.31**	**$144,000**	X	X	X	**Y**	
Recycling Water Treatment Plant Filter Backwash	E	Non-Revenue	X	X	X	**1,813.39**	**181.34**	**$0.01**	**$2,750**	X	X	X	**Y**	
Master Plans/Water Supply Plans	E	All Categories except Wholesale-Muni	X	X	X	**390.41**	**39.04**	**$5.27**	**$670,318**	X		X	**Y**	
Targeted Technical Assistance and Incentives														
Slow the Flow Residential Irrigation Audits	P	Residence	X	X	X	**15.04**	**0.27**	**$11.12**	**$54,498**	X		X	**N**	Lack of Staff support
Indoor Residential Water Audits	P	Residence	X			**13.09**	**0.24**	**$9.35**	**$39,899**	X		X	**N**	Not as popular according to other water providers.
Residential and Commercial Ultra High-Efficiency Toilet Upgrade Service or High-Efficiency Toilet Rebate Program	P	Residence, C&I				**251.42**	**4.57**	**$3.62**	**$296,850**	X			**N**	Difficult to implement with limited Staff.
High Efficiency Clothes Washer Rebate	P	Residence, C&I				**3.18**	**0.06**	**$15.27**	**$15,839**				**N**	Not enough predicted participants.
Giveaways: Residential Water Audit Kits	E	Residence				**0.82**	**0.01**	**$17.03**	**$4,541**	X			**Y**	
Giveaways: Residential Water Audit Kits - New	E	Residence				**26.18**	**0.48**	**$10.48**	**$89,378**	X			**N**	Previous giveaways have not been overly popular.
Ordinances and Regulations														
Smart Watering Guidelines	E	Residence, C&I [b]	X			**13.07**	**1.31**	**$3.03**	**$12,899**	X		X	**Y**	
Education Activities														
Bill Stuffers	E	All Categories [a]	X			**1,156.11**	**115.61**	**$3.49**	**$1,315,862**	X	X	X	**Y**	
Newsletters	E		X							X	X	X		
Newspaper Articles	E		X							X	X	X		
Mass Mailings	E		X							X	X	X		
Website	E									X	X	X		
Water Fairs and classroom activities	E									X	X	X		
Interactive Websites	P									X	X	X		
Social Networking (Facebook & Twitter)	E									X	X	X		
Xeriscape Demonstration Garden	P	Residence, C&I	X			**3.96**	**0.07**	**$18.38**	**$23,712**				**N**	Lack of Staff to solicit volunteers
Landscape Design (Xeriscape) and Maintenance Classes	P/E	Residence, C&I				**0.43**	**0.01**	**$27.42**	**$3,821**				**N**	Lack of Staff support at this time
Garden in a Box	P	Residence, C&I	X			**0.32**	**0.01**	**$44.97**	**$4,625**				**Y**	

[a] All categories except Non-Revenue and Wholesale-Muni.
[b] Outdoor Efficiency Activity: All categories except Non-Revenue and Wholesale-Muni potentially benefitted.
[c] Indoor Efficiency Activity: All categories except Non-Revenue and Wholesale-Muni potentially benefitted.

APPENDIX D

Activity Cost and Benefit Analysis

Meter Testing and Replacement Program (Meter Upgrades)

Large meters are tested every year; smaller meters are replaced every five years. Faulty meters account for apparent losses (i.e. losses due to meter inaccuracies) and real losses (also known as physical losses). Approximately 95% of the District meters have been upgraded to AMR (Automatic Meter Reading) meters. AMR meters allow for data to be processed quicker and with less sources of error. Currently smaller meters are being upgraded to iPERL AMR meters. iPERL meters offer a capability of downloading incremental data (15 minute increments). The iPERL meters also have AMI (Advanced Metering Infrastructure) capabilities, but the District is not currently planning on further upgrades to an AMI system during the Planning Period.

Planning Period	2018 to 2027	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Annual Estimated Savings Rate	1.00%	

Category	Avg. Annual Water Use over Planning Period (MG)	*Estimated Annual Water Savings (gal/yr)*
Non Revenue Water	219.77	2,197,659

Estimated Annual Water Savings	**2.20**	MG/yr
Estimated Savings over Planning Period	**22.0**	MG

Notes:

2011 - 2015 average system non-revenue leakage/loss rate was 6.9%. Natural Resources Defense Council estimate 10% of homes have leaks that waste 90 gals or more per day. These leaks are often go unaccounted due to faulty meters.

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours	900	
Hourly Cost	$55.00	
Annual Staff Costs	$49,500	
Third Party Costs	$0.00	
Evaluation and Follow-up Costs	$0.00	
Annual Labor	**$49,500.00**	
Materials Costs		
Unit Cost	$207.77	/participant
Number of Meters/Year	300	/year
Annual Materials	**$62,331.00**	/year

Estimated Annual Cost	**$111,831**	/year
Estimated Total Cost over Planning Period	**$1,118,310**	
Cost per 1000 Gallons Saved	**$50.89**	

Notes:

The $207.77 weighted average unit cost includes meter testing and replacement

Residential = $200/meter; Commercial Industrial and other categories = $300/meter.

System Wide Water Audits

By implementing System Wide Water Audits, NWCWD could identify unmetered and unbilled treated water uses in order to assess where losses are occurring and how losses can be addressed. These losses are considered non-revenue water. The District may utilize the IWA/AWWA Water Audit Method published in the AWWA Manual of Practice M36 to conduct a "top down approach."

Planning Period	2018 to 2027	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Annual Estimated Savings Rate	0.50%

Category	Avg. Annual Water Use over Planning Period (MG)	*Estimated Annual Water Savings (gal/yr)*
Non Revenue Water	219.77	1,098,829

Estimated Annual Water Savings	**1.10**	MG/yr
Estimated Savings over Planning Period	**11.0**	MG

Notes:

By specifically identifying these losses, additional actions can be taken to reduce the water lost. This measure has the potential to improve all categories. A conservative reduction of 0.5% of projected annual water use was assumed.

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours	50	/year
Hourly Cost	$40.00	/hour
Annual Staff Costs	$2,000.00	
Third Party Costs	$0.00	/year
Evaluation and Follow-up Costs	$0.00	/year
Annual Labor	**$2,000.00**	/year

Notes:

Estimated staff costs for Staff to spend approximately 50 hours per year at $40.00/hour to continue to develop within NWCWD.

Although some revenue may be lost on the demand side, more revenue will likely be realized on the supply side.

Estimated Annual Cost	**$2,000**	/year
Estimated Total Cost over Planning Period	**$20,000**	
Cost per 1000 Gallons Saved	**$1.82**	

Control of Apparent Losses (with Metering and SCADA)

This measure entails utilizing meters as well as the District's SCADA system to determine where system losses are occurring. The District monitors meters and SCADA information on a weekly or even daily basis.

Planning Period	2018 to 2027	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Annual Estimated Savings Rate	0.75%

Notes:

2011 - 2015 average system non-revenue leakage/loss rate was 6.9%. One of the first steps in reducing losses is to identify where the losses are occuring. Metering and System Wide Water Audits help in this process.

Category	Avg. Annual Water Use over Planning Period (MG)	*Estimated Annual Water Savings (gal/yr)*
Non Revenue Water	219.77	1,648,244

Estimated Annual Water Savings	**1.65**	MG/yr
Estimated Savings over Planning Period	**16.5**	MG

Costs

Total Cost to Water Provider

Labor Costs

Staff Hours	100.0	
Hourly Cost	$55.00	
Annual Staff Costs	$5,500	
Third Party Costs		
Evaluation and Follow-up Costs		
Annual Labor	**$5,500.00**	

Estimated staff costs for Staff to spend approximately 100 hours per year at $55.00/hour to continue to develop within NWCWD.

Materials Costs

Unit Cost	$3,500.00	/meter
Number of New Meters	5	/year
Annual Materials	**$17,500.00**	/year

Meters range in price depending on size and type. Prices range from $2000/unit to over $5,000 per unit. Unit cost represents an approximate average.

Estimated Annual Cost	**$23,000.00**	/year
Estimated Total Cost over Planning Period	**$230,000.00**	
Cost per 1000 Gallons Saved	**$13.95**	

Automatic Water Meter Reading Installation and Operations

Approximately 95% of the District meters are AMR meters. The remaining are manual read meters. The general make-up is about 15% large meters, and 85% of smaller meters. Approximately 20% of the smaller meters have been upgraded to iPERL AMR meters. iPERL meters offer a capability of downloading incremental data (15 minute increments). AMR meters allow for data to be processed quicker and with less sources of error. The iPERL meters also have AMI capabilities, but the District is not currently planning on further upgrades to an AMI system during the Planning Period. Other customers, depending on the size of the meter, are tied directly into NWCWD's SCADA system.

Planning Period	2018 to 2027	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Customer Category	Avg. Annual Water Use over Planning Period (MG)	Estimated Annual Savings Rate	*Estimated Annual Water Savings (gal/yr)*
Non-Revenue	240.49	0.50%	1,202,440
Wholesale-Muni	1,304.58	0.50%	6,522,898
Wholesale-NonMuni	149.16	0.30%	447,494
Commercial Industrial	1,168.95	0.25%	2,922,381
Residence	795.81	0.50%	3,979,034
Bulk Water	189.88	0.15%	284,822

Estimated Annual Water Savings	**15.36**	MG/yr
Estimated Savings over Planning Period	**153.6**	MG

Notes:

Because there is not customer interaction with an online webpage, savings is estimated to be relatively small. AMR meters are still an improvement over the older manual read meters because data can be processed quicker, and there are less sources for error.

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours	45	/year
Hourly Cost	$55.00	/hour
Annual Labor	**$2,475.00**	/year

Notes:

Annual Staff Costs for this savings measure include data processing. Other costs, such as fuel and vehicle maintenance are not included since some costs would be associated with reading the meters no matter what the scenario.

Water Rates

Rate Category	Current Rates (per 1,000 gals)
Non-Revenue	N/A
Wholesale-Muni	$3.20
Wholesale-NonMuni	$3.20
Commercial Industrial	$3.20
Residence	$3.20
Bulk Water	$3.20

Notes:

Water rates are based on a weighted average for each customer category and incorporate seasonal usage.

Estimated Revenue assumes that the current rates will not change significantly over the planning period.

Estimated Average Annual Revenue without Water Savings	$11,546,831	/year
Estimated Average Annual Revenue with Water Savings	$11,501,530	/year
Estimated Annual Revenue Loss Related to Water Savings	$45,301	/year

Estimated Annual Cost	**$47,776**	/year
Estimated Cost over Planning Period not including Lost Revenue	**$24,750**	
Estimated Total Cost over Planning Period Including Lost Revenue	**$477,762**	
Cost per 1000 Gallons Saved	**$3.11**	

Automatic Water Meter Reading Installation and Operations - Enhanced

The District is currently investigating enhancing their AMR system by offering a customer interactive portal where customers would get usage alerts and be able to view billing and metering data.

Planning Period	2018 to 2027	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Customer Category	Avg. Annual Water Use over Planning Period (MG)	Estimated Annual Savings Rate	*Estimated Annual Water Savings (gal/yr)*
Non-Revenue	240.49	0.50%	1,202,440
Wholesale-NonMuni	149.16	0.10%	149,165
Commercial Industrial	1,168.95	0.75%	8,767,142
Residence	795.81	1.00%	7,958,067
Bulk Water	189.88	0.10%	189,881

Estimated Annual Water Savings	**18.27**	MG/yr
Estimated Savings over Planning Period	**182.7**	MG

Notes:

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours	35	/year
Hourly Cost	$55.00	/hour
Annual Labor	**$1,925.00**	/year

Third Party Costs		
Program Cost	**$1,000.00**	/year

Notes:

Annual Staff Costs for this savings measure include data processing. Other costs, such as fuel and vehicle maintenance are not included since some costs would be associated with reading the meters no matter what the scenario.
Third party costs for interactive customer portal cover up to 7,500 meters.

Water Rates

Rate Category	Current Rates (per 1,000 gals)
Non-Revenue	N/A
Wholesale-Muni	$3.20
Wholesale-NonMuni	$3.20
Commercial Industrial	$3.20
Residence	$3.20
Bulk Water	$3.20

Notes:

Water rates are based on a weighted average for each customer category and incorporate seasonal usage.

Estimated Revenue assumes that the current rates will not change significantly over the planning period.

Estimated Average Annual Revenue without Water Savings	$7,372,176	/year
Estimated Average Annual Revenue with Water Savings	$7,317,570	/year
Estimated Annual Revenue Loss Related to Water Savings	$54,606	/year

Estimated Annual Cost	**$57,531**	/year
Estimated Cost over Planning Period not including Lost Revenue	**$29,250**	
Estimated Total Cost over Planning Period Including Lost Revenue	**$575,306**	
Cost per 1000 Gallons Saved	**$3.15**	

Water Efficient Rate Structure/Water Budgets with Regular Updates

Based on many studies, water rates (e.g., inclining and/or tiered) are one of the most effective ways to encourage efficient water use. A rate study is necessary to ensure maximum water conservation savings. NWCWD just completed a rate study in 2016. New rates will go into effect January 1, 2017. The District does an annual evaluation of their rates. Because they are very interrelated, this measure also includes Volumetric Billing within it.

Along with tiered rates and volumetric billings, the District also sets up an annual water budget for many of their water customers. Customers are billed monthly based on their volumetric use and are charged a surcharge if they exceed their annual budget.

Planning Period	2018 to 2027	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Customer Category	Avg. Annual Water Use over Planning Period (MG)	Annual Estimated Savings Rate	*Estimated Annual Water Savings (gal/yr)*
Non-Revenue	240.49	0.00%	0
Wholesale-NonMuni	149.16	5.00%	7,458,233
Commercial Industrial	1,168.95	5.00%	58,447,614
Residence	795.81	8.00%	63,664,540
Bulk Water	189.88	0.50%	949,407

Notes:

Assumed a conservative reduction of per customer category of projected total billed water. Rate change studies have often shown an even greater savings (e.g., Southwest Florida Water Management District study indicated a 13% savings). Conservative savings rates were applied to each category. Providers using Water Budget rate structures have often indicated an even greater savings than just a straight tiered rate type of structure.

Estimated Annual Water Savings	**130.52**	MG/yr
Estimated Savings over Planning Period	**1,305.2**	MG

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours	15	/year
Hourly Cost	$55.00	/hour
Annual Staff Costs	$825.00	
Third Party Costs (Rate study)		/year
Evaluation and Follow-up Costs (Labor/Consultant)		/year
Annual Labor	**$825.00**	/year

Notes:

Annual staff costs includes initial webinar and training on rate study software.

Annual Revenue Lost due to water savings is not incorporated into the Total Cost to Water Provider because these costs are absorbed and included in the rate adjustments to the customers.

Total Cost to Water Provider

Estimated Annual Cost	**$825**	/year
Estimated Total Cost over Planning Period	**$8,250**	
Cost per 1000 Gallons Saved	**$0.01**	

Leak Detection and Repair Program - No Third Party

Currently NWCWD combines customer service staff's analysis of billed water use, maintenance personnel's water line observations, and communication efforts with customer observations to evaluate their system for leaks. Repairs to the system are made as needed.

Planning Period	2018 to 2027	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Annual Estimated Savings Rate	0.50%	
Annual Estimated Non-Revenue Water without Savings	219.77	MG/yr
Estimated Annual Water Savings	**1.10**	MG/yr
Estimated Savings over Planning Period	**11.0**	MG

Notes:

2010 - 2014 average system unaccounted leakage/loss rate was 6.9%.

Savings equals the current projected water usage of non-revenue water multiplied by the estimated savings rate.

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours	40	/year
Hourly Cost	$55.00	/hour
Annual Staff Costs	$2,200.00	
Third Party Costs (Leak Detection Consult)		/year
Evaluation and Follow-up Costs (Labor/Consultant)		/year
Annual Labor	**$2,200.00**	/year

Notes:

Estimated Annual Cost	**$2,200**	/year
Estimated Total Cost over Planning Period	**$22,000**	
Cost per 1000 Gallons Saved	**$2.00**	

Leak Detection and Repair Program

The District is interested in investigating whether an outside consultant (e.g., American Leak Detection) would offer enough benefit to offset the costs.

Planning Period	2018 to 2027	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Annual Estimated Savings Rate	5.00%	
Annual Estimated Non-Revenue Water without Savings	219.77	MG/yr
Estimated Annual Water Savings	**10.99**	MG/yr
Estimated Savings over Planning Period	**109.9**	MG

Notes:

2010 - 2014 average system unaccounted leakage/loss rate was 6.9%.

Savings equals the current projected water usage of non-revenue water multiplied by the estimated savings rate.

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours	80	/year
Hourly Cost	$55.00	/hour
Annual Staff Costs	$4,400.00	
Third Party Costs (Leak Detection Consult)	$10,000.00	/year
Evaluation and Follow-up Costs (Labor/Consultant)		/year
Annual Labor	**$14,400.00**	/year

Notes:

Third Party Costs include leak survey performed annually by a consultant.

Annual staff costs include coordination with consultants.

Estimated Annual Cost	**$14,400**	/year
Estimated Total Cost over Planning Period	**$144,000**	
Cost per 1000 Gallons Saved	**$1.31**	

Recycling Water Treatment Plant Filter Backwash

NWCWD anticipates 95% of the backwash at the Soldier Canyon Filter Plant will be able to be recycled back into the treatment process.

Planning Period	2018 to 2027
Years in Planning Period	10
Program Length	10

Estimated Water Savings

Planning Period Savings Rate	1.7%	
Annual Estimated Total Raw Water without Savings	3,517.23	MG/yr
Estimated Annual Water Savings	**59.1**	MG/yr
Estimated Savings over Planning Period	**591**	MG

Notes:

Estimated amount of water saved from backwashes being recycled: 1.7%. Data based on previous data from SCFP.

Savings equals the current projected water usage of non-revenue water multiplied by the estimated savings rate.

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours	5	/year
Hourly Cost	$55.00	/hour
Annual Labor	$275.00	

Notes:

Very little additional labor costs are associated with WTP Filter Backwash. No revenue is lost due to water savings since measure is performed prior to meters.

Estimated Annual Cost	**$275.00**	/year
Estimated Total Cost over Planning Period Including Set-up	**$2,750.00**	
Cost per 1000 Gallons Saved	**$0.01**	

Master Plans/Water Supply Plans

NWCWD plans to continue developing, updating, and evaluating plans (i.e. Master Plans, Water Efficiency Plans, etc.) that will improve its overall water efficiency and help plan for future use.

Planning Period	2018 to 2027	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Annual Estimated Savings Rate	0.50%

Notes:

This measure has the potential to improve all categories. A conservative reduction of 0.5% of projected annual water use was assumed.

Category	**Avg. Annual Water Use over Planning Period** (MG)	***Estimated Annual Water Savings*** *(gal/yr)*
Non-Revenue	240.49	1,202,440
Wholesale-NonMuni	149.16	745,823
Commercial Industrial	1,168.95	5,844,761
Residence	795.81	3,979,034
Bulk Water	189.88	949,407

Estimated Annual Water Savings	**12.72**	MG/yr
Estimated Savings over Planning Period	**127.2**	MG

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours	90	/year
Hourly Cost	$55.00	/hour
Annual Staff Costs	$4,950.00	
Third Party Costs	$14,000.00	/year
Evaluation and Follow-up Costs		/year
Annual Labor	**$18,950.00**	/year

Notes:

Estimated staff costs for Staff to spend an average of 90 hours per year at $55.00/hour to help develop the various Plans for the District.

Water Rates

Rate Category	Current Rates (per 1,000 gals)
Weighted average of customer rates	$3.05

Notes:

The annual revenue loss was estimated based on a weighted average of current rates for all NWCWD customers.

Estimated Revenue assumes that the current rates will not change significantly over the planning period.

Estimated Average Annual Revenue without Water Savings	$9,616,366	/year
Estimated Average Annual Revenue with Water Savings	$9,568,284	/year
Estimated Annual Revenue Loss Related to Water Savings	**$48,082**	/year

Estimated Annual Cost	**$67,032**	/year
Estimated Cost over Planning Period not including Lost Revenue	**$189,500**	
Estimated Total Cost over Planning Period Including Set-up and Lost Revenue	**$670,318**	
Cost per 1000 Gallons Saved	**$5.27**	

Slow the Flow Residential Irrigation Audits

The District would like to potentially partner for this activity with the Town of Windsor and/or other communities within their boundaries. Resource Central (ReCen) offers multiple programs including Slow the Flow sprinkler consultations for NWCWD's residential customers. "The service usually takes 90 minutes and involves a visual inspection, data collection, and in-depth evaluation. The consultant will deliver a clear and actionable list of suggestions to reduce water use and runoff at each property, while keeping landscapes and lawns healthy." -ReCen

Planning Period	2018 to 2027	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Annual Estimated Savings Rate	5%

Customer Category	Avg. Annual Outdoor Water Use Over the Planning Period (gal/tap)	*Estimated Annual Water Savings (gal/tap/yr)*	*Annual Program Participants (taps)*
Residence	71,299	3,565	25

Estimated Annual Water Savings	**0.089**	MG/yr
Estimated Savings over Planning Period	**4.9**	MG

Notes:

The outdoor use estimates are based on the following approximations for each customer category: Commercial Industrial = 7%, Residence = 47%.

Assumed a conservative estimate of 5% savings of projected outdoor water usage . Customers have to put Auditor's advice and suggestions into practice.

Program Participants based on other water providers' participation rates for similar numbers of people. Dual System customers are assumed to be much less likely to participate in audits.

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours	18.75	/year
Hourly Cost	$55	/hour
Annual Labor	**$1,031**	/year
Third Party Costs		
Audit Cost	$114	
Number of Participants	25	/year
Annual Cost	**$2,850**	/year

Notes:

Costs include staff time for implementing (approximately 45 min. per participant). Program is largely organized by ReCen .

Third Party Costs include ReCen's time. Residential audits = $114/audit

Water Rates

Rate Category	Current Rates (per 1,000 gals)
Residence	*3.20*

Note:

The annual revenue loss was estimated based on current rates for the listed District customer categories.

Estimated Revenue assumes that the current rates will not change significantly over the planning period.

Estimated Average Annual Revenue without Water Savings	$31,372	/year
Estimated Average Annual Revenue with Water Savings	$29,803	/year
Annual Revenue Loss Related to Water Savings	**$1,569**	/year

Estimated Annual Cost	**$5,450**	/year
Estimated Cost over Planning Period not including Lost Revenue	**$38,813**	
Estimated Total Cost over Planning Period Including Set-up and Lost Revenue	**$54,498**	
Cost per 1000 Gallons Saved	**$11.12**	

Indoor Residential Water Audits

This would be another activity that NWCWD is hoping to eventually partner with other communities. Resource Central (ReSen) also offers indoor water audits (w/ low-flow shower-heads and faucet aerators) "Slow the Flow offers consultations on residential water use and suggests simple measures to increase water use efficiency in the home. During the session the consultant will measure outputs from faucets, toilets, and shower-heads, and perform a cost/benefit analysis on fixture replacement options. He/She may also install low-flow shower-heads and faucet aerators at no cost. The consultation will leave the home owner with a customized list of recommendations for increasing efficient water use." -ReCen

Planning Period	2018 to 2027	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Annual Estimated Savings Rate	5%

Customer Category	**Avg. Annual Indoor Water Use Over the Planning Period** (gal/tap)	***Estimated Annual Water Savings*** *(gal/tap/yr)*	***Annual Program Participants*** *(taps)*
Residence	77,550	3,877	20

Estimated Annual Water Savings	**0.078**	MG/yr
Estimated Savings over Planning Period	**4.27**	MG

Notes:

The indoor use estimates are based on the following approximations for each customer category: Commercial Industrial = 92%, Residence = 52%.

Assumed a conservative estimate of 5% savings of projected indoor water usage . Customers have to put Auditor's advice and suggestions into practice. Shower heads and aerators will be installed by ReCen.

Program Participants based on other water providers' participation rates for similar numbers of people. Indoor audits tend to be less popular than outdoor audits.

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours	15	/year
Hourly Cost	$55	/hour
Annual Staff Costs	$825	
Third Party Costs		/year
Evaluation and Follow-up Costs		/year
Annual Labor	**$825**	/year

Third Party Costs		
Audit Costs	$90	
Number of Participants	20	/year
Annual Third Party Cost	**$1,800**	/year

Notes:

Costs include staff time for implementing (approximately 45 min. per participant). Program is largely organized by ReCen

Third Party Costs are incorporated into audit costs charged by ReCen.

Residential audits = $90/audit

Water Rates

Rate Category	Current Rates (per 1,000 gals)
Residence	*3.20*

Note:

The annual revenue loss was estimated based on current rates for the listed District customer categories.

Estimated Revenue assumes that the current rates will not change significantly over the planning period.

Estimated Average Annual Revenue without Water Savings	$27,298	/year
Estimated Average Annual Revenue with Water Savings	$25,933	/year
Annual Revenue Loss Related to Water Savings	**$1,365**	/year

Estimated Annual Cost	**$3,990**	/year
Estimated Cost over Planning Period not including Lost Revenue	**$26,250**	
Estimated Total Cost over Planning Period Including Set-up and Lost Revenue	**$39,899**	
Cost per 1000 Gallons Saved	**$9.35**	

Residential and Commercial Ultra High-Efficiency Toilet Upgrade Service or High-Efficiency Toilet Rebate Program

NWCWD hopes to potentially partner with other communities to participate in the Ultra High-Efficiency Toilet Upgrade Service offered by ReCen where participants can "Save thousands of gallons of water per year with the breakthrough technology of the Niagara Stealth Toilet." -ReCen. If NWCWD does not participate in the ReCen program, then the District will partner with Windsor to offer rebates instead of the high efficiency toilet replacements. Number of participants is estimated to be approximately the same.

Planning Period	2018 to 2027	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Annual Estimated Percent Savings: **10%**

Annual Estimated Water Use Per Tap without Savings

Customer Category	**Avg. Annual Indoor Water Use Over the Planning Period** (gal/tap)	***Estimated Annual Water Savings*** *(gal/tap/yr)*	***Annual Program Participants*** *(taps)*
Commercial Industrial	2,824,025	282,403	5
Residence	77,550	7,755	10

Estimated Annual Water Savings	**1.49**	MG/yr
Estimated Savings over Planning Period	**81.93**	MG

Notes:

The indoor use estimates are based on the following approximations for each customer category: Commercial Industrial = 92%, Residence = 52%.

Upgrade service available through ReCen.

Savings based on Toilet Rebate program data provided by other water providers. Number of participants were adjusted to fit the population and demographics. ReCen has a minimum number of 30 toilets. After the data was filtered, calculated savings came to 10% for the Cost/Benefit analysis.

Estimated Savings over Planning Period is calculated by compounding the estimated annual water savings per the total number of participants for each given year. As more participants utilize the replacements or rebates, more savings is realized.

Costs

Total Cost to Water Provider

Labor Costs

Staff Hours	**11.25**	/year
Hourly Cost	$55.00	/hour
Annual Labor	$618.75	/year

Rebates

Rebate Cost	$190.00	
Number of Participants	15	/year
Annual Rebate Cost	**$2,850.00**	

Notes:

Annual staff time is estimated at approximately 45 min. per participant. This time includes water savings tracking.

Minimum participation is 30 toilets at $5,700. Additional toilets are $190 a piece. Costs for a rebate program may be lower, but savings is also likely to be lower.

Water Rates

Rate Category	Current Rates (per 1,000 gals)
Commercial Industrial	*3.20*
Residence	*3.20*

Notes:

The annual revenue loss was estimated based on current rates for the listed customer categories.

Estimated Revenue assumes that the current rates will not change significantly over the planning period.

Estimated Average Annual Revenue without Water Savings	$262,163	/year
Estimated Average Annual Revenue with Water Savings	$235,947	/year
Annual Revenue Loss Related to Water Savings	**$26,216**	/year

Estimated Annual Cost	**$29,685**	/year
Estimated Cost over Planning Period not including Lost Revenue	**$34,688**	
Estimated Total Cost over Planning Period Including Set-up and Lost Revenue	**$296,850**	
Cost per 1000 Gallons Saved	**$3.62**	

High Efficiency Clothes Washer Rebate

This is another activity where NWCWD sees value in partnering with Windsor and/or the other communities within their boundaries. The hope would be to offer rebates to customers for High-Efficiency Clothes Washers.

Planning Period	2018 to 2027	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Annual Estimated Residential Water Use Per Tap without Savings

Notes:

Customer Category	Avg. Annual Indoor Water Use Over the Planning Period (gal/tap)	*Estimated Annual Water Savings (gal/tap/yr)*	*Annual Program Participants (taps)*
Commercial Industrial	2,824,025	1,714	*1*
Residence	77,550	1,714	*10*

Residential Annual Use	1,688,255	gallons/tap/yr
Total	1,688,255	gallons/tap/yr
People per Household (tap)	2.90	
Laundry loads per tap per week	5.05	
Estimated savings per rebate	1,714	gallons/yr
Gallons Saved per Household per Year	1,714	gallons/yr
Annual Program Participants	11	/yr
Estimated Annual Water Savings	**0.02**	MG/yr
Estimated Savings over Planning Period	**1.04**	MG

Notes:

Savings based on other water providers' results (0.25 loads per person per day) and on Amy Vickers' "Handbook for Water Use and Conservation" . Vicker's savings based on 0.37 loads per person per day.

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours	8.25	/year
Hourly Cost	$55.00	/hour
Annual Staff Costs	$453.75	
Evaluation and Follow up Costs	$0.00	/year
Annual Labor	**$453.75**	/year
Rebates		
Rebate Cost	$100.00	
Number of Participants	11	/year
Annual Rebate Cost	**$1,100.00**	

Notes:

Estimated annual staff time is estimated at approximately 45 minutes per participant. This time includes water savings tracking.

Rebates offered to customers: 1 per household for $100.

Water Rates

Rate Category	Current Rates (per 1,000 gals)
Commercial Industrial	*3.20*
Residence	*3.20*

Notes:

Estimated Revenue assumes that the current rates will not change significantly over the planning period.

Estimated Average Annual Revenue without Water Savings	$49,703	/year
Estimated Average Annual Revenue with Water Savings	$49,673	/year
Annual Revenue Loss Related to Water Savings	**$30**	/year

Estimated Annual Cost	**$1,584**	/year
Estimated Cost over Planning Period not including Lost Revenue	**$15,538**	
Estimated Total Cost over Planning Period Including Set-up and Lost Revenue	**$15,839**	
Cost per 1000 Gallons Saved	**$15.27**	

Giveaways: Residential Water Audit Kits

Self-guided residential water audit kits are designed with the following items: Dye tablets (for leak detection), a kitchen and bathroom faucet pressure reducer, and a toilet displacement device that doubles as a showerhead flow meter. Showerheads are also available upon request. The guidance offered in the instructions could lead the customer to take part in other conservation programs offered like Garden in a Box.

Planning Period	2018 to 2027	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Annual Estimated Savings Rate	0.25%

	Avg. Annual Indoor Water Use Over the Planning Period (gal/tap)	***Estimated Annual Water Savings*** *(gal/tap/yr)*	***Annual Program Participants*** *(taps)*
Residence	77,550	194	25

Estimated Annual Water Savings	**0.00**	MG/yr
Estimated Savings over Planning Period	**0.27**	MG

Notes:

Estimated Savings over Planning Period is calculated by compounding the estimated annual water savings per the total number of participants for each given year. Estimated Water Use is based on the forecasted annual indoor water use since most of the audit kit contents are related to indoor savings efforts.

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours (Website updates, etc.)	6.25	/year
Hourly Cost	$55.00	/hour
Annual Labor	**$343.75**	/year

Giveaways per Year		
Giveaway Kits per Year	**25**	/year
Materials Cost	**$25.00**	/year

Notes:

Staff Hours are estimated at 15 minutes per kit or participant. Residential water conservation kits are available at wholesalers like AM Conservation Group, Inc. (www.amconservationgroup.com) for $1. NWCWD currently has a backstock of existing items, so this measure would not include ordering more kits.

Water Rates

Rate Category	Current Rates (per 1,000 gals)
Commercial Industrial	*3.20*
Residence	*3.20*

Notes:

The annual revenue loss was estimated based on current rates for listed Town customers.

Estimated revenue assumes that the current rates will not change over the planning period.

Estimated Average Annual Revenue without Water Savings	$34,122	/year
Estimated Average Annual Revenue with Water Savings	$34,037	/year
Annual Revenue Loss Related to Water Savings	**$85**	/year

Estimated Annual Cost	**$454**	/year
Estimated Cost over Planning Period not including Lost Revenue	**$3,688**	
Estimated Total Cost over Planning Period Including Set-up and Lost Revenue	**$4,541**	
Cost per 1000 Gallons Saved	**$17.03**	

Giveaways: Residential Water Audit Kits - New

Self-guided residential water audit kits are designed with the following items: Dye tablets (for leak detection), a kitchen and bathroom faucet pressure reducer, and a toilet displacement device that doubles as a showerhead flow meter. Showerheads are also available upon request. The guidance offered in the instructions could lead the customer to take part in other conservation programs offered, including rebates, Garden in a Box, or Outdoor Water Audits.

Planning Period	2018 to 2027	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Annual Estimated Savings Rate	1.00%

	Avg. Annual Indoor Water Use Over the Planning Period (gal/tap)	***Estimated Annual Water Savings*** *(gal/tap/yr)*	***Annual Program Participants*** *(taps)*
Residence	77,550	775	200

Estimated Annual Water Savings	**0.16**	MG/yr
Estimated Savings over Planning Period	**8.53**	MG

Notes:

Estimated Savings over Planning Period is calculated by compounding the estimated annual water savings per the total number of participants for each given year. Estimated Water Use is based on the forecasted annual indoor water use since most of the audit kit contents are related to indoor savings efforts.

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours (Website updates, etc.)	50	/year
Hourly Cost	$55.00	/hour
Annual Labor	**$2,750.00**	/year

Giveaways per Year		
Giveaway Kits per Year	**200**	/year
Materials Cost	**$3,458.00**	/year

Notes:

Staff Hours are estimated at 15 minutes per kit or participant. Residential water conservation kits are available at wholesalers like AM Conservation Group, Inc. (www.amconservationgroup.com) for $17.29 per unit for a bulk purchase of kits. Kits are customized to include NWCWD's logo.

Water Rates

Rate Category	Current Rates (per 1,000 gals)
Commercial Industrial	*3.20*
Residence	*3.20*

Notes:

The annual revenue loss was estimated based on current rates for listed Town customers.

Estimated revenue assumes that the current rates will not change over the planning period.

Estimated Average Annual Revenue without Water Savings	$272,975	/year
Estimated Average Annual Revenue with Water Savings	$270,245	/year
Annual Revenue Loss Related to Water Savings	**$2,730**	/year

Estimated Annual Cost	**$8,938**	/year
Estimated Cost over Planning Period not including Lost Revenue	**$62,080**	
Estimated Total Cost over Planning Period Including Set-up and Lost Revenue	**$89,378**	
Cost per 1000 Gallons Saved	**$10.48**	

Smart Watering Guidelines

NWCWD does not have specific restrictions. However, the District has posted Smart Watering Guidelines on their website that have several suggestions including time of day, windy weather, frequency, and soil amendments.

Planning Period	2018 to 2027	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Annual Estimated Savings Rate	0.10%	

Notes:

Outdoor use is estimated at a weighted average of approximately 12% for the listed categories.

A conservative estimate of 0.1% savings of projected outdoor water usage was assumed.

Customer Category	Avg. Annual Outdoor Water Use Over the Planning Period (MG)	*Estimated Annual Water Savings (gal/yr)*
Commercial Industrial	77.70	77,695
Residence	348.35	348,348

Estimated Annual Water Savings	**0.4**	MG/yr
Estimated Savings over Planning Period	**4.3**	MG

Costs

Total Cost to Water Provider

Labor Costs

Staff Hours	0	/year
Hourly Cost	$55.00	/hour
Annual Staff Costs	$0.00	
Annual Labor	**$0.00**	/year

Notes:

Since webpage is in place, no Staff Hours are estimated for this existing measure.

Water Rates

Rate Category	Current Rates (per 1,000 gals)
Commercial Industrial	*3.20*
Residence	*3.20*

Notes:

The annual revenue loss was estimated based on current weighted rates for listed customer categories

Estimated Revenue assumes that the current rates will not change significantly over the planning period.

Estimated Average Annual Revenue without Water Savings	$1,289,933	/year
Estimated Average Annual Revenue with Water Savings	$1,288,643	/year
Annual Revenue Loss Related to Water Savings	**$1,290**	/year

Estimated Annual Cost	**$1,290**	/year
Estimated Cost over Planning Period not including Lost Revenue	**$0**	
Estimated Total Cost over Planning Period Including Set-up and Lost Revenue	**$12,899**	
Cost per 1000 Gallons Saved	**$3.03**	

Educational Activities

Analysis of costs and benefits for educational activities are combined as shown below. Activities include Bill Stuffers, Newsletter, Newspaper Articles, Mass Mailings, Water Efficiency Page on NWCWD's website, and Social Media (Facebook and Twitter). NWCWD is also active in the community with outreach efforts like Water Fairs and Classroom Education.

Planning Period	2018 to 2027	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Customer Category	Avg. Annual Water Use over Planning Period (MG)	Estimated Annual Savings Rate	*Estimated Annual Water Savings (gal/yr)*
Wholesale-NonMuni	136.31	1.0%	1,363,116
Commercial Industrial	1,068.23	1.0%	10,682,271
Residence	727.23	3.5%	25,453,205
Bulk Water	173.52	0.1%	173,520

Estimated Annual Water Savings	37.7	MG/yr
Estimated Savings over Planning Period	**377**	MG

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours	177	/year
Hourly Cost	$55.00	/hour
Annual Labor	**$9,711.17**	/year
Materials Costs		
Unit Cost (cost of Bill Stuffers)	$0.25	/participant
Avg. Number of Participants (receiving bill stuffers) over Planning Period	5,297	/year
Annual Materials	**$1,324.25**	/year

Notes:

Staff hours include time spent preparing newsletter, updating website, and preparing bill stuffers.

In 2014 there were 4261 active tap accounts. The average affected number of taps during the planning period is projected to be 5297.

Water Rates

Rate Category	Current Rates (per 1,000 gals)
Wholesale-Muni	$3.20
Wholesale-NonMuni	$3.20
Commercial Industrial	$3.20
Residence	$3.20
Bulk Water	$3.20

Notes:

The annual revenue loss was estimated based on current rates for all District customers and assumes rates will not change significantly over the planning period.

Estimated Average Annual Revenue without Water Savings	$6,736,937	/year
Estimated Average Annual Revenue with Water Savings	$6,616,387	/year
Estimated Annual Revenue Loss Related to Water Savings	**$120,551**	/year

Estimated Annual Cost	**$131,586**	/year
Estimated Cost over Planning Period not including Lost Revenue	**$110,354**	
Estimated Total Cost over Planning Period Including Lost Revenue	**$1,315,861.73**	
Cost per 1000 Gallons Saved	**$3.49**	

Xeriscape Demonstration Garden

Maintaining a xeriscape demonstration garden is an excellent way to educate the public to the water savings and beauty available from xeriscaping. NWCWD is considering partnering with Boy Scouts or another organization to design and maintain a xeriscape demonstration garden at their main office. The District also has links and pictures to other nearby xeriscape gardens; for example since 2008 Windsor has volunteers that maintain the Treasure Island Xeriscape Garden that can be seen along the Poudre River Trail Corridor multiuse trail.

Planning Period	2018 to 2027	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Annual Estimated Savings Rate	0.25%

Customer Category	Avg. Annual Outdoor Water Use Over the Planning Period (gal/tap)	*Estimated Annual Water Savings (gal/tap/yr)*	*Annual Program Participants (taps)*
Commercial Industrial	221,511	554	15
Residence	71,299	178	85

Estimated Annual Water Savings	**0.02**	MG/yr
Estimated Savings over Planning Period	**1.3**	MG

Notes:

This measure affects projected outdoor water usage for the listed Customer Categories. Other customer categories may also benefit, but participation would be considerably less given the demographics or the very small percentage of customers within those categories.

It is estimated that approximately 22% of total customer use is outdoor use.

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours	8	/year
Hourly Cost	$55.00	/hour
Annual Staff Costs	$458.33	
Third Party Costs	$1,000.00	/year
Evaluation and Follow-up Costs (Labor/Consultant)	$0.00	/year
Annual Labor	**$1,458.33**	/year
Materials Costs		
Annual Materials Budget	$500	/year
Annual Materials	**$500.00**	/year

Notes:

Relatively little Staff time is estimated per participant. Cost is for garden, installation, plants, planting materials, and on-going maintenance. Much of the garden is run through volunteer efforts and donations.

Water Rates

Rate Category	Current Rates (per 1,000 gals)
Commercial Industrial	$3.20
Residence	$3.20

Notes:

The annual revenue loss was estimated based on current rates for all Town customers and assumes rates will not change significantly over the planning period.

Estimated Average Annual Revenue without Water Savings	$165,143	/year
Estimated Average Annual Revenue with Water Savings	$164,730	/year
Annual Revenue Loss Related to Water Savings	**$413**	/year

Estimated Annual Cost	**$2,371.19**	/year
Estimated Cost over Planning Period not including Lost Revenue	**$19,583.33**	
Estimated Total Cost over Planning Period Including Set-up and Lost Revenue	**$23,711.90**	
Cost per 1000 Gallons Saved	**$18.38**	

Landscape Design (Xeriscape) and Maintenance Classes

Classes have been traditionally conducted at Windsor's Treasure Island Xeriscape Demonstration Garden. The classes provide a number of venues in which participants can learn more about xeriscaping as well as other gardening techniques. The District could advertise the classes and post the times and dates when the events will be taking place.

Planning Period	2018 to 2027	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Annual Estimated Savings Rate	0.25%

Customer Category	Avg. Annual Outdoor Water Use Over the Planning Period (gal/tap)	*Estimated Annual Water Savings (gal/tap/yr)*	*Annual Program Participants (taps)*
Commercial Industrial	221,510.9	554	2
Residence	71,299.3	178	8

Estimated Annual Water Savings	**0.003**	MG/yr
Estimated Savings over Planning Period	**0.1**	MG

Notes:

Similar to the Demonstration Garden itself, this measure affects projected outdoor water usage for the listed Customer Categories. Other customer categories may also benefit, but participation would be considerably less given the demographics or the very small percentage of customers within those categories.
It is estimated that approximately 40% of total customer use is outdoor use.

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours	2.5	/year
Hourly Cost	$55.00	/hour
Annual Staff Costs	$137.50	
Third Party Costs	$100.00	/year
Evaluation and Follow-up Costs (Labor/Consultant)	$0.00	/year
Annual Labor	**$237.50**	/year
Materials Costs		
Annual Materials Budget	$100	/year
Annual Materials	**$100.00**	/year

Notes:

Staff time is estimated at approximately 1/4 hour per participant for scheduling and coordination. Much of the garden is run through volunteer efforts including the classes.

Water Rates

Rate Category	Current Rates (per 1,000 gals)
Commercial Industrial	$3.20
Residence	$3.20

Notes:

The annual revenue loss was estimated based on current rates for all District customers and assumes rates will not change significantly over the planning period.

Estimated Average Annual Revenue without Water Savings	$17,836	/year
Estimated Average Annual Revenue with Water Savings	$17,792	/year
Annual Revenue Loss Related to Water Savings	**$45**	/year

Estimated Annual Cost	**$382**	/year
Estimated Cost over Planning Period not including Lost Revenue	**$3,375**	
Estimated Total Cost over Planning Period Including Set-up and Lost Revenue	**$3,821**	
Cost per 1000 Gallons Saved	**$27.42**	

Garden in a Box

This is another activity in which the District would hope to partner with the Town of Windsor. Each year ReCen offers an array of do it yourself Xeric garden kits, created by professional landscape designers for sun, shade, and everything in between. These plant by number gardens can have a significant conservation impact and are perfect for anyone who wants to beautify their yard while using less water than standard turf.

Planning Period	2018 to 2027	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Annual Estimated Savings Rate	25%	[1]

Customer Category	Avg. Annual Outdoor Water Use Over the Planning Period (gal/tap)	*Estimated Annual Water Savings (gal/tap/yr)*	*Annual Program Participants (taps)*
Commercial Industrial	221,510.9	374	1
Residence	71,299.3	374	4

Estimated Annual Water Savings	**0.00**	MG/yr
Estimated Savings over Planning Period	**0.1**	MG

Notes:

[1] The "Annual Estimated Saving Rate" represents a 25% savings of water for the turf area replaced with the Garden in the Box plants and not a 25% savings overall.

Similar to the Demonstration Gardens themselves, this measure affects projected outdoor water usage for the listed Customer Categories. Other customer categories may also benefit, but participation would be considerably less given the demographics or the very small percentage of customers within those categories.

It is estimated that approximately 40% of total customer use is outdoor use. Each garden is estimated to use up to 60% less water than the same area of turf, but irrigation systems need to be adjusted for benefit to be realized. A garden typically covers 100 sq ft. Assumption was made that same area of turf will be replaced with same area of xeriscaping. Irrigation requirements = approximately two AF/acre for turf = 748 gal/garden saving. This estimate was cut in half due to other potential problems.

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours	2.5	/year
Hourly Cost	$55.00	/hour
Annual Staff Costs	$137.50	
Third Party Costs		/year
Evaluation and Follow-up Costs (Labor/Consultant)	$0.00	/year
Annual Labor	**$137.50**	/year

Notes:

Staff cost include approximately 1/4 hour per participant. ReCen offers end consumers a discount through the water provider.

Materials Costs		
Associated Costs	$65.00	/garden
Number of Participants	5	/year
Annual Materials	**$325.00**	/year

CReSC's price is $4,370 for 80 gardens. An assumed 20% mark-up was made for smaller quantity.

Water Rates

Rate Category	Current Rates (per 1,000 gals)
Commercial Industrial	$3.20
Residence	$3.20

Notes:

The annual revenue loss was estimated based on current rates for all Town customers and assumes rates will not change significantly over the planning period.

Estimated Average Annual Revenue without Water Savings	$8,918	/year
Estimated Average Annual Revenue with Water Savings	$8,918	/year
Annual Revenue Loss Related to Water Savings	**$0**	/year

Estimated Annual Cost	**$463**	/year
Estimated Cost over Planning Period not including Lost Revenue	**$4,625**	
Estimated Total Cost over Planning Period Including Set-up and Lost Revenue	**$4,625**	
Cost per 1000 Gallons Saved	**$44.97**	

APPENDIX E

NWCWD Supplementary Documents

Table E1: NWCWD Rates and Fees

Water Rates: Monthly and Annually based on Usage Classification of Meter

Basic Monthly Water Fees: 0 to 6,000 gallons = $19.20 Minimum 6,000 gallons and up = $3.20 Per 1,000 Gal (Kgal)

Surcharge will be assessed when an account's year to date usage exceeds the Water and/or Plant Investment Allotment. See Below for Rates.

Equivalent Usage per month			9,500	14,250	19,000	38,000	47,500	52,250	57,000	76,000

	Monthly Rate		Annual Rate Structure per Kgal							
Usage Classification	**0-6 Kgal**	**6 Kgal +**	**0**	**114,000**	**171,000**	**228,000**	**456,000**	**570,000**	**627,000**	**684,000**	**912,000**
Standard - Full	$19.20	$3.20/Kgal		$3.20			$9.15 (3.20+2.00+3.95)				$7.15 (3.20+2.00+1.95)
Standard - 75%	$19.20	$3.20/Kgal		$3.20			$9.15 (3.20+2.00+3.95)			$7.15 (3.20+2.00+1.95)	
Standard - 50%	$19.20	$3.20/Kgal		$3.20		$9.15 (3.20+2.00+3.95)			$7.15 (3.20+2.00+1.95)		
Conservation Blue	$19.20	$3.20/Kgal		$7.15 (3.20+3.95)			$9.15 (3.20+2.00+3.95)	$7.15 (3.20+2.00+1.95)			
Conservation Blue - 75%	$19.20	$3.20/Kgal		$7.15 (3.20+3.95)		$9.15 (3.20+2.00+3.95)		$7.15 (3.20+2.00+1.95)			
Conservation Blue - 50%	$19.20	$3.20/Kgal		$7.15 (3.20+3.95)	$9.15 (3.20+2.00+3.95)			$7.15 (3.20+2.00+1.95)			

One Full Allocation equals 228,000 Gallons **One 75% Allocation equals 171,000 Gallons** **One 50% Allocation equals 114,000 Gallons**

A tap may be allotted more than 1 unit of Water and/or Plant Investment. In this case the allotment is the class X 228,000 gallons = Annual Allocation (i.e. Water Allocation 5 x 228,000 = 1,140,000 gallons Annual Allocation)

Allotment: The Water and Plant Investment allotment for a standard tap is 228,000 gallons per year or 70% of 1 Acre Foot. The allotment on your account may vary due to additional purchases, transfers, or possible Plant Investment grandfathering. Please contact our office to discuss your individual account.

Rate Differential: ** Effective November 1, 2015, the District no longer accepts water transfers.

The water year runs from November 1st through October 31st.

Surcharge will be assessed when an account's year to date usage exceeds the Water and/or Plant Investment Allotment.

Plant Investment Surcharge

Plant Investment Surcharge will be assessed when an account's year to date usage exceeds the Plant Investment Allotment. The transfer of additional water will not remove this charge. Additional Plant Investment Units must be purchased to increase the allotment and reduce the Plant Investment Surcharges. These rates are in addition to the standard monthly usage fee.

Tier 1: 0 to 456,000 gallons above the Plant Investment Allotment $3.95 per 1,000 gallons (Kgal)

Tier 2: More than 456,000 gallons above the Plant Investment Allotment $1.95 per Kgal

Water Surcharge

Water Surcharge will be assessed when an account's year to date usage exceeds the annual water allotment. Currently, the surcharge is $2.00 per Kgal in addition to the standard monthly usage fee. This fee is to recover the District's cost to obtain additional water rights for delivery.

Surcharge Credit Annual Program

The amount paid in Plant Investment Surcharge or Water Surcharge can be used as a credit towards the purchase of additional Water or Plant Investment allocation(s), respectively, from November 1st to March 1st following the water year. This program is only valid for the current water year and does not allow carryover.

Contact the office for the amount of surcharge you paid and what would be owed for the allocation increase.

APPENDIX F

Public Comments and Response

Account #: FTC-006300

FORT·COLLINS
COLORADOAN

Invoice Text

NORTH WELD COUNTY WATER DISTRICT NOTICE OF DRAFT

STATE OF COLORADO)
) ss: AFFIDAVIT OF PUBLICATION
COUNTY OF LARIMER)

NORTH WELD CTY WATER DIST
32825 COUNTY ROAD 39

LUCERNE CO 80646

I, being duly sworn, deposes and says that said is the legal clerk of the Fort Collins Coloradoan; that the same is a daily newspaper of general circulation and printed and published in the City of Fort Collins, in said county and state; that the notice or advertisement, of which the annexed is a true copy, has been published in said daily newspaper and that the notice was published in the regular and entire issue of every number of said newspaper during the period and time of publication of said notice, and in the newspaper proper and not in a supplement thereof; that the publication of said notice was contained in the issue of said newspaper on

02/16/19

that said Fort Collins Coloradoan has been published continuously and uninterruptedly during the period of at least six months next prior to the first publication of said notice or advertisement above referred to; that said newspaper has been admitted to the United States mails as second-class matter under the provisions of the Act of March 3, 1879, or any amendments thereof; and that said newspaper is a daily newspaper duly qualified for publishing legal notices and advertisements within the meaning of the laws of the State of Colorado.

Legal Clerk

Subscribed and sworn to before me, within the County of Brown, State of Wisconsin this 18th of February 2019.

Notary Public

11/9/22

Notary Expires

KAZOUA YANG
NOTARY PUBLIC
STATE OF WISCONSIN

Legal No.0003391708

Affidavit Prepared
Monday, February 18, 2019 9:38 am

NORTH WELD COUNTY WATER DISTRICT
NOTICE OF DRAFT MUNICIPAL WATER EFFICIENCY PLAN

The North Weld County Water District (NWCWD or District) has completed a draft Municipal Water Efficiency Plan Update (Plan). The Plan is designed to promote the efficient consumption of all water usage by residents, businesses, and local governments; the goal of the Plan is to encourage more beneficial use of our water resources and insure a future adequate water supply.

Prior to finalization of the Plan, the District welcomes input from its customers. NWCWD shall have a 60-day public review period beginning the date of this notice, February 13, 2019 through April 14, 2019. A complete copy is on file and available for public inspection at the District's Office, 32825 CR 39, Lucerne, Colorado, during regular business hours. The District will also post the plan on its website at https://nwcwd.org.

All written comments are due to Leann Koons, Operations Manager, prior to April 15, 2019 at:
North Weld County Water District, 32825 CR 39, PO Box 56, Lucerne, CO 80646

3391708
The Coloradoan
Feb 16, 2019

Ad#:0003391708
P O :
# of Affidavits :1

Affidavit of Publication

STATE OF COLORADO

ss.

County of Weld,

I Lucy Montoya

of said County of Weld, being duly sworn, say that I am an advertising clerk of

THE GREELEY TRIBUNE,

that the same is a three days weekly plus Sunday newspaper of general circulation and printed and published in the City of Greeley in said county and state; that the notice or advertisement, of which the annexed is a true copy, has been published in said daily newspaper for consecutive (days): that the notice was published in the regular and entire issue of every number of said newspaper during the period and time of publication of said notice, and in the newspaper proper and not in a supplement thereof; that the first publication of said notice was contained in the

Sixteenth day of February A.D. 2019 and the last publication thereof: in the issue of said newspaper bearing the date of the

Sixteenth day of February A.D. 2019 has been published continuously and uninterruptedly during the period of at least six months next prior to the first issue thereof contained said notice or advertisement above referred to; that said newspaper has been admitted to the United States mails as second-class matter under the provisions of the Act of March 3,1879, or any amendments thereof; and that said newspaper is a daily newspaper duly qualified for publishing legal notices and advertisements within the meaning of the laws of the State of Colorado.

February 16, 2019

Total Charges: $17.16

Lucy Montoya

16th day of February 2019

My Commission Expires 08/13/2022

Vickie G. Garretts

Notary Public

VICKIE G GARRETTS
NOTARY PUBLIC
STATE OF COLORADO
NOTARY ID 20144031754
MY COMMISSION EXPIRES AUGUST 13, 2022

NORTH WELD COUNTY WATER DISTRICT

NOTICE

OF DRAFT MUNICIPAL WATER EFFICIENCY PLAN

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All written comments are due to Leann Koons, Operations Manager, prior to April 15, 2019 at:

North Weld County Water District, 32825 CR 39, PO Box 56, Lucerne, CO 80646

The Tribune
February 16, 2019

APPENDIX G

Colorado Water Conservation Board Cover Letter and Approval