Perry Park Water and Sanitation District

Water Conservation Plan

February 20, 2013

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Section 1: Introduction

1.1 Purpose

The **Perry Park Water and Sanitation District (PPWSD)** developed this water conservation plan to formalize the District's long standing conservation policies into a single document.

Throughout its history, PPWSD has delivered reliable potable water to its commercial, residential, and irrigation water users. PPWSD is committed to sustainable and efficient use of its water resources and has implemented this water conservation plan as a key element of an integrated water resources planning approach. The water conservation plan is also warranted, since water conservation technology has improved to the point that water use efficiency can be planned and implemented more reliably and predictably than at any time in the past.

This water conservation plan identifies recommended water conservation measures and programs that can promote, support and sustain efficient water use by the PPWSD customers.

1.2 Organization

In keeping with that scope of work, this water conservation plan is organized as follows:

1. Introduction
2. Existing system, water sources, and limitations
3. Current water use
4. Pricing structures and existing conservation efforts
5. Identification and screening of proposed conservation measures

Section 2: Existing System, Water Sources, and Limitations

2.1 District Formation

PPWSD is a quasi-municipal corporation and a political subdivision of the State of Colorado. PPWSD was created pursuant to Article 1 of Title 32 C.R.S. for the purpose of providing quality potable water and reliable sanitary sewer services to the PPWSD Customers. The District was formed in 1970.

2.2 Geography and Demographics

The District is located in two primary locations along Highway 105 and Interstate 25 in south central Douglas County, just north and west of the Town of Larkspur. PPWSD is primarily single family residential with some commercial and irrigation use. As of the start of 2011, the District serves 1,330 single family homes and a population of approximately 3,600. The service area is shown in Figure 2-1.

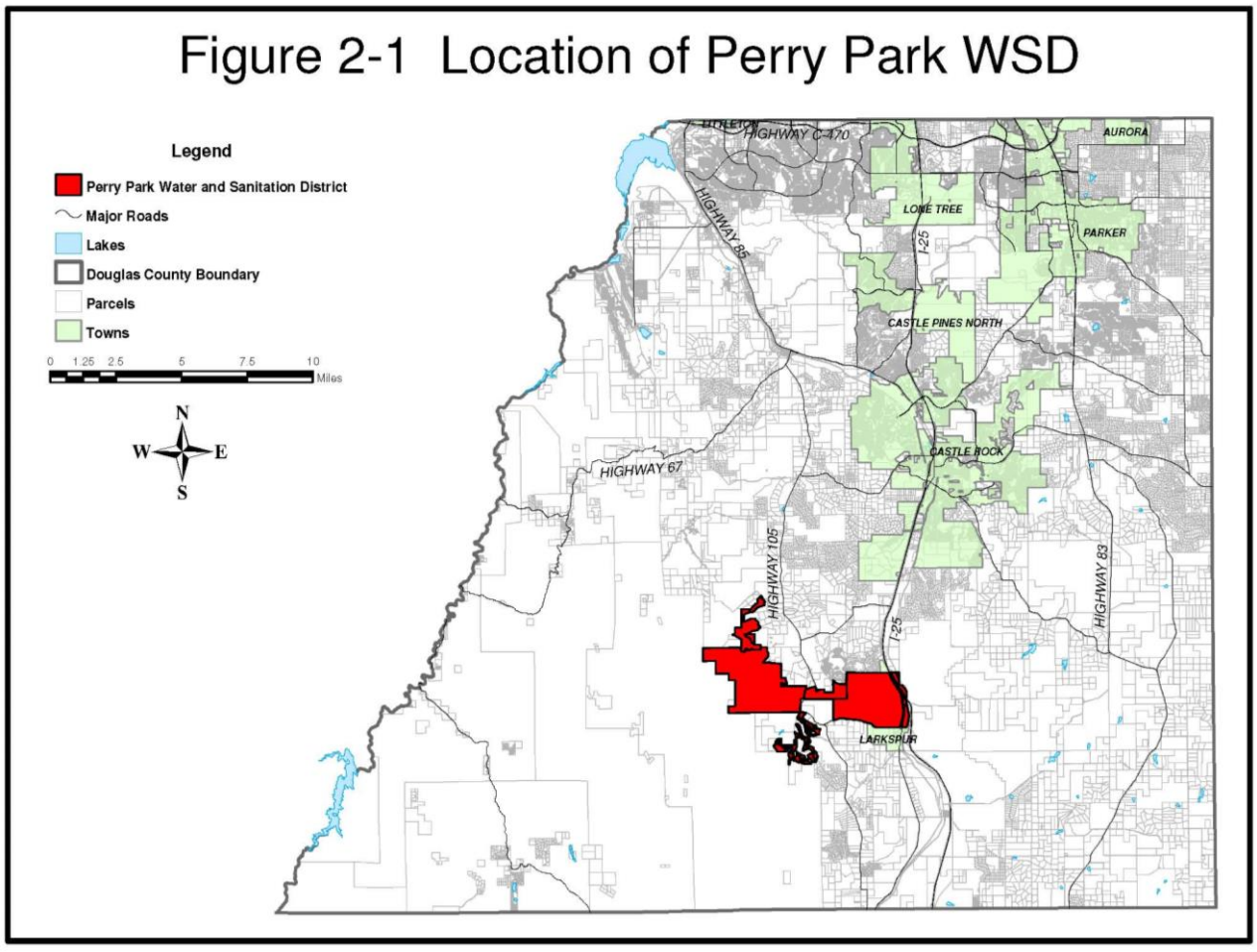

Figure 2-1
Location of PPWSD

2.3 Historical Water System Development

PPWSD is located in an area of limited surface water supplies. Plum Creek, located east of the District, is the largest stream in the area. As the District has grown, however, it has been able to successfully develop a diverse water portfolio that includes both senior and junior surface water rights. The District's use of renewable water is now approaching 50 percent of its annual demand. The District ultimately plans to construct a reservoir to improve reliability and an ability to use its more junior water rights.

The District has also developed groundwater supplies in the Denver Basin formation. Although that water is nonrenewable, it is readily available, drought resistant, can be developed incrementally and needs minimal treatment.

2.3.1 Tributary Wells and Ditches

PPWSD has water rights to several senior ditches, junior ditches and tributary wells. The District's six senior ditches include the Bear Creek Ditch, Plum Creek Ditch, Grant Ditch, Glen Grove Feeder Ditch, Pleasant Park Ditch and Gove Ditch. The District's senior water rights date back to 1867 and comprise a reliable share of the District's supply. PPWSD also has rights to eight tributary wells/junior ditches. In a dry year, those sources may not yield water for the District, and thus are not as reliable a component of the water supply.

2.3.2 Nontributary Groundwater

PPWSD owns several wells and water rights for nontributary groundwater. The District has two Dakota wells and 12 permitted wells in the Denver Basin. The permitted Denver Basin wells include one Dawson, three Denver, six Arapahoe, and two Laramie-Fox Hills wells. Figure 2-2 is an illustrative cross-section of the Denver Basin aquifer formations. Groundwater development to meet PPWSD's water demands has all occurred within the district boundaries. Wells have been and will be drilled incrementally as development occurs.

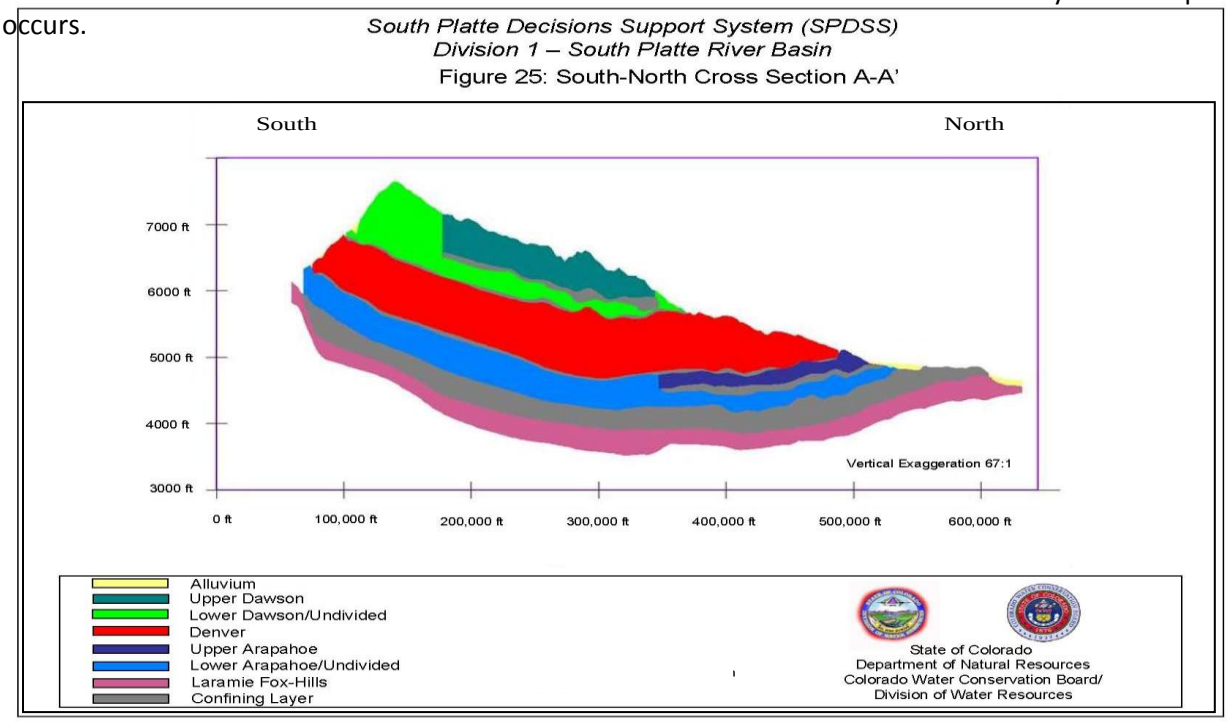

Figure 2-2
Denver Basin Aquifer South-North Cross Section
South Platte Basin
(Source: CWCB South Platte DSS)

2.3.3 Reuse of Wastewater Return Flows

The District collects and treats the service area's wastewater, however 281 single family homes are on septic systems and do not contribute to the District's wastewater influent. Ninety percent of the wastewater effluent is reusable. The District exchanges that return flow for surface water, and does not directly reuse its treated effluent for nonpotable irrigation. Basically, for every 1,000 gallons of water that is returned to the stream from the wastewater treatment plants, an additional 900 gallons of renewable stream water can be used for potable drinking water. This significantly increases the volume of renewable water that the District has available in its renewable water rights portfolio. This allows the District to reduce their reliance on limited ground water supplies, improving their renewable water to ground water consumption ratio.

2.4 Water Sources and Yields

The annual yields of PPWSD's major water sources are summarized in Tables 2-1 and 2-2.

Nontributary Water Supply Source	Aquifer	Annual Yield (Acre Feet per Year (AFY))
In-District Groundwater Wells	Dakota **Well No. 1**	181
In-District Groundwater Wells	Dakota **Well No. 2**	297
In-District Groundwater Wells	Denver **Well No. 3** is a Denver Basin Well	509
In-District Groundwater Wells	Denver **Well No. 5** is a Denver Basin Well	509
In-District Groundwater Wells	Denver **Well No. 6** is a Denver Basin Well	511
In-District Groundwater Wells	**Well No. DA - 3, 5, 6 i**s a Denver Basin Well	416
In-District Groundwater Wells	Sage Port Arapahoe **Well No. #1** is a Denver Basin Well	105
In-District Groundwater Wells	Sage Port Arapahoe **Well No. #2** is a Denver Basin Well	295
In-District Groundwater Wells	Sage Port Arapahoe **Well No. #4** is a Denver Basin Well	320
In-District Groundwater Wells	**Well No. A-3** is a Denver Basin Well	100
In-District Groundwater Wells	**Well No. A-5** is a Denver Basin Well	100
In-District Groundwater Wells	**Well No. A-6** is a Denver Basin Well	101
In-District Groundwater Wells	**Well No. LFH-3** is a Denver Basin Well	285
In-District Groundwater Wells	**Well No. LFH-6** is a Denver Basin Well	285
Total	14 Wells	4014 AFY

Table 2-1
Summary of Major Water Sources – Nontributary Groundwater
Perry Park Water and Sanitation District

Consumptive Use Water Supply Source	Ditch	Annual Yield (AFY)	Comments
Senior Ditch	Bear Creek Ditch	341.2 AFY	These senior water rights constitute a reliable firm yield.
Senior Ditch	Plum Creek Ditch		
Senior Ditch	Gove Ditch		
Senior Ditch	Grant Ditch		
Senior Ditch	Glen Grove Feeder Ditch		
Senior Ditch	Pleasant Park Ditch		
Tributary Well/ Junior Ditch	Glen Grove Feeder Ditch Well	1,600 AFY (Zero in Dry Year) - *1	*1 - Although there is no dry-year yield from these junior water rights, the District is able to draw its return flows from these sources by exchange. This provides a reliable supply equal to 90 percent of its annual nonrenewable supply yield.
Tributary Well/ Junior Ditch	Grant Ditch Well		
Tributary Well/ Junior Ditch	EP-1		
Tributary Well/ Junior Ditch	EP-2		
Tributary Well/ Junior Ditch	EP-3		
Tributary Well/ Junior Ditch	WP-1		
Tributary Well/ Junior Ditch	WP-2		
Tributary Well/ Junior Ditch	BC-1		
Total	6 Senior Ditches, 8 Junior Ditches	1,941.2 AFY	---

Table 2-2
Summary of Major Water Sources- Tributary Wells and Ditches
Perry Park Water and Sanitation District

2.5 Ability to Serve

PPWSD currently relies on its Dakota and Denver Basin wells for approximately 52 percent of its water supply. Improvements to the District's Glen Grove Water Treatment Plant will increase the District's use of renewable water. PPWSD has adequate water supplies for its current needs. However, the District relies on nonrenewable groundwater like many other suppliers throughout the region, identified in the Statewide Water Supply Initiative as a critical water supply area. A summary of system conditions is shown in Table 2-3.

Planning Questions	Yes	No	Comments
Does the system frequently experience shortage of supply emergencies?		x	
Does the system have substantial unaccounted-for and lost water?		x	
Is the system experiencing a high rate of population and/or growth?		x	
Is the system planning substantial improvements or additions?	x		There are no particular limitations to the system; the District will increase its water supply incrementally as development occurs. The District has also purchased a reservoir site and plans to construct a reservoir in the future to make better use of their water.
Are increases to wastewater system capacity anticipated within the planning horizon?		x	

Table 2-3
Summary of System Conditions
Perry Park Water and Sanitation District

2.6 System Limitations

The District has no particular system limitations.

Section 3: Current Water Use

3.1 Annual Water Use by Customer Class

The PPWSD customer base, as shown in Table 3-1, consists primarily of single-family residential, along with a few commercial and irrigation accounts. Table 3-1 shows customer demands. The baseline of 2008 was selected because it was fairly recent, has complete data readily available, and was a relatively average year with regard to precipitation. It is important to note that 2008 water usage was impacted by the post-2002 drought reductions in demand experienced throughout the Front Range. The long-term effects of the "drought shadow" meaning ongoing drought awareness are unknown. Residential demand in 2008 represented approximately 98 percent of the total billed water use. When considered on the basis of water production, the unaccounted for water represented 12.5 percent of the total. The accepted benchmark of up to 15 percent unaccounted for water is the industry standard.

General Class	2008 Total (in 1,000 gal)	% of Total	Number of Taps				Total Taps	Total TEs	Unit Demand (gpd/TE)	GPCD[1]
			5/8"	3/4"	1"	2"				
Single Family	104,538	97.6%	1,174	100	39	---	1313	1313	218	83
Commercial,[2] Park Irrigation, and Other	2,615	2.4%	---	---	---	6	6	48	149	---
Total[3]	**107,153**	**100%**	**1174**	**100**	**39**	**6**	**1319**	**1361**	**216**	**---**

[1] Per District estimates, there are 2.64 people per residence in PPWSD.
[3] District records do not distinguish between commercial and irrigation demands, so this usage class will be analyzed together. "Other" consists of bulk water sales.
[3] Percents may not equal 100% due to rounding.

Table 3-1
Annual Water Use in 2008 by Customer Class

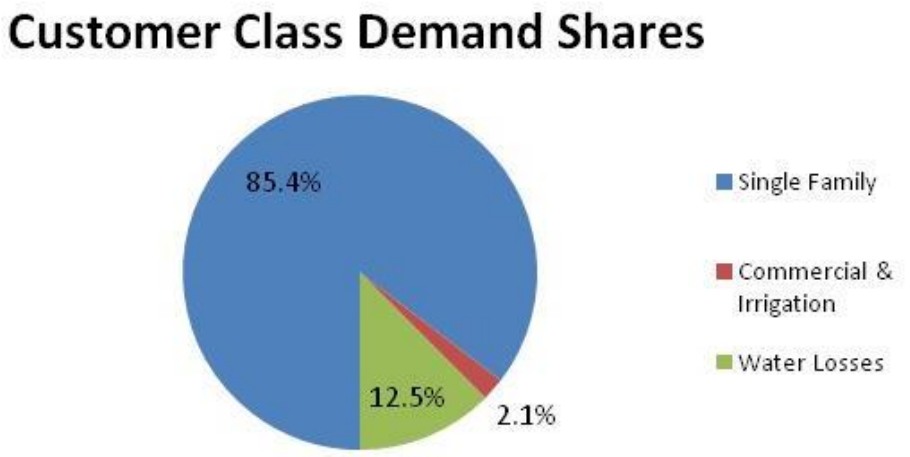

Figure 3-1
Percent of Water Produced in 2008 by Customer Class

3.2 Historical Water Demand

Total annual water production for 2000 through 2009 is shown in Figure 3-2. As seen in Figure 3-2, demand increased by 37 percent from 2000 to 2009, increasing from approximately 110 MG to a little less than 152 MG; an increase of approximately 41 MG. However, the District estimates that its population increased by 46 percent over that same period, indicating some reduction in unit demands. The 2002 demand was down more than 6 percent from 2001 due to onset of a drought, and the 2009 demand shows a decline of 3 percent from 2008. A similar drop in water usage was seen regionally that year, likely due to above average precipitation during the irrigation season.

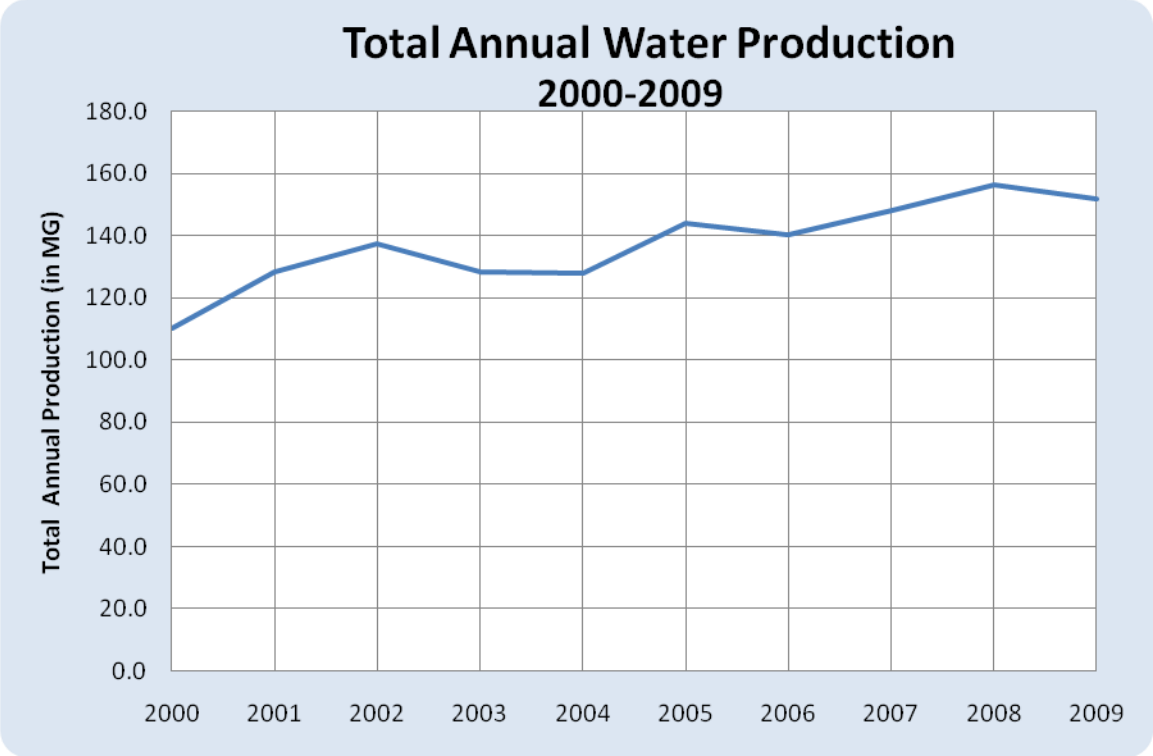

Figure 3-2
Total Annual Water Production

Single family residential PPWSD taps vary from 5/8-inch to 1-inch size but, by definition, each of these taps counts as one single-family equivalent (SFE) or tap equivalent (TE). Commercial users have a single tap providing for both in-building and irrigation use. The commercial taps are 2-inch size, and were converted to TEs on the basis of 8 TEs per 2-inch tap.

3.2.1 Unit Water Demands

An analysis of gallons per capita water demand is a common measurement of water use (GPCD). PPWSD metered water demands are analyzed on the basis of TEs as well as GPCD. Average daily water demand divided by the number of TEs served provides the unit demand in gallons per day per TE (gpd/TE). Commercial and irrigation uses are not metered separately, so those classes are combined to determine the nonresidential unit demand. In 2008, PPWSD's residential unit demand was 218 gpd/TE or 83 GPCD, and nonresidential demand was 149 gpd/TE. Together, the District's total demand averaged 216 gpd/TE.

3.2.2 Peak Water Demands

Monthly water production for the 2008 baseline year is shown in Figure 3-3. The peak month production/demand for 2008 occurred in July. That month's production of 22.7 MG was 75 percent higher than the average annual production of 13 MG per month, for a peak month to average month ratio of 1.75 to 1.

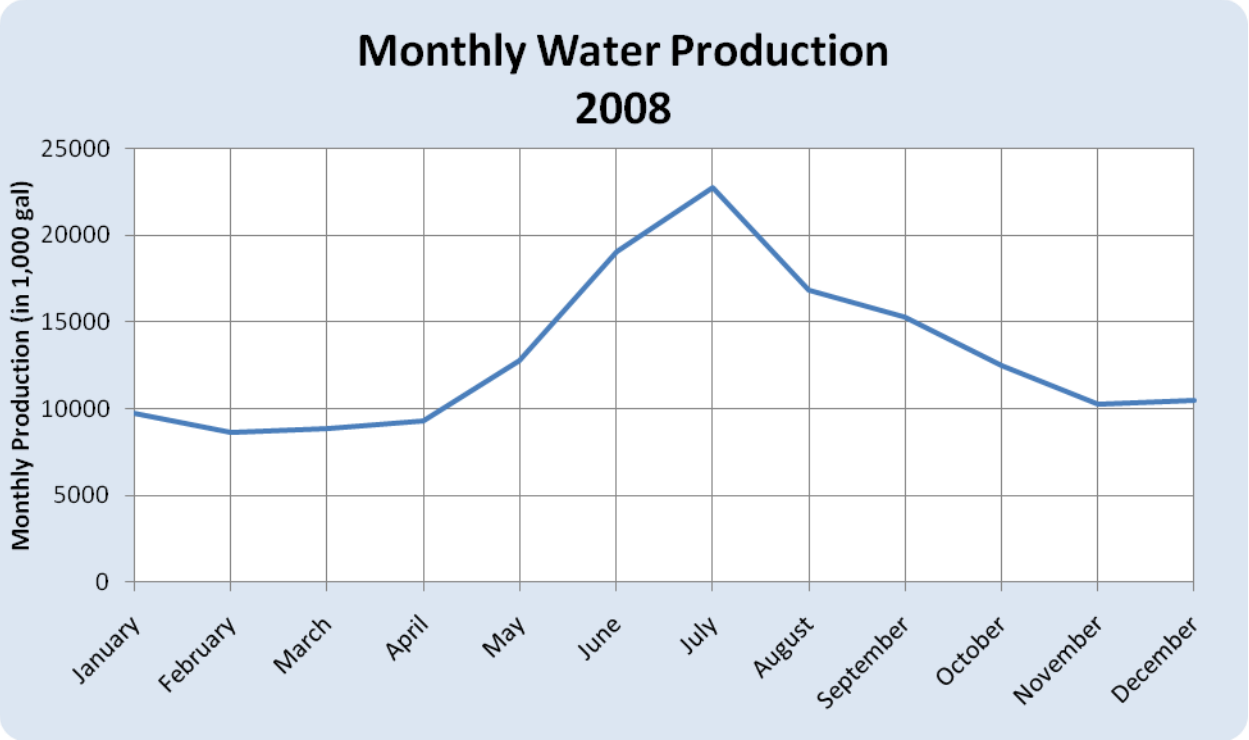

Figure 3-3
Monthly Water Production 2008

3.3 Water Loss Accounting

The description of current water use in this water conservation plan is meant to be consistent with the International Water Association (IWA) and American Water Works Association (AWWA) Water Balance approach, which was published in 2000 as part of the IWA publication Performance Indicators for Water Supply Services to provide utilities a consistent methodology for assessing water loss. Though the full assessment of a water balance is outside the realm of this report, the terminology is consistent. The main categories discussed for PPWSD are revenue (metered) and non-revenue (metered and unmetered) water, which are defined in Figure 3-4.

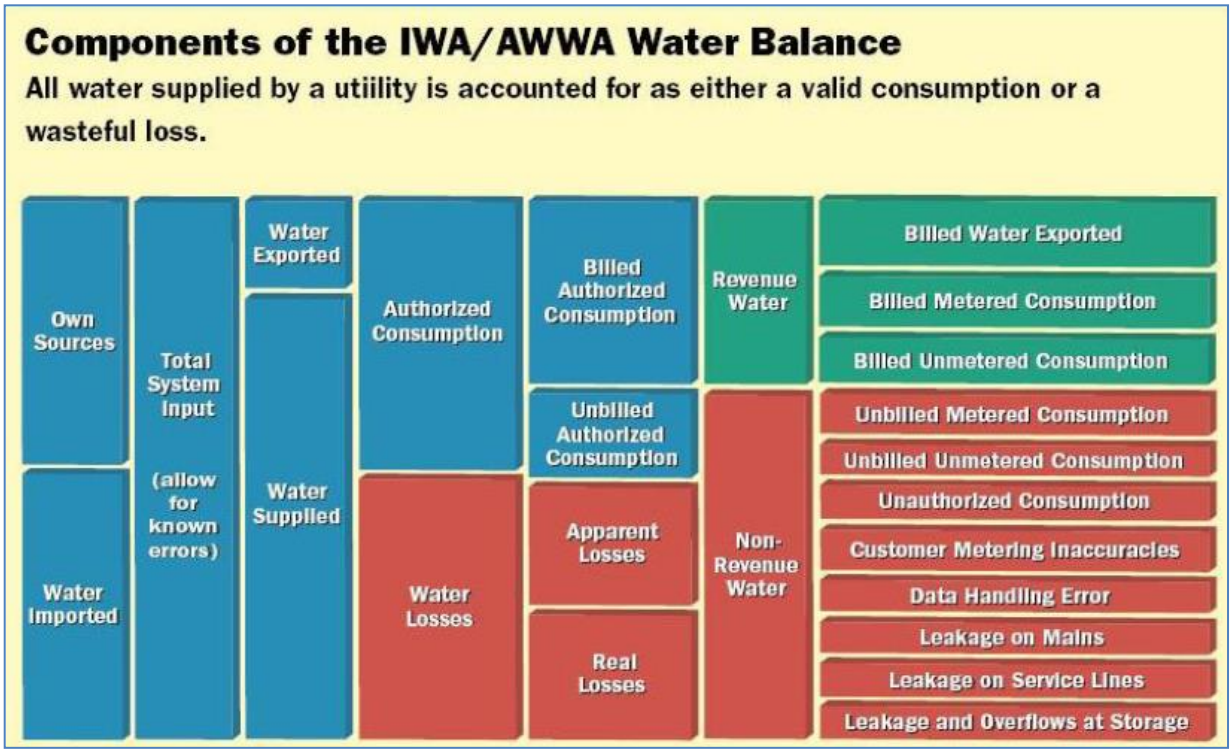

Figure 3-4
IWA/AWWA Water Balance Summary
(Source: AWWA Publication, Opflow, October 2007)

The majority of PPWSD's customer water use is metered and billed. There are no customers that receive water that is unbilled, and all metered water use is Revenue Water as defined in the IWA/AWWA Water Balance. The non-revenue water use for the PPWSD system includes:

- Unbilled, unmetered consumption (see below)
- Customer metering inaccuracies
- Data handling errors
- Leakage on mains and service lines
- Leakage and overflows at storage

Unbilled, unmetered consumption includes such uses as waterline and fire hydrant flushing conducted by PPWSD. Additionally, District field use is currently unmetered and accounts for an estimated 25 to 30 percent of unmetered use. This includes water used for water and wastewater treatment plants, pump stations and lift stations.

A comparison of estimated total water production vs. total water billed in 2008 is shown in Figure 3-1. The difference between total production and billed is water losses or unaccounted for water. This is the same as the non-revenue categories described above. Although AWWA now recommends evaluating non-revenue (or unaccounted for) water without reference to percentage of water produced, such a reference has been a standard practice in the industry for many years ("Water Wiser," 2010) (Angers, 2001). At the level of analysis in this water conservation plan, it is helpful to consider the District's water system with respect to the accepted benchmark of up to 15 percent unaccounted for water. As shown in Figure 3-1, PPWSD's unaccounted for water was estimated at 12.5 percent and is within the industry standard.

Section 4: Pricing Structure and Existing Conservation Efforts

PPWSD has used water conservation measures to manage water demands and conserve water since it was formed. In addition, the District has a water conservation program that offers a diverse range of measures. Current conservation measures are described in this section and summarized in Table 4-2.

4.1 Pricing Structure

PPWSD has implemented a conservation oriented water rate structure designed to encourage efficient use for all customers.

Modifications to increasing block rate structure – PPWSD implemented a tiered, increasing-block rate structure in the 1980s. Customers are billed bimonthly at the rates shown in Table 4-1. The District has enjoyed very stable and reasonable water rates.

Water Rates (as of January 1, 2012)		
Volume (gallons)	Bimonthly Base Rate	Added Cost per Tier (per 1,000 gal)
0-10,000	$48.20	$0
10,001-33,000	$48.20	$5.06
33,001-66,000	$48.20	$6.64
66,001-133,000	$48.20	$8.60
133,001 and Over	$48.20	$11.63

Table 4-1
Water Rate Tiers

4.2 Operational Utility Side Measures

Integrated Resources Planning –Water conservation and demand management options are generally cost effective factors affecting future supply planning. PPWSD's integrated resources planning approach incorporates water conservation as part of its strategy to meet future needs.

Full metering – All PPWSD customers and associated water use is metered and billed.

Conservation Coordinator – Diana Miller serves as the District's water conservation coordinator.

Irrigation System Restrictions – The District has strict irrigation requirements for its users. PPWSD requires the user to submit their landscaping plan for a sprinkler permit. Please see Appendix A.

4.3 Water Loss Control Program

Water Loss Control Program –Total water production is compared to total water billed to determine unaccounted for water. As PPWSD continuously monitors unaccounted for water, it will analyze and resolve any increase in accounted for water. The District has installed touch-read meters to increase accuracy. In 2009 the District changed its billing period from quarterly to bimonthly to improve the Customers ability to

resolve irrigation system issues and to allow the District to more quickly analyze fluctuations in the District's unaccounted for water percentages.

Summary of Current Water Conservation Measures

Summary of Water Conservation Measures
Pricing Structure
Modifications to Increasing Block Rate Structure
Operational Utility Side Measures
Integrated Resources Planning
Full Metering
Conservation Coordinator
Irrigation System Restrictions
Water Loss Control Program
Tracking of Water Losses

Table 4-2
Current Water Conservation Program

Section 5: Identification and Screening of Proposed Conservation Measures

As part of this water conservation plan, existing conservation measures and additional programs and measures were evaluated. It is important to note that as a water district, PPWSD does not have land use or building permit regulatory authority. As a result, PPWSD does not have the regulatory authority to require water conservation measures that are related to land use and building permit requirements.

In July, 2008, the Colorado Water Conservation Board (CWCB) awarded an efficiency grant to Colorado Water Wise, a water conservation non-profit group, to create a best management practices guidebook specific to Colorado. The guidebook will assist water providers with the selection and implementation of effective water conservation programs and measures. The Colorado WaterWise Guidebook of Best Practices for Municipal Water Conservation in Colorado (Best Practices Guidebook) (Colorado WaterWise, 2010) is a planning tool prepared for the purpose of improving and enhancing water efficiency in Colorado. The Best Practices Guidebook offers a detailed description of specific water conservation measures, program elements, regulations, policies, and procedures that can be implemented by Colorado water providers to help ensure reliable and sustainable water supplies for future generations.

The existing PPWSD water conservation measures were evaluated and compared to the Best Practices Guidebook to determine if there were potential best practices to be considered that are not part of the current PPWSD water conservation program. The Best Practices are shown in Table 5-1. The Best Practices Guidebook was also used to evaluate potential additional conservation measures.

[1] Each item and corresponding BP# is from the Best Practices Guidebook (Colorado WaterWise, 2010)

Measure	Best Practice	Category or Sector Impacted
Full metering	BP 1	ALL
Conservation oriented rates	BP 1	ALL
Conservation oriented tap fees	BP 1	ALL
Integrated resource planning, goal setting and monitoring	BP 2	Utility
Water loss control	BP 3	Utility
Conservation coordinator	BP 4	ALL
Water waste ordinance	BP 5	ALL
Public information and education	BP 6	ALL
Landscape water budgets	BP 7	Outdoor irrigation
Rules and regulations for landscape design and installation	BP 8	Outdoor irrigation
Certification of landscape professionals	BP 8	Outdoor irrigation
Water efficient design, installation and maintenance practices for new and existing landscapes	BP 9	Outdoor irrigation
Irrigation efficiency evaluations	BP 10	Outdoor irrigation
Rules for new construction (residential and non-residential)	BP 11	ALL
High efficiency fixtures and appliances-Residential	BP 12	Residential
High efficiency fixtures and appliances-Non Residential	BP 12	CII
Residential water surveys and evaluations, targeted at high demand customers	BP 13	Residential
Specialized non-residential surveys, audits, and equipment efficiency improvements	BP 14	CII

Table 5-1
Water Conservation Best Practices from Guidebook

Descriptions of the existing and proposed conservation measures that were evaluated are included below. A summary of the water conservation measures are shown in Table 5-2. Given the effectiveness of the District's conservation measures to date, the District does not plan to implement any additional measures that would increase costs to their customers.

5.1 Pricing Structure

Modifications to increasing block rate structure – PPWSD will continue to refine its water rate structure to promote water conservation. **(BP #1)**

5.2 Operational Utility Side Measures

Integrated Resources Planning – This is an existing measure and PPWSD will continue its water supply and demand management planning. **(BP #2)**

Full Metering – All PPWSD customers and associated water use will continue to be metered and billed**. (BP #1)**

Monthly Billing – To increase customer awareness of water use, PPWSD will consider the cost/benefit of increasing billing frequency from bimonthly to monthly for all customers.

Conservation Coordinator – The District will continue to assign a water conservation coordinator and will consider joining the Douglas County Water Resource Authority (DCWRA) for support. **(BP #4)**

Water surveys and evaluations, targeted at high demand customers – PPWSD has increasing water block rates that limit water use and discourage high water users.

5.3 Water Loss Control Program

Water Loss Control Program – PPWSD's 2008 unaccounted for water was estimated at 12.5 percent. The District monitors it's unaccounted for water on a bimonthly basis. The District compares water sales to treated water leaving the water treatment plants. The District has and will continue to implement both short and long term measures to resolve any detected increases in the unaccounted water percent. **(BP #3)**

5.4 Education and Public Information

Conservation Public Information Campaign – The District currently provides web links to their website that directs users to websites with tips and ideas to help with water conservation. **(BP #6)**

5.5 Water Reuse Systems

Reuse of consumable effluent return flows – By virtue of its return flows, PPWSD will be able to expand its use of surface water supplies, particularly when it develops reservoir storage.

Summary of Proposed Water Conservation Measures

Water Conservation Measure	Existing - to be Continued	PPWSD has Regulatory Authority?	Best Practices Guidebook BP #	Retained for Continued and/or Future Implementation?
Pricing Structure				
Modifications to increasing block rate structure	Yes	Yes	1	Yes
Operational Utility Side Measures				
Integrated Resources Planning	Yes	Yes	2	Yes
Full Metering	Yes	Yes	1	Yes
Monthly Billing		Yes	--	TBD
Conservation Coordinator	Yes	Yes	4	Yes
Residential water surveys and evaluations, targeted at high demand customers		Yes	13	TBD
Water Loss Control Program				
Water Loss Control Program	Yes	Yes	3	TBD
Education and Public Information				
Conservation Public Information Campaign		Yes	6	Yes
Water Reuse Systems				
Supply augmented by reusable return flow credits		Yes		Yes

Table 5-2
Evaluated Water Conservation Program Activities

References

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