Final Water Efficiency Management Plan
October 2011

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Section 1
Introduction

Purpose

The City of Durango has a long history of providing safe, reliable, potable water to its residents, and commercial, industrial and institutional water users. The City has long maintained and provided ample water supply through its water rights portfolio and infrastructure dating back to 1882. The City also maintains a strong connection to the natural environment and the needs of everyone in the area. For this reason, the City and its customers recognize the importance of wise water use and water use efficiency as an essential component of the community's culture – helping to maintain the local quality of life in a responsible, sustainable manner.

This Water Efficiency Management Plan of 2011 (hereafter "Plan"), therefore, identifies the City sponsored future water use efficiency measures and programs that will help manage the future water supply demands of the growing residential, commercial, industrial and institutional water users served by the City. Noteworthy is that this Plan has been prepared in adherence to the prevailing state statutory requirements and allows for the responsible implementation of more meaningful water efficiency in the coming years (3 to 5 years and beyond). The Plan has an overall planning horizon of 10 years, from 2011 to 2020.

Acknowledgements

This Plan has been prepared through the cooperative efforts of the City Public Works Department, Planning Department, Parks and Recreation Department, the Durango Water Commission, and the City Manager's Office. It was prepared under the leadership of Public Works Department and was funded in part through a generous grant from the Colorado Water Conservation Board.

Section 2
Existing Water System Profile

The City currently serves slightly over 20,200 citizens as of the end of 2010 with about 17,000 of these citizens located within the City limits and the other 3,200 outside of the City limits. A map of the City limits is presented in Figure 1. Overall, the City maintains about 6,200 residential, commercial, institutional, and industrial customer connections.

The City's raw water supply relies on water from two sources: the Florida and the Animas Rivers. Currently, raw water is obtained preferentially from the Florida River, representing a supply of about 8.7 cubic feet per second (cfs). Water from the Florida River is conveyed by pipeline to Terminal Reservoir. Water needs in excess of this amount are obtained from the Animas River. Water from the Animas River may be diverted at the 10 million gallon per day (mgd) Santa Rita pump station. The Santa Rita pump station pumps raw water from the Animas River to Terminal Reservoir. A pump station at 29th Street in Durango also brings water to the City from the Animas River. This pump station has recently been converted to an irrigation water only use after not being used for water supply for several years.

Terminal Reservoir is a raw water storage reservoir having a normal capacity of about 230 acre-feet. The reservoir is situated at an elevation of about 6,950 feet. Terminal Reservoir provides feed water to the City's 14 million gallons per day (mgd) water treatment plant, situated adjacent to the reservoir. Treated water flows by gravity into the City's primary treated storage facility.

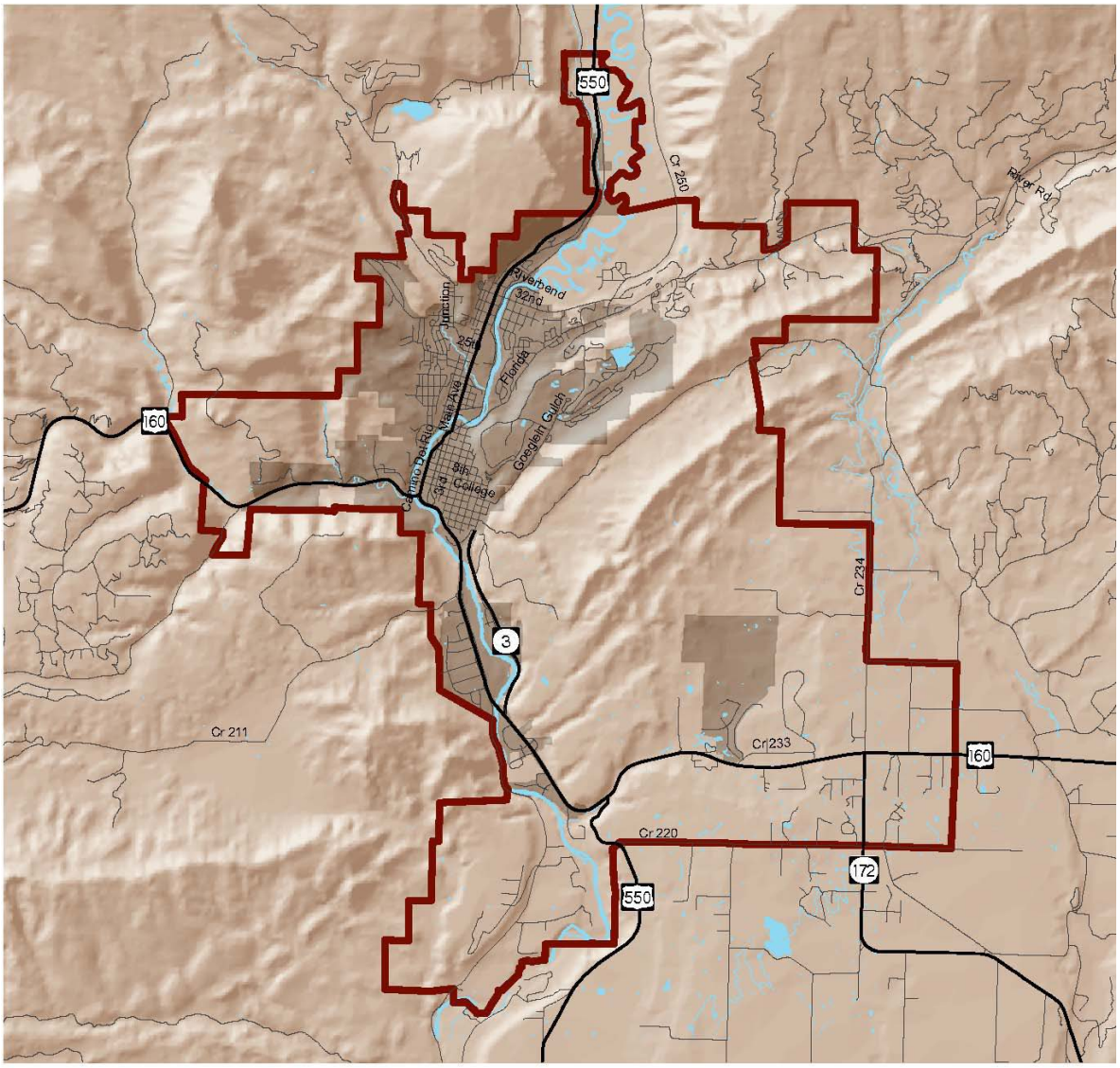
Water rights are available to the City to fully satisfy demands for the highest growth scenario population of 49,279 (which is a larger build-out population than the expected 40,000) under average river flow and demand conditions. However, during periods of extreme drought there is the potential that downstream bypass obligations would prevent the City from diverting the needed water supply from its current sources such that both alternative supplies and additional storage are being evaluated by the City to improve system reliability and drought protection.

Concurrently the City is committed to developing more rigorous water use efficiency measures and programs to support seasonal and dry-year imbalances between raw water supply and treated water demand. This Plan therefore was developed to provide a more rigorous understanding to the City of the costs and related benefits of water use efficiency to support future demand management.

Water Demand and Per Capita Water Use

The City serves on average about 3.5 mgd of treated water to its 6,200 plus customers in 2009, with a peak daily delivery of about 7.1 mgd in July. The service area is expected to grow to a

Figure 1 – City of Durango Service Area Map



City Limits shown in grey

population of about 40,000, with an average demand of over 8 mgd[1]. A summary of the water use supported by the City in 2009 (the latest year with complete records) is provided in Table 1.

Table 1 - Summary of Annual Water Supply in 2009

Annual Water Supply	Annual Volume (1,000 gallons)	Number of Sources	Percent Metered
Groundwater	0	n/a	n/a
Surface Water	1,523,270	2 Rivers	100%
Non-potable Water Billed	9,525		100%
Treated Water Billed	1,042,421		100%[a]
Total Annual Water Sold in 2009	1,051,946		

[a] – the City suspects that some metered customers have unmetered irrigation use which will be addressed through the measures and programs implemented as a result of this Plan.

Table 2 provides a summary of the water use data for the City over the period 2006 to 2010. This table indicates the population served the number of connections and the estimated total water used per household (including both treated and raw water use) over this same period.

Table 2 – Summary of Past and Current Water Use

Year	Total Treated Water Demand (mill gal)	Total Raw Water Demand (mill gal)	Total Water Demand (Ac.Ft.)	Non-Revenue Water (real and apparent losses) (mill gal)	Total Number of Treated Water Taps[a]	Estimated Population Served	Total Per Capita Water Use (gpcd)
2004	1,338	227	4,801	276	5,585	18,500	232
2005	1,302	207	4,632	234	5,747	18,804	220
2006	1,261	264	4,680	281	5,789	19.054	219
2007	1,255	260	4,648	255	5,921	19,344	214
2008	1,283	297	4,849	251	6,060	19,636	220
2009	1,274	250	4,675	231	6,152	19,636	213
2010[b]	1,287	255	4,733	278	6,226	20,239	209

[a] – in existence in December of each year

[b] – estimated (see Section 4 for a discussion of the estimation technique)

It should be noted that the highest observed annual and peak daily water use that has ever been measured in the City, occurred in 1970 when annual treated water use was 4.5 MGD (or about 1.64 billion gallons in a year); and the peak daily maximum was 10.1 MGD, which is 30% greater than that observed in 2009, although the population in the Durango service

[1] The City of Durango 2007 Comprehensive Plan indicates: "Future water system needs have been identified in a report prepared by Boyle Engineering Inc., entitled City of Durango Comprehensive Plan Update Utilities Report, January 2007. The City's current plan for meeting additional water supply needs is participation in the Animas-La Plata Water Project, a Bureau of Reclamation joint use project currently under construction immediately west of the City of Durango. The City has an option to purchase sufficient water from the project to support a population of 40,000 residents using the current rate of water consumption by City water customers. Costs for this purchase are included in the Public Works Capital Projects Funds for 2012."

area is about 50% greater today than it was in 1970. A timeline of treated water use and population since 1970 is presented in Figure 2.

It should also be noted that total water use (raw plus treated water) per capita in the City has trended downward over the past six years, as shown in Table 2. Figure 3 presents the per capita water use trend from 2004 to 2010, based on estimated end of the year water use for 2010.

Water Reuse by the City

The City uses raw water from the Animas River for irrigation purposes. Although the City could assess reuse of treated effluent from the City's wastewater treatment plant, it is of no greater benefit than the use of raw water for irrigation, and is considered to be more expensive to pipe and pump to areas that may benefit from reuse water application. The only cost-effective reuse of wastewater effluent identified by the City is for applications within the boundaries of the wastewater treatment plant where effluent is use for process water and for irrigation purposes within the plant to reduce the need to use treated water for such purposes.

Water Use by Customer Type

Another water use attribute that was used to characterize water use in the City was the demand by customer type. The City tracks treated water use by residential, duplex and commercial uses[2] both inside and outside of City limits. The City also tracks the large retail sale of treated water use to Fort Lewis College and the Animas Water Company. In addition, the City tracks raw water use at five accounts including: Fort Lewis College (unbilled), the Hillcrest Golf Course (unbilled), and billed raw water deliveries[3] to Ute Pass Ranch, the untreated water pipeline (code WQ)[4], and the Riverview School (coded as raw water use WP). The City also tracks other unbilled municipal raw water uses – including water treatment plant uses, etc. in the Water Division's monthly report. A summary of the City's water deliveries for both treated and raw water is presented in Table 3.

[2] The City's institutional uses (e.g., City Hall, Police Station, City Recreational Center, etc.) are tracked as commercial customers for treated water use, and as other accounts for raw water use. In addition, commercial use also includes multi-family residential water use (that is not a duplex). It is estimated that about 40% of commercial water use is associated with multi-family customers.

[3] Billed raw water deliveries are included in the City's monthly billing report, whereas the unbilled raw water accounts for Fort Lewis College and the Hillcrest Golf Course are contained in the Water Division's Monthly Reports.

[4] The untreated water pipeline contains raw water that is provided to a small set (6) accounts (account numbers 2778901, 2779101, 2800001, 2799801, 2778601, and Elks Campground) free of charge, for up to 16,000 gallons per month, as an agreement for easements negotiated 80 to 100 years ago.

As can be gleaned from Table 4, the majority of the water use in the City is commercial, followed by residential. Commercial in fact makes up about 43% of the treated water use per year, whereas the combined residential and duplex water use is about 34%. Notable is that unaccounted for water is about 20% of the treated water use (Table 3 summarizes non-revenue water observed for each of the past five years). This quantity of water relates to both real and apparent losses in the water distribution system including but not limited to meter inaccuracies, unmetered, metered – unbilled water accounts, leaking pipes, flushing and fire flows, etc.

The City has a keen interest in reducing the unaccounted for water in its system, such that specific water use efficiency measures and programs will be developed to address reducing unaccounted for water. One specific area of improvement that will be evaluated in this Plan and during Plan implementation will be reducing unbilled treated water being provided unwittingly to existing residential customers as a result of one or more of the following:

- Older residences that have irrigation taps located outside of the home prior to when the meter was installed inside the home;
- Older residences and/or commercial enterprises that have been remodeled and/or have suffered from fire damage that required the meter to be placed in inactive status, but were brought back to service without the finance department's knowledge; or
- Area schools that either self meter or turn on their own meters without notify the City.

By developing methods to track and control these various unbilled water uses, the City would increase its water sales revenue and decrease it's unaccounted for water use. The City also would benefit from improving its water use tracking methodologies, in part by consolidating and coordinating the efforts currently being conducted by the Finance and Water Departments.

Table 3 – Summary of Non-Revenue Water 2006-2010

Year	% Non-Revenue Water
2006	**22.3**
2007	**20.3**
2008	**19.5**
2009	**18.1**
2010	**21.6**
Average	**20.4**

Figure 2 – Population and Average Treated Water Demand at Five Year Intervals

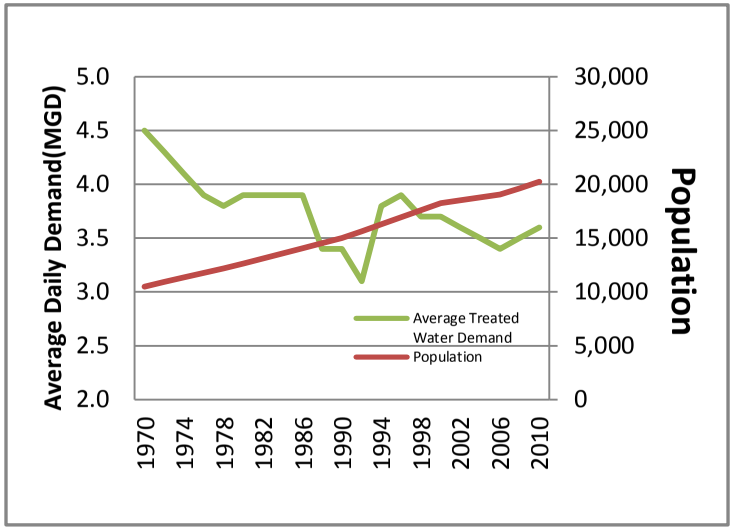
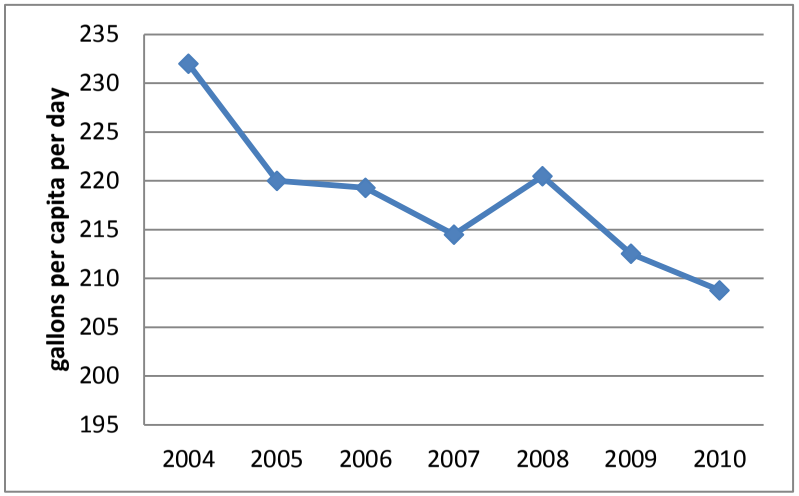


Figure 3 – Total Water Per Capita Water Use 2004 to 2010 *



* – total water use includes both treated and raw water demand

Table 4 – Summary of Water Use by Customer Type

		Treated Water Use (1,000 gallons per year)												Total Water Use	
	Service Area Population	Single Family Residential Inside City	Single Family Residential Outside City	Duplex Inside City	Duplex Outside City	Commercial Inside City	Commercial Outside City	Compound Commercial Meters	Animas Water Company Deliveries	Fort Lewis Deliveries	Non-Revenue Water	Total Treated Water	Total Raw Water Deliveries	1,000 gals per year	Acre-Feet
2006	19,054	349,014	35,885	26,976	358	505,199	22,107	6,862	1,042	32,642	281,383	1,261,468	263,607	1,525,075	4,680
2007	19,344	353,056	35,111	25,423	477	517,078	26,790	6,556	968	34,336	254,830	1,254,625	259,784	1,514,409	4,648
2008	19,636	359,699	35,937	26,611	470	539,535	25,137	7,088	1,182	36,648	250,675	1,282,982	297,203	1,580,185	4,849
2009	19,636	380,750	36,243	26,780	169	522,271	36,007	5,057	1,383	33,761	231,226	1,273,647	249,623	1,523,270	4,675
2010	20,239	379,512	36,792	25,031	439	484,239	45,269	4,254	1,503	31,985	278,080	1,287,105	255,195	1,542,300	4,733

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Section 3
Summary of Past and Current Water Use Efficiency Activities

The City has long maintained an ethic of wisely using water in the community. This is evidenced by the City's long-term trend of reducing total and per capita water use since the 1970s. Formal water conservation planning for the City began in 1998 in response to State 1991 statute, and continues today. The most recent update to the City's formal water conservation efforts prior to preparing this Plan was the City's "Long Range Water Efficiency Management Plan" which was created in 2003 (see Appendix A). The 2003 document had the following stated goals:

- Promote awareness that Durango is located on the edge of a high desert and that its water resources are limited and could be seriously affected by long-term drought conditions:
- Reduce the operating costs of the Public Works Department;
- Reduce peak day per capita water demands;
- Preserve the capacity of the City's physical system, thereby delaying the costs and environmental impact of new water supply facilities;
- Educate the public in water efficient techniques that apply to indoor and outdoor water use;
- Provide leadership through example by demonstrating practical and attractive water-efficient devises and landscapes on all City lands;
- Continue to allow the scenic beauty of the area to be maintained;
- Is supported by the residents of the City; and
- Can be evaluated and revised as necessary to reflect and enhance the effectiveness of the various elements.

These same goals will undoubtedly be carried into the current Plan: however, these goals will have to be amended to include quantitative goals that meet with the requirements of the current State statute.

In the 2003 Plan, the City listed numerous water use efficiency measures that should be considered for implementation in future years. Given limitations in the City's resources, and the impressive water use behaviors of the City's customers, most of the "to be considered" measures listed in the 2003 Plan were deemed unnecessary for implementation, since per capita water use continued to drop after the drought of 2002-3. Nonetheless, the City chose to move forward with the following key measures for implementation since 2003.

These measures included:

- Reviewing and adjusting water rates periodically.
- Conducting various education and public awareness tasks.
- Encouraging replacement and retrofit of water-efficient plumbing fixtures and appliances for all customers.
- Adopt "Water Efficient Landscape Ordinance" (see attached Appendix B) which define outdoor water requirements for new commercial and institutional construction and can be used voluntarily by existing water customers and new residential construction.
- Supporting improved water use efficiency with the City's institutional, commercial and industrial customers.

The City also budgets substantial funds each year for various "foundational" programs including meter testing and replacement, leak detection and repair, and water line replacement. These efforts are focused on reducing and managing real and apparent water loss from the system, as well as managing the City's infrastructure that is vital to the delivery of reliable water supply to its customers while maintaining the requisite flow of cash into the City to support the various functions needed to operate and maintain the water supply system.

As a result of the City's water use efficiency ethic, and the behaviors of its citizenry, per capita water use has been consistently dropping since the turn of the century. Treated water demand has in fact dropped from over 200 gallons per capita per day (gpcd) in 2000 to less than 175 gpcd in 2010, which is a drop of about 13%. In addition, total (treated plus raw) water demand has dropped nearly 10% since 2004 on a per capita basis. The decrease in water use by the community is considered to be the combined effect of the City's water use efficiency measures, the community's water ethic, and the drought of 2002-3, which is known to have changed water use behaviors in the local community.

Table 5 – Per Capita Water Use 2006-2010

	Total Treated Per Capita Water Use (gpcd)	**Total Treated Per Capita Residential Water Use[a] (gpcd)**
2006	181	89
2007	178	89
2008	179	91
2009	178	94
2010	174	90

[a] – estimated based single family, duplex and about 40% of commercial use being attributed to multi-family use

Section 4
Forecast of Future Water Demands

Forecasting water use (or water demand) is a critical part of the planning process since water use efficiency planning will be used to address increases in future water demand – identified as increasing water use within specific customer categories – and limits to existing infrastructure or some combination thereof.

Forecasts can range from simple projections based on anticipated growth in the population to complex models using several variables to explain variations in water use. Forecasts can be made for a water system as a whole; however, forecasts are considered more accurate and valuable to water use efficiency planning when they are prepared for separate classes of water users. For this reason, the demand forecasting developed for Durango evaluated expected growth of daily, monthly and annual water demand for each of the City's customer types – single family residential, commercial, multi-family and non-potable (raw) water.

The potential effects of new water use efficiency efforts that will be selected during this planning process have not been included in the demand forecast prepared during this step. Demand forecasting at this point only developed future water demand based on a continuation of the current and ongoing water use efficiency efforts and "passive conservation" as older fixtures and appliances wear out and are replaced with models that meet current efficiency standards. A revision to the demand forecast based on implementing the planned use efficiency measures is made later during the planning process, and is presented in Section 9.

Forecasting Method and Annual Water Demand

To begin with, the forecasting methods that were developed for this planning effort focused on predicting future treated and raw water demands based on the continuation of ongoing trends in water use and expected population growth in the City's service area.[5] In addition, the forecast looked at the variability of water demand in recent years to estimate future variations in system wide water demand for non-average years[6]. A summary of the forecast modeling results are provided in Appendix D.

[5] Data for forecasting was based on average monthly per connection water use for the period 2006 through 2010; during which time recent trends in municipal water use were established. Characterizing variability in City water demands was developed using a longer period of record (2002-2010) to characterize deviations in municipal water use over this period of time when climate impacts on municipal water use were known to exist.

[6] Variability of future water demand was developed assuming that the water demand over the past 9 years is normally distributed and that natural variability of weather and customer water use behaviors will continue through the planning period in a manner consistent with those observed since 2002. The available data was

Forecasting began by predicting total annual treated water demand based on the following assumptions:

- Residential population serviced by the City was estimated to grow from 2.3-3.0% per year throughout the 10 year planning period, such that 2020 population is about 30% greater than the population in 2010, based on estimates developed by the Department of Public Works which were used to forecast future water demands and infrastructure needs.
- Per capita residential water use (for treated water only) was estimated to decrease over the planning period from about 90 gpcd in 2010 to 79 gpcd in 2020 conjunction with "passive water conservation" that is expected to occur as residential customers replace outmoded and broken toilets, dishwashers and clothes washers with new, high efficiency models without the influence of the City's water use efficiency efforts. Passive conservation only impacted future demands for single family, duplex and multi-family residential demands. Passive savings were developed based on recent analyses conducted by the CWCB (Great Western Institute, 2010).[7]
- Commercial water use (for treated water only) is predicted to increase by about 7% over the planning period based on the rate of population change and the current ratio of commercial connections to total connections. For purposes on this forecast, the per connection water use for each commercial customer was assumed to remain constant over the planning period.
- Municipal water use is contained within the commercial water use customer category. It is anticipated to continue to be used at the same rates as are currently used; based in part on the consistency of municipal use over the past five years.
- Treated water deliveries to the Animas Water Company (the District) have consistently increased by about 1.4% a year over the past 5 years. This trend was used to estimate future treated water deliveries to the District over the planning period, such that annual deliveries are expected to increase, on average from about 1.5 million gallons per year (gpy) in 2010 to about 2.8 million gpy in 2020.
- Treated water deliveries to Fort Lewis College have not grown in recent years, and have in fact decreased slightly in 2009 and 2010. However, the five year trend is nearly flat; therefore, future water demand associated with this single large customer of the City's was estimated to remain constant over the next 10 years at a use rate

determined to be adequate for predicting variability in future demand over the coming 10 years, but not adequate to estimate extreme variations due to drought or wet weather with more than a 10 year return period.

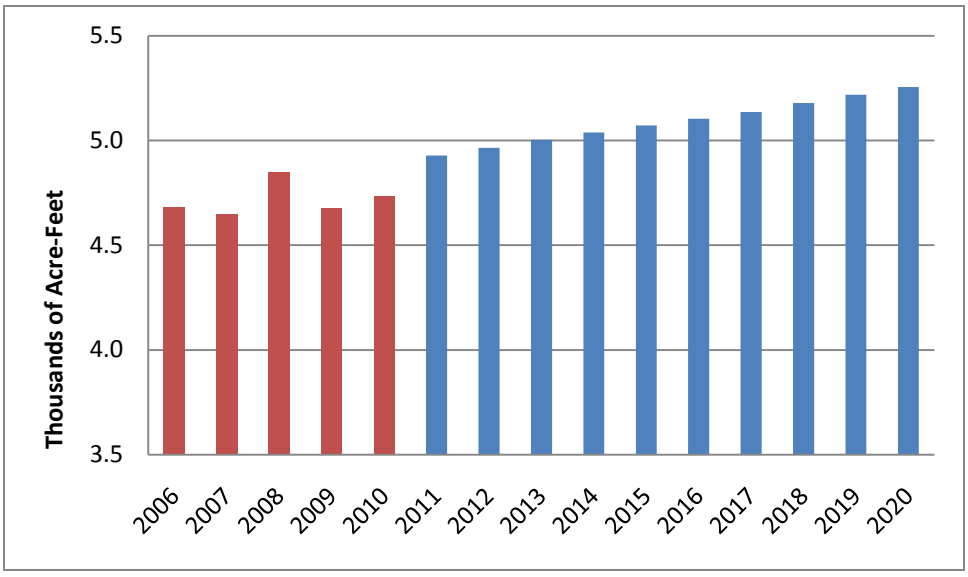
[7] Passive savings calculations were developed by estimating the reduction to per capita water use for those populations that existed or will exist at key dates during the development of high-efficiency products for consumer use (i.e., 1996 for low-flow toilets (1.6 gallons per flush (gpf)); 2005 for high-efficiency clothes washers and dishwashers; and 2015 for high-efficiency toilets (0.9 to 1.28 gpf)). Appendix D presents the details of the passive savings analysis along with the results of the forecasting modeling.

consistent with the average treated water deliver observed over the past five years, or about 33.9 million gpy.

- Non-revenue water related to real and apparent water losses from the treated water delivery system was estimated for each year based on the average percent non-revenue water observed from 2006 to 2010, which was 20.4%. Although certain City records indicated a trend of increased non-revenue water during the summer months, this observation was chiefly associated with a one month offset between the billing records and the Water Department monthly report. Therefore, it was assumed that non-revenue water was consistently 20.4% for each month throughout the planning period.
- Raw water deliveries from the City to its various customers (including parks, the municipal golf course, selected commercial customers, and others) vary from year to year by as much as 50% by customer. However, the total raw water delivery from the City to its combined customers is reasonably consistent (coefficient of variation (i.e., the ratio of the standard deviation to the mean) is less than 7% over the past five years). Therefore, it was assumed that future raw water deliveries would remain consistent with the average raw water deliveries observed over the past five years, or about 268 million gpy.

Figure 4 presents the forecasted total water demands for the City for average conditions based on the analyses summarized above, which equates to 5,500 acre-feet in 2020. As indicated, the demands presented in Figure 4 are those demands that will be expected for five years out of every 10 years if conditions expected in 2020 continued into the future. Stated another way, the actual demand in 2020 has a 50% probability of being larger than those presented in Figure 4.

Figure 4 – Average Annual Forecasted Water Use



To understand the potential variability on the City's future water demands, a statistical analysis was performed using the last nine years of water use data, which is summarized in Table 6. This table indicates that the greatest variability in water use by customer category occurs in the commercial and duplex accounts outside of the City limits, as well as Animas Water Company; whereas the largest customer uses are Fort Lewis College, the commercial compound meter in the city and the Animas Water Company, respectively. For purposes of this analysis, it is assumed that the variability in the per connection water use relates to the natural variability of weather and behavioral impacts on water use in the City. Using the statistics presented in Table 6, there is a 16.7% probability that total water demand in 2020 for the City would be about 5,700 acre-feet; and a 2.5% probability that total water demand in 2020 for the City would be about 6,100 acre-feet (or about 16% greater than the average year demand of 5,250 acre-feet).

Table 6 – Summary of Annual Daily Treated Water Use by Connection – 2002 to 2010 (in gallons)

	Single Family Residential		Commercial			Duplex		Animas Water	Fort Lewis College
	Inside City	Outside City	Inside City	Outside City	Compound Meter	Inside City	Outside City		
Mean	260	288	1,253	903	4,296	324	279	3,234	95,361
Standard Deviation	31	25	57	240	680	23	81	670	5,899
Coefficient of Variance[8]	12%	8.8%	4.6%	37%	16%	7.0%	29%	21%	6.2%

Note that beneficial impacts of measures and programs to be identified and implemented by the City to manage future water demand as a result of this planning effort have not been included in the forecast modeling.

Monthly Treated Water Demand

Monthly treated water demand has been measured and consistently recorded by the City. This information was used to develop an estimate of future monthly treated water demand using the following methodology:

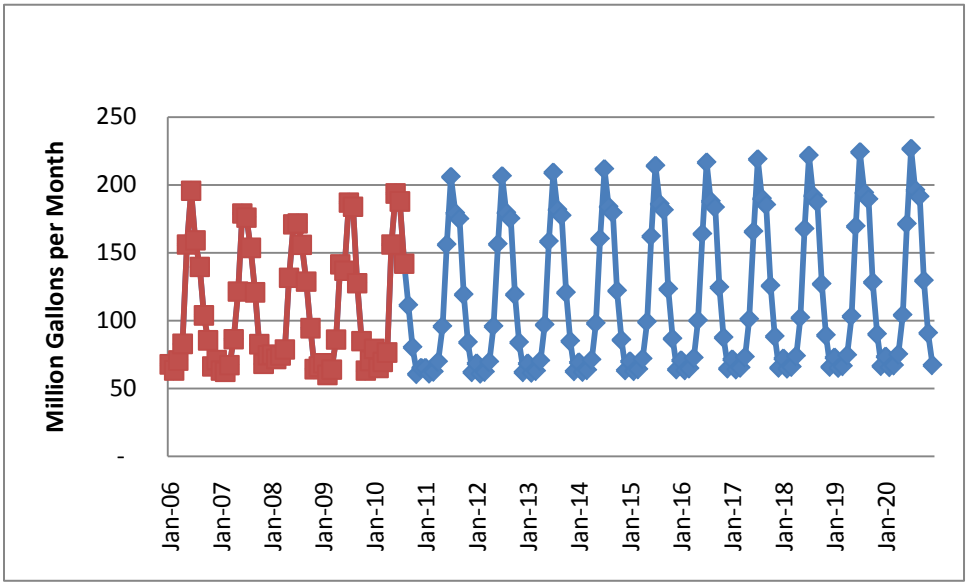
- A listing of the monthly treated water demand by customer category for treated and raw water was developed for the period from January 2006 to August 2010.

[8] Coefficient of variance is the ratio of standard deviation to mean for the sample population (based on annual water use per customer connection.

- The ratio of the total water demand for each category was calculated for the months from January through August and from September through December for the years 2006 through 2009. This ratio was used to predict the total water use in the final four months of 2010.
- The ratio of water use per month to the water use per year for each treated and raw water customer category was developed to estimate future monthly water use based on the forecasted annual water use for each year from 2011 to 2020.
- Unaccounted for water related to real and apparent water losses from the treated water delivery system was estimated for each year based on the average percent of unaccounted for water observed from 2006 to 2010, which was 20.4%. This value was applied to each month of predicted treated water use to estimate total treated water demand.

Figure 5 presents the predicted monthly water demand to 2020 assuming average conditions persist over the planning period.

Figure 5 – Current and Future Average Monthly Treated Water Demand (in million gallons)



Daily Peak Treated Water Demand

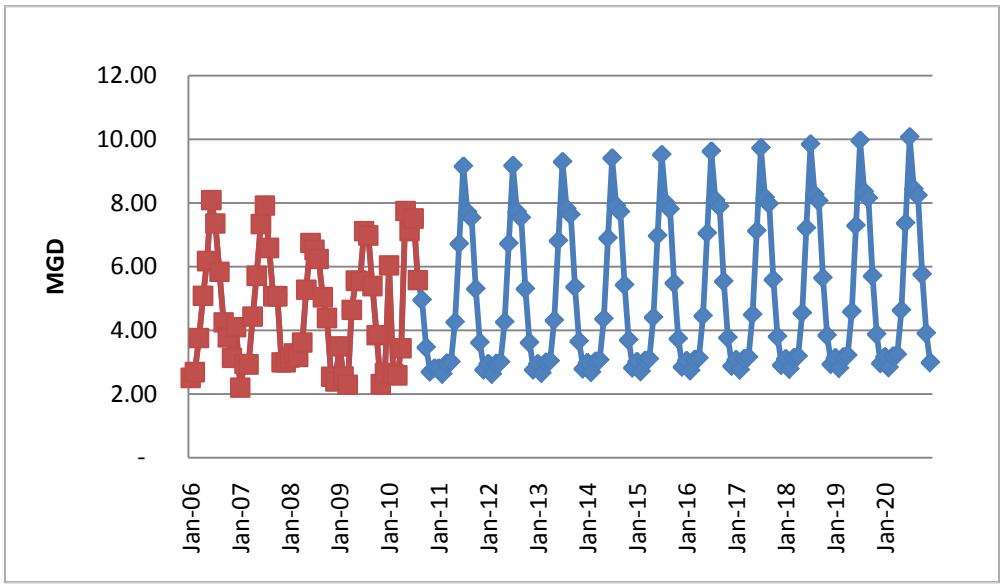
Daily peak treated water demand has been measured and consistently recorded by the City for decades. Monthly water treated water production and peak daily water demand for each month for the period from January 2006 to August 2010 was used to calculate an

average peaking factor[9]. The mean peaking factor of 1.33 resulted, with a standard deviation of 0.23 (producing a coefficient of variation of 17%).

Average daily peak treated water demand was calculated based on the average monthly treated water demands presented in Figure 5. The resulting average daily peak treated water demands are presented in Figure 6.

Using the statistical analyses presented earlier in this section, the probability that the maximum peak daily demand in 2020 is greater than 10.1 MGD is 50%. The probability that the maximum peak daily demand in 2020 is greater than 12.8 MGD is 16.7%[10].

Figure 6 – Current and Future Average Daily Peak Treated Water Demand by Month (in million gallons per day)



List of Other Assumptions

In addition to those assumptions presented above, the following assumptions were used to develop the forecasted water demands:

- No substantial changes to current residential water use practices have been included to represent existing or future single and multi-family water use such as:

[9] Peaking factor is the peak day demand for any given month divided by the average daily demand for the month calculated from the measured peak day treated water demand and the monthly treated water production.

[10] The maximum peak daily demand is calculated using the dry year annual demand of 5,700 acre-feet to calculate the dry year monthly demand and the average daily demand from the dry year month is used with a peaking factor of 1.56 which is one standard deviation greater than the average peaking factor of 1.33.

- Residential outdoor watering will not occur using grey-water or non-potable water systems; and
- Indoor water use will occur for the same basic configuration of bathroom, laundry and kitchen uses as exist today (noting that passive savings account for the use of new, more efficiency appliances and fixtures without changing the way that the appliance and fixtures are used).

- The City will maintain the current level of non-revenue water and water treatment plant efficiencies into the future.

- Fort Lewis College will continue to maintain its current use of raw and treated water, which includes the construction of about 12 acres of new soccer fields to be irrigated with raw water increasing demands by about 9 million gallons per year (or about .07% of current facility usage).

- No large industrial, commercial and/or manufacturing facilities will be constructed within the City's service area over the next ten years requiring substantial new water supply.

- No substantial change from past measured conditions in current weather and precipitation patterns will occur over the planning period.

Section 5
Identification of Future Water Related Capital Improvement Needs

The City maintains a 15-year Capital Improvement Plan (CIP) that identifies water system project funding needs into the future. The CIP categorizes the projects as either current infrastructure maintenance and upgrades, or new development projects.

The current listing of water projects in the CIP include waterline replacements, meter replacements (using radio read technology), new and upgraded water treatment plant projects, new water line construction, pump and booster stations projects, and storage tank projects. Many of the identified projects in the CIP are either scheduled replacement and/or upgrade projects that are needed regardless of the amount of future water demand reductions. In addition, the CIP includes a $6.2 million Animas La Plata contract obligation that the City will incur; as well as the initial phases of construction of a new water treatment plant (Ridges Basin) for about $8 million.

There are a number of CIP water projects which are planned to be constructed during the next ten years whose scope and timing may be influenced by reductions in future water demand. These projects are summarized in Table 7.

Table 7 – Summary of CIP Water Projects that May be Delayed by Reduced Future Water Demand

Project	Year of Financing Estimated in the CIP	Estimated Cost ($1,000)
ALP to Ridges Basin WTP Pipeline	2015	$ 920
East 8th Avenue Waterline	2015	102
Highway 160 East Water South Grandview Waterline	2015	500
Ewing Mesa to Grandview Waterline	2017	2,146
Upgrade to Grandview	2018	938
Ridges Basin Storage Tank	2019	8,700
Grandview Pump Station Improvements	2020	725

All of these projects have a start date for financing that begins in 2015 or later; and they have the combined total cost of over $14 million.

If the combination of City water use efficiency measures and programs, passive savings and customer water use behaviors change over the coming five or so years, some, if not all of these water projects could be delayed. Assuming a 30-year bond at 3.75%, a one year delay of each of these projects would delay about $780,000 of debt service payments; and a two year delay would delay about $1,500,000 of debt service.

A key decision point for the City regarding the implementation of the water projects listed in Table 7 relates to the need for the Ridges Basin Water Treatment Plant (WTP), which is required for dry year water supply reliability and peak summertime demand. Some of the factors at play in deciding when to build the Ridges WTP include the Animas La Plata by-pass flow requirements on the Animas River and dry year water rights calls on the City's water rights in the Animas River. It is reasonable to expect that the City will choose to have the Ridges WTP operational at a point when the service area population reaches 25,000.

According to the population projections provided in the section on forecasting, the population in 2020 will reach over 26,000. Based on this metric, the Ridges Basin WTP would not be needed until after the current ten year planning period. However, peak daily demand may reach the target of 11.2 mgd[11] in dry years (see page 16) before 2020 under current water use projections. Therefore, one key goal that the City will include in developing this Plan and selecting water use efficiency measures and programs to implement will be to reduce the summertime peak daily treated water demand, which has been measured over 8 mgd at least once in the past 5 years.

[11] Based on the City white paper entitled "Selection Matrix – When to Invest in a WTP at Ridges Basin Reservoir," the City needs to maintain treatment capacity that is 20% greater than peak daily demand. Given that the City's current daily treatment capacity is 14 mgd, additional treatment capacity would be needed when peak daily demand exceeded 11.2 mgd, which is 80% of 14 mgd.

Section 6
Goals and Objectives for Future Water Use Efficiency Activities

The City is required by State Statute (see Appendix C) to develop goals for this Plan. The goals need to include the identification of future water savings either as a percentage of future estimated water demands or as acre-feet of water demand reductions (AKA savings) or both. To get to a number, the City first estimated water use reductions related to past and ongoing water use efficiency programs and efforts. The estimated water use savings from past and ongoing efforts will be used to help frame the savings that the City must create or desires to create as a result of implementing this Water Efficiency Management Plan.

Past water use efficiency programs by the City, along with other natural circumstances (e.g., the 2002-03 drought, the Missionary Ridge fire) have reduced per capita water use in the City consistently since 2005, such that per connection water annual water use is about 30% of pre-drought demands. In addition, the City has a reliable water supply portfolio that will not be exceeded by future expected water demands associated with population growth in the City's service area.

However, the City is looking to improve overall water use efficiency since the City takes pride in its "green" image that values and understands that relationship between its citizens and the natural environment within which its citizens live, work and recreate. As part of maintaining the City using sustainable concepts, there are components of the City's water delivery system that can be improved. In addition, the City has determined that delaying certain capital improvement projects by controlling future water demand may be beneficial to the City's business model. Therefore water conservation objectives have been developed based on the City's 2003 Plan goals (see Section 3) and the City's desire to:

- Limit unaccounted for treated water and unbilled raw water
- Reduce water use by the City's largest customers (e.g., Ft. Lewis College)
- Maintain a fair and equitable inclining block water rate structure to help promote efficient water use by the City's customers, without interrupting the required cash flow to support reliable potable and non-potable water delivery
- Reduce water and energy use in the City's operations
- Reduce summer time peak water demand to the extent feasible

Specific numerical goals that the City has developed in compliance with State Statute, based on the above stated objectives are as follows:

- Reduce unaccounted for water from an average of about 20% to 13% during the planning horizon (i.e., by 2020) (equivalent to about 320 acre-feet (AF) in increased water for sales).
- Reduce real losses from the water distribution system by about 30% (which is estimated to be about 150 AF and creates an avoided cost of about $70,000 per year).[12]
- Reduce City facility indoor water use by an average of 18% by 2020 (equivalent to about 5 AF).
- Reduce City facility outdoor water use by an average of 3% by 2020 (equivalent to about 8 AF).
- Reduce Fort Lewis College's overall treated water use by 18% by 2020 (equivalent to about 20 AF).
- Reduce other City commercial customer water use (excluding City and multi-family uses) by 3% by 2020, focusing on summer demand management (equivalent to about 35AF).
- Reduce unbilled treated water use by 50% (which is estimated to be about 170 AF per year, creating about $100,000 per year in additional revenue).

The cumulative benefit of all the City's proposed water use efficiency efforts will reduce annual water demand in 2020 by about 320 AF from future demand levels, which represents a reduction of about 6% from 2020 average demands.

[12] Avoided costs estimated assuming the cost of treatment and distribution to be $1.50 per thousand gallons of treated water.

Section 7
Identification and Screening of Water Use Efficiency Measures and Programs

This section presents the identification and screening of potential measures and programs that may have relevance to the City. The task of identifying relevant measures and programs requires that a listing of candidates be created based in part on the State guidelines and policies (e.g., CWCB's Best Practices Manual (Aquacraft, 2010) and the various categories that are required under CRS 37-60-126). In addition, as presented in Section 3, the City has ongoing water use efficiency measures and programs that will be included in the evaluation. Once a listing of candidates has been created, the measures and programs will be screened and eliminated from further consideration using these criteria:

- Expected costs outweighing the potential benefits;
- The City has already implemented the measure or program;
- Expectation that limited to no real reduction in current demand could occur as a result of implementation; and
- Either the City Council or the community would not accept the measure or program because of its effect on non-water related circumstances.

Those measures and programs that were not eliminated using these criteria were carried forward to the next step of the planning process – the detailed evaluations of measures and programs. Note that some of the measures and programs were carried forward based on past experience and the current state of the science (e.g., educational programs were selected for implementation without detailed analysis). Those measures and programs that were selected for further evaluation are presented at the end of this section.

It is important to understand the meaning of measures and programs within the framework of the City's Water Efficiency Management Plan. Based on the prevailing literature[13], measures include both hardware devices and practices that reduce demand (e.g., toilet retrofits in City facilities, developing and enforcing ordinances that reduce wasteful irrigation practices). Whereas, programs are strategic combinations of activities and measures (e.g., customer audits and education programs linked to wise water use incentives like rebates) that will bring about reduced water use demands in the long-term. To this point, measures can be implemented to achieve measurable long-term water savings without necessarily changing customer water use behaviors. In contrast, programs tend to be used to engage customers and change their water use behaviors which then lead to long-term water demand reductions. Both approaches are important, since short-term technology

[13] Water Use and Conservation, Amy Vicker, 2001

changes and long-term behavioral changes are best used in conjunction with one another to create a culture of community water use efficiency. Therefore, the best water use efficiency programs are those that link hardware installations that the City can control (e.g., improving metering and leak detection efforts) with customer awareness and education (e.g., audits and focused messaging).

For the City, the listing of candidate water use efficiency measures and programs identified and evaluated in this Plan were those that can be planned and implemented over the next ten years, or until 2020. Any planning horizon beyond this time period may be compromised with extrapolations and estimates that do not necessarily support the short- and mid-range evaluations that are needed to develop the tactics which must be included in the Water Efficiency Management Plan. Therefore, the identification and selection of water use efficiency measures and programs presented herein will be associated with only those measures and programs that can be planned for and implemented within the next ten years.

Identification and Initial Screening of Measures and Programs

To being with, the listing of candidate water use efficiency measures and programs was developed using the new CWCB framework for water conservation plan evaluation developed by Greet Western Institute (2010). This framework differentiates all water conservation measures and programs into four basic categories:

- **Foundational –** those measures and programs that are aligned with the key business needs and practices of the City
- **Ongoing Water Use –** those measures and programs that are designed to understand and improve the water use efficiency of ongoing water uses.
- **Ordinances –** those measures and programs that are designed to regulate and control water use efficiency through local, regional, and/or statewide using laws, regulation, statutes and/or ordinances.
- **Education and Public Information**

A discussion of the City's ongoing efforts in each of these water use efficiency categories is presented below to help frame why certain measures and programs were identified for potential implementation; and why some of the identified measures and programs were selected for further consideration.

Foundational

Metering

As previously discussed, the City has many strong foundational measures and programs in place. For example, the City has about 95% of its treated water customers with AMR

technology installed. This technology allows the City to read all of its meters in a nearly contemporaneous manner, facilitating monthly billings and allowing for a fairly accurate accounting of non-revenue water. In addition, the City is in the process of installing radio-read technology that will allow for tracking water use on a daily basis or less, depending on the needs of the City. The City intends to use this technology to track and identify high water use and customer side leaks, as has been performed successfully by other water utilities. The Plan will call for completion of this ongoing program.

The City could improve its metering of water use by its customers by increasing the use of sub metering on its large commercial water users that have both indoor and outdoor water uses from the same tap. Sub metering can be used to help better understand customer water use, and therefore support the identification and development of future water use efficiency programs that support specific customer needs.

In addition, the City has some treated water use customers that are suspected of having unmetered outdoor water use that occurred as a result of past meter installation errors. A combination of sub metering sections of the City to identify unmetered water uses and conducting outdoor residential water audits will help to identify these customers and allow for proper meter installation. Data mining in conjunction with the AMR technology with the radio-read devices will also help to identify unmetered uses in the City.

Finally, the City maintains a meter testing and replacement program that has recently installed about 100 new meters at the largest commercial water uses (which constitutes all of its commercial customers with taps of 2 inches or larger plus some 1.5" meters – see Table 8). Continual meter testing and replacement is warranted for the City's largest meters, and the City maintains an annual budget for just this effort. Therefore, additional meter testing and replacement is not considered warranted at this time; however, changes to this program may be an outcome of future commercial and raw water use accounts conducted by the City.

Table 8 – Summary of Existing Meter Sizes in the City

Meter Size	Number of Current Meters
5/8" or 3/4"	6,293
1"	288
1.5"	35
2"	69
3"	16
4"	1

Water Rates

The City maintains a tiered water rate structure for all its customers that include a total of two tiers in addition to a service fee that includes 2,000 gallons of water for residential, commercial and industrial customers. The water rates also include a summertime surcharge of water use in the second tiered rate. The water rates used by the City are as follows:

Residential - Single Family
Service Fee - $12.46 with 2,000 gallons (or $6.23 per thousand gallons)
1st Tier - $2.12 per thousand gallons from 2,000 to 10,000 gallons
2nd Tier - $2.78 per thousand gallons (winter), $3.06 per thousand gallons (summer)

Residential - Duplex
Service Fee - $24.92 with 4,000 gallons (or $6.23 per thousand gallons)
1st Tier - $2.12 per thousand gallons from 4,000 to 12,000 gallons
2nd Tier - $2.78 per thousand gallons (winter), $3.06 per thousand gallons (summer)

Commercial, Industrial, Multi-Family, Institutional
Service Fee - $24.92 with 2,000 gallons (or $12.46 per thousand gallons)
1st Tier - $2.12 per thousand gallons from 2,000 to 100,000 gallons
2nd Tier - $2.78 per thousand gallons (winter), $3.06 per thousand gallons (summer)

The City realizes that it will have future water rate increases that will need to occur to address increasing fixed and variable costs, and the costs to replace aging infrastructure. The City also realizes that a more aggressive tiered rate structure would support the City in its efforts to control summertime peak daily demands. Therefore future water rate studies will be included in the measures and programs that are carried to the detailed evaluations.

Noteworthy is that the City has incentives for non-residential customers to create development that is water efficient. The City reduces its water plant investment fees that builders must pay before a meter can be installed on a new project if the project can be demonstrated to have summer month water demands 20% less than typical using water saving fixtures and landscape efficiencies. This incentive has been in place since 2007. The City will consider making revisions and/or updates to this incentive program in the future.

The City may look to develop more sophisticated water rate billing structures in the future – including water budgets for each customer. However, the City does not currently have the infrastructure or information system in place to support developing water budgets for each water customer based on their irrigated areas.

System Wide Water Loss

The City current has about 20% non-revenue water, which is known to include unmetered treated water use, unbilled water use, other apparent losses (associated with meter inaccuracies) and real losses. The City commits funds annually to conduct water line repair and leak detection. The City also has a number of future capital improvement projects that will fund line replacement and new line installation projects. However, the City has a goal to reduce its overall system wide real and apparent losses throughout the planning period,

such that numerous other efforts will be considered for implementation to better track and reduce unaccounted for water loss.

To begin with, the City will consider performing a system wide audit of its water use following the AWWA M-36 methodology. This methodology will help the City to characterize unmetered and unbilled City uses, other unmetered treated water uses, and expected system wide water loss rates based on the characteristics of the City's distribution system. The system wide audit will also use data collected by the City to characterize selected segments of the City's current water distribution pipelines. From this effort, the City will be in better position to focus efforts on tracking and remedying unmetered water use.

With respect to unmetered water use, it is expected that some of the issue stems from older residential connections with meters installed inside the home after an irrigation tap occurs outside the home. Other unmetered and/or unbilled treated water uses occur as a result of City policies that occasional allow taps to be "turned on" without the knowledge of the finance department resulting in lost revenues. The system wide audit will be used to reduce the number of these occurrences and propose policy changes that will minimize this kind of apparent water loss in the future.

In addition, the City will need to consider a more aggressive pipeline repair and replacement program in the future. This evaluation will likely need to be link to other system wide water loss evaluations and efforts, such that it can be delayed until more information is available.

Finally, the City will need to consider improving its data collection and management protocols to better track and understand its customer water use behaviors, reduce apparent water losses, and generally improve its revenue production. For example, the City should track the municipal water use separately from its commercial water users. The City should also consider creating a commercial outdoor only water use category to help track commercial summertime irrigation demand (which could occur in tandem with future sub metering efforts). Finally, the City may want to consider segregating its large commercial accounts from its smaller commercial accounts (based on industry code or tap size, etc.) to help determine the use patterns and needs of its largest water use category. Other improvements to the City's water use tracking methods and processes may because apparent as a result of the system wide water audit.

Other

The City does not currently have a full-time staff person committed to water conservation and due to the City's size and available resources, it is not likely to be able to afford one during the planning period. However, the City may consider creating a more formal water

conservation position within public works to help implement this Plan and better track and characterize water use in the City. The City currently includes the impacts of water use efficiency in its water supply planning, it will continue to utilize an integrated approach to its resource planning efforts in the future.

Ongoing Water Uses

City Facilities

The City conducted a comprehensive Water Audit of its municipal facilities in 2003. These audits were chiefly used to make recommendations for indoor water use efficiencies; even though the audits included an evaluation of both indoor and outdoor water uses. Table 9 summarizes which facilities were audited in 2003. To evaluate the impact of the 2003 Water Audits on facility water use, a review of water use from 2006 to 2010 for each facility was conducted. Table 7 also indicates which facilities had 2006 to 2010 water use records available to allow for this evaluation.

Based on the review of the past and recent water use for those facilities with complete records, it is unclear if any of the recommendation made in the 2003 Report were implemented. For example, indoor water use in the Chapman Skate Rink, City Hall, and

Table 9 – Summary of City Audited Facilities in 2003

Facility Audited in 2003	Nature of 2003 Audit			Type of Taps		Availability of 2006-2010 Water Use Data	
	Indoor	Outdoor	Number of Taps	Treated Water	Raw Water		Tap Numbers; Comment
Airport	Yes	No	n/a	none, local well	unmetered	n/a	indoor water use metered by Airport; raw water for irrigation unmetered
Greenmont Cemetery	Yes	Yes	3	indoor only	unmetered	n/a	599901, 598301 (one tap missing) (no raw water use data available)
Chapman Skating Rink	Yes	Yes	3	Combined	-		372501, 372601, 372701
City Hall	Yes	Yes	2	Separate	-		184501, 187301
City Hall Service Center	Yes	No	1	indoor only	-	n/a	
Public Library	Yes	Yes	1	Combined	-		174501
Mason Center School	Yes	Yes	4	Separate	-		164001, 164101, 164301, 164401
Police Department	Yes	Yes	1	combined	-	n/a	
Recreation Center	Yes	Yes	1	combined	-	n/a	
River City Hall	Yes	Yes	1	Combined	-		440001
Wastewater Treatment Plant	Yes	Yes	3	indoor only	unmetered treated effluent	n/a	717501 (two others missing) (treated effluent use unmetered)

n/a not available

River City Hall increased from 2003 to 2008, 2009 and/or 2010. In the one facility that had a decrease in water use, the Public Library, water use was observed to decrease by nearly 90%

after 2008; however, this decrease is associated with the construction and opening of another Public Library in the City and may or may not be associated with any specific water use efficiencies.[14]

Table 10 presents a summary of the recommended indoor water use efficiency improvements updated from the 2003 Report supplemented by considerations for new technology (e.g., 1.5 gpm showerheads and 0.5 gpm faucet aerators for bathrooms and wash sinks) not available in 2003.

Similarly, outdoor water use at the audited facilities did not change significantly from 2003 to 2006 through 2010. Table 11 presents the recommended average irrigation water application volume for a typical season based on recommendations in the 2003 Report, as well as the actual irrigation rates for 2003, 2006, 2007, 2008 and 2009. For those City facilities with data, only City Hall indicates some reduction in outdoor water use since the 2003

Table 10 – Potential Indoor Water Use Efficiency Retrofits for City Facilities Based on the 2003 Audit

	Shower		Sink		Toilet		Urinal	
Facility	#	Average Observed Flow (gpm)	#	Average Observed Flow (gpm)	#	Average Observed Flow (gpf)	#	Average Observed Flow (gpf)
Airport	0	0	17	2.44	14	3.5	4	3
Greenmount Cemetery	2	2	4	3.6	3	3.5	1	3
Chapman Skate Rink	0	0	10	1.5	0	0	0	0
City Hall	0	0	5	3.2	6	3.5	2	3.5
City Service Center	2	2.5	4	2	0	0	0	0
Public Library[14]	0	0	9	1.8	7	3.5	2	3
Mason Center	4	2	10	3	14	3.5	4	3
Police Department	4	2.75	7	2.4	8	3.5	2	3
Rec Center	18	3.7	1	1.5	0	0	0	0
River City Hall	2	2.5	7	2.7	4	4.6	2	3
WWTP	2	6.25	5	4.8	4	3.5	1	3
Total Fixtures	**34**		**79**		**60**		**18**	
Costs per fixture	$ 33		$ 1.61		$ 282		$311	
Estimated Cost for Retrofit[1]		**$ 1,122**		**$127**		**$ 16,920**		**$5,598**
Estimated Water and Energy Savings[2]								

[1] costs only include hardware, no installation costs have been included
[2] inadequate data currently exists to estimate potential energy and water savings at this point in time
gpm – gallons per minute; gpf – gallons per flush

[14] The public library was moved and the old library building has new uses beginning in 2008. The 2003 audit of the library is therefore included for completeness but does not represent a change in water use efficiency.

irrigation season; however, all of the facilities appear to be over irrigating based on the 2003 recommendations. For this reason, it would behoove the City to consider revisit its facilities and identify new opportunities for improving water use efficiencies.

In addition, the City operates 25 parks, as listed in Table 12. These parks will also be considered for future audits to evaluate current irritation application rates and potential improvements in sprinkler head distributions and types; controllers and overall irrigation practices, etc.

Table 11 - Summary of Outdoor Watering Evaluations for City Facilities Audited in 2003

Facility Audited in 2003	Nature of 2003 Audit		Annual Irrigation Water Use (1,000 gpy)					Average Irrigation Rate (1,000 gpy)*
	Indoor	Outdoor	2003	2006	2007	2008	2009	
Airport	Yes	No	unmetered raw water used for irrigation					-
Greenmont Cemetery	Yes	Yes	unmetered raw water used for irrigation					n/a
Chapman Skating Rink	Yes	Yes	combined taps could not be separated					n/a
City Hall	Yes	Yes	**99**	**68**	**86**	**129**	**63**	21
City Hall Service Center	Yes	No	no outdoor water use					-
Public Library	Yes	Yes	**205**	**109**	**192**	2nd library constructed		83
Mason Center School	Yes	Yes	**638**	423	**648**	**912**	**758**	617
Police Department	Yes	Yes	tap information not available					n/a
Recreation Center	Yes	Yes	tap information not available					n/a
River City Hall	Yes	Yes	**246**	**395**	**286**	**306**	**331**	215
Wastewater Treatment Plant	Yes	Yes	unmetered treated effluent used for irrigation					n/a

Bolded Annual Irrigation use Indicates Higher than Required

* as defined in 2003 Audit Report "Smart Water Audits."
n/a not available; gpy – gallons per year

Existing Customers

Audits and Incentives

The City has limited interactions with its existing customer base and wants to improve in this area as a result of this planning effort. As previously discussed, the City wishes to reduce its unbilled and/or unmetered treated water uses. The City also wishes to limit summertime peak demands on the water treatment and supply system – to postpone future water treatment plant expansions and to improve community drought preparedness, respectively.

The first step that the City will consider is to conduct water audits of its largest commercial customers (including Fort Lewis College) and raw water use customers. It will also consider targeting outdoor irrigation audits for those residential customers that may have unmetered outdoor uses. The City could also consider providing indoor water

Table 12 – Summary of City Parks for Potential Water use Audits

Parks	Irrigated Area (Acres)	Availability of 2006-2010 Water Use Data	
		Taps/comment	
55 Plus Park	0.5	n/a	
Animas City Park	1.25		493101
Brookside Park	1		574501, 578601
Car Park	n/a		327001
Crestview Park	0.33		559501
Fairgrounds	4.5	n/a	
Fanto Park	2.98		132301
Fassbinder Park	0.97		593301, 593401, 593601
Folsom Park	4.35		372901
Gateway Park	14	n/a	
Goeglein Park	n/a		118701
Memorial Park Phase I	7	n/a	
Memorial Park Phase II	0.5	n/a	
Needham Park	2.5		579701
Pioneer Park	2.5		506501, 506601
Rank Park	12	n/a	
Riverfront Park	1	n/a	
Riverview Park	5	n/a	
Roosa Park	1.88		599201 et1
Rotary Park	1		434601
Santa Rita Park	n/a		705001, 705301, 732301
Schneider Park	18.62		599801
Third Avenue Parkway	1.25		170901, 181101, 181201, 181301, 181401, 181501, 181601, 181701, 181801, 181901, 182001, 182101, 182201
Viles Park 1	0.49		445501, 446501
West Park	n/a		594201

audits to its residential customers; however, average single family indoor per capita water use is about 90 gpcd, so this effort may not return adequate water savings for the investment needed to conduct such a program.

Rebates and retrofit of residential indoor fixture and appliance do not necessarily make business sense, since residential customers will be naturally replacing clothes washers, dishwashers and toilets; and the single family indoor per capita water use is already about 90 gpcd. Rebates and retrofits, or some similar incentives may make sense for the City's commercial customers; however, the scope of such a program would be best determined after a number of audits are conducted to collect location-specific water use information. Outdoor irrigation equipment rebates or retrofits may also be of some benefit to the City; but as with the indoor incentive programs, outdoor incentives should not be offered until some key outdoor water use audits have been conducted and customer outdoor water use behaviors are better understood.

The City will also consider and plan for the cost of installing and reading meters for those customers that currently have unmetered and/or unbilled uses.

Technical Assistance

In general, the City does not have the resources to conduct substantial technical assistance programs for its customers such as water use and "how to" workshops. It will consider conducting focused workshops in the future – workshops that would present information and education on specific water use behaviors and track the pre- and post-workshop water use of the attendees - however, this kind of educational effort is not necessarily warranted until other water use efficiency measures and programs are first implemented to address unaccounted for water, for example.

The City does have the available resources to install a Xeriscape demonstration garden in a high profile location within the grounds owned and maintained by the City. If planned and conducted correctly, a Xeriscape Garden can become part of a community garden that is supported by a gardening program at a local high school or club. The City will consider creating or supporting the creation of a Xeriscape Demonstration Garden.

Ordinances

The City has water efficiency landscape standards[15] that address the construction of new or the rehabilitation of existing non-residential landscapes and multi-family projects over 2,000 square feet. This ordinance requires that regulated landscapes document a statement of concept of the water efficient landscape, and prepare both a landscape and an irrigation design plan. The contractor uses the plans to direct the planting schemes, soil preparation and irrigation system layout and operation. Upon completion of the construction, a licensed landscape architect or contractor, irrigation designer or other landscape/irrigation professional shall certify that the plan was completed in writing to the City.

This ordinance includes water waste requirements for the completed landscape including overspray limits and time of day watering restrictions.

Currently, the ordinance only applies to non-residential and multi-family construction. The City will consider expanding the applicability of the current ordinance, and/or develop a water waste ordinance for residential properties based on the water waste language included in the irrigation design plan requirements contained within the ordinance.

Also note that, as indicated previously, the City has incentives for developers to include water efficiency in all new construction to help reduce the Water Plant Investment Fee

[15] City Ordinance 0-2007-30, see Appendix B.

currently charged by the City. This incentive program which currently is available for both non-residential and residential construction.

The City may also consider establishing a Green Building ordinance which would impacts all new residential developments. Such an ordinance could require new residential construction and renovation projects to meet minimum efficiency requirements. In other locations in Colorado, new dwellings have to meet "green point" requirements based on the project type and square footage. Many of the points are energy related, such as evaporative cooling, solar power, and efficient windows. However, there are several points that would conserve water. The City could also create a similar Green Building code for new commercial construction.

There is no additional cost to the City to develop Green Building codes for commercial development beyond what is already in place for administering the plan submittal and review requirements for new residential construction, beyond some staff training. City plan review, construction site review and inspection, and permitting must all work together to enforce the code requirements[16]. Any new Green Building code would carry with it the cost for training staff to appropriately implement the code and facilitate its intent.

Any other rules requiring water use efficiency for new and/or existing facilities that may be useful in reducing future water demand are currently beyond the reasonable preview of the Durango City Council (e.g., point of sale requirements). Therefore, no other water use efficiency ordinances were considered for inclusion in the detailed evaluations.

Education and Public Information

The City has limited programs currently in place to provide information or education to the local community regarding the benefits of water use efficiency and water conservation. There has been limited need for these tools in the past given that the community has consistently reduced its per capita water use over the past 30 to 40 years; with substantial reductions in the past 10 years. However, with recent increases in overall water use driven by population increases, the City wishes to manage summertime water demands to postpone construction of another water treatment plant and to improve future drought preparedness. For this reason, education and public information programs will become increasingly important to the City.

[16] City planning, finance and permitting already work together to conduct reviews and approvals of new construction in the City.

Therefore the City will consider implementing different types of education and information programs to engage and educate the community that the City serves. The programs that the City can choose from include:

- One-Way Education – bill stuffers, mass mailings, web pages, Xeriscape demonstration gardens
- Two-Way Education – water fairs, interactive websites, K-12 teacher and classroom education programs
- Engaged Education – focus groups, customer surveys, citizen advisory boards

Noteworthy is that consistent messaging by and from the City is vital to any educational program it funds. Consistent messaging - one that is authentic and guided by the principles that drive and shape the utility - represents to the community that water conservation and water use efficiency is important and respected. This kind of messaging can be very powerful and create substantial impact.

Summary and Screening of Candidate Water Use Efficiency Measures and Programs

Appendix E presents a listing of those candidate water use efficiency measures and programs that the City considered for implementation. This listing includes references to how these measures and programs align with the relevant state statute (CRS 37-60-126) and the CWCB Best Practices Manual. Appendix D also presents comments and specific issues that were used to determine whether or not a specific measure and program would be carried into the evaluation phase of the project.

Table 13 presents the list of water use efficiency measures and programs that the City will consider for implementation based on the screening comments and issues presented in Appendix E. The screened measures and programs will be evaluated in more detail in the section that follows, specifically to analyze the cost and benefit of any particular measure and/or program; as well as to select those measures and programs that the City will choose to implement in the next ten years.

Note that not all of the screened measures and programs will be evaluated for cost effectiveness. Selected measures and programs such as customer education and public information programs do not lend themselves easily to cost benefit analyses. In addition, other selected measures and programs (e.g., City's landscape ordinance) have already been, or are in the process of being, implemented by the City. Table 13 indicates which of the screened measures and programs will be evaluated using costs and benefits; weight of evidence; and/or other evaluation methods.

Table 13 – Water Use Efficiency Measures and Programs Selected for Further Evaluation

			Evaluation Method		
			Cost	Continuation of Program	Weight of Evidence
Foundational					
Metering					
	AMR Installation and Operations (see Data Collection)			X	X
	Identify Unmetered and Unbilled Treated Water Use		X		X
	Meter Testing and Replacement			X	X
	Expand Sub metering		X		X
Water Rates					
	Water Rate Increases		X	X	X
	Revisions/Additions to Inclining Rate Block Structure (link to rate increases)		X	X	X
System Water Loss Control					
	System Wide Water Audit (using AWWA M-36 methodology)		X		X
	Leak Detection Using Isolation Valving and Meters		X		X
	Pipeline Repair and Replacement		X	X	
Data Collection					
	Improved Customer Categorization			X	X
	AMR Installation and Operations			X	X
Ongoing Water Uses					
City Facilities					
	Revisit 2003 Audits		X	X	X
	Implement 2003 Recommendations - Indoor		X	X	X
	Implement 2003 Recommendations - Outdoor		X	X	X
	Audits of City Parks		X		
Existing Customers					
	Audits				
		Residential Outdoor	X		X
		Commercial	X		X
		Fort Lewis Treated Water Uses	X		X
		Irrigation (raw water uses)	X		X
	Technical Assistance				
		Xeriscape Demonstration Garden			X
	Rebates and Retrofits				
		Residential Outdoor Meter Installations	X		X
		Commercial Indoor (based on the audits)	X		X
		Fort Lewis College Indoor	X		
		Irrigation Equipment (raw and treated water)(based on the audits)	X		X
Ordinances					
	Water Waste				
		Expand Current Water Waste Program to Residential Construction		X	X
	Landscape and Indoor Water Use Reduction Incentives				
		Expand Current Water Waste Program to Residential Construction		X	X
Education and Public Information					
	One-Way				
		Bill Stuffers, Newsletter, Mailings, Website		X	X
	Two-Way				
		K-12 Education, Water Fair		X	X
		Message Development			X
	Engagement				
		Citizen's Advisory Group			X

Section 8

Evaluation and Selection of Water Use Efficiency Measures and Programs

The City has identified a select group of candidate water use efficiency measures and programs that address the key needs of the community with regard to future water use demand management. However, additional analyses are required for the City to appropriate value and evaluate the effectiveness of each candidate water use efficiency measure and program with regard to key evaluation criteria the City has developed.

The candidate measures and programs have been evaluated and discussed in the broad categories that the CWCB established within the new water conservation framework developed last year (Great Western Institute, 2010). The CWCB framework includes:

- Foundational measures and programs;
- Management of ongoing water uses;
- Ordinances; and
- Education and outreach.

Using this framework, the City is able to evaluate measures and programs that share common characteristics. For example, the City can compare expanding ongoing foundational programs without necessarily completing detailed cost benefit analyses, since these measures and programs are known to be a priority for managing water deliveries and generating revenue. In addition, the City can use the framework to select measures and programs from each broad category without direct comparison. For example, educational and outreach programs do not provide water demand reductions that are explicitly measurable. However, educational efforts are known to be integral to the implementation of measures and programs, and to the maintenance of long-term water conservation savings. To this point, the evaluation of candidate measures and programs will be completed using these three evaluation techniques:

- **Cost benefit analyses** which will be conducted by calculating the cost for each acre-foot of future water demand reduction.
- **Weight of evidence** which uses information from the literature and other sources to identify the benefit and appropriateness of selected measures and programs.
- **Continuation of ongoing programs** which have been identified as being effective in reducing water demand.

Overall, the candidate measures and programs were selected because they addressed key water conservation needs of the City including:

- Reduce non-revenue water losses (real and apparent) for both treated and raw water supplies;

- Reduce the City's water use;
- Reduce water demand of the City's largest customers (e.g., Fort Lewis College);
- Reduce summertime peak demands by all water users; and
- In general, support the City's efforts to be a "green" or "sustainable" community.

This section presents a detailed description of each candidate measure and program, and an evaluation of the measure and program using at least one of the criteria lists above.

Description and Evaluation of Candidate Measures and Programs

Foundational Measures and Programs

The City is most focused on implementing foundational measures and programs since these will improve the water use efficiency and profitability of the organization, as well as they are actions that the City has the ability to control, such that if chosen, the City will be able to implement the selected measures and programs completely and to fruition.

System Wide Water Audit

The City would benefit from an audit of overall water use, since non-revenue water use has increased to an average of about 20 percent in the last four years[17]. The system wide audit would be performed using the guidelines and methods that AWWA has identified (AWWA, 2009), as further characterized by various regional water management agencies[18]. The goal of the system wide audit would be to characterize current non-revenue water losses in both the potable and non-potable water systems through a review of current water production and delivery data. It would also identify water uses that may be unmeasured and/or unbilled, and evaluate the accuracy of City and customer meters for accuracy. The system wide audit would be used to better characterize real and apparent water losses, and identify data gaps regarding measuring current non-revenue water within the City's distribution system.

The cost of performing a system wide audit is variable depending on the level of detail desired, and the availability of staff resources. At a minimum, the City will need to commit staff resources from the Public Works, Finance, and Parks Departments to perform the audit. The City would also need to commit some resources to implement recommendations identified during performance of the system-wide audit.

Actual water savings from the system wide audit can vary widely depending on the study findings. For example, the audit may find that a substantial amount of apparent losses exist as a result of inaccurate metering. A more aggressive meter replacement program could

[17] Non-revenue water at a rate of about 20% is higher than the target of 7 to 8 %, which is based on the City's goals and targets that AWWA has identified (AWWA M-36, 2009).

[18] Using a methodology such as the following, which is based on the AWWA reference: http://www.mde.state.md.us/assets/document/water_cons/Water_Audit_guidance.pdf

help increase revenue for the City. A reduction of apparent water losses by one percent could translate into increased water sales of about 13 million gallons annually or an increase in water sales revenue of about $27,000 per year.

Other water savings may also be realized in associated with the system wide audit including:

- Reducing unbilled water uses[19] (which could account for another 1.5 to 2 percent of the City's non-revenue water),
- Improving water and wastewater treatment plant operations,
- Reducing real losses (when coupled with improved metering and sub-metering of the distribution system).

Implement Recommendations from the System Wide Audit

The system wide audit may produce recommendations for implementation of various water saving or revenue generating activities, such as:

- Improve measurement of unbilled water uses (e.g., residential outdoor uses, other City uses),
- Increase meter testing and replacement efforts on large taps,
- Conduct additional acoustic testing of older distribution lines,
- Install sub-meters and valves in the distribution system to separate portions of the distribution system, and allow for flow testing.

Each of these potential recommendations could help the City improve its water use efficiency and the efficiency of its distribution system. No specific recommendations are presented at this time until the system wide audit is conducted beyond those activities discussed below, some of which are the continuation of ongoing City programs.

Distribution System Repair and Maintenance

The City currently conducts line repair and replacement as an ongoing component of operations. The work consists chiefly of repairing observed leaks in both the potable and non-potable systems and replacing old distribution lines. The City maintains one line item in its annual budget for general repair and replacement at a funding level of $300,000 per year over each of the next 10 years.

The City also maintains specific projects for known water line replacement projects including Riverview, Florida Road, and Crestview waterlines. Altogether, the City has budgeted slightly over $2 million dollars for specific water line replacement projects, in addition to the $300,000 per year.

[19] The City has some unbilled uses that it controls (e.g., flushing flows from fire hydrants); however, some older residential customers have unmetered outdoor water taps that need to be identified and remedied.

Given that these projects are within the continuing programs that the City has funded, no additional evaluation is necessary at this time.

Note that line replacement and/or maintenance may change in the future depending on the outcome of the system-wide audit that is recommended as part of Plan implementation. However, until the system-wide audit is conducted, various data gaps are addressed, and appropriate data is collected, additional line replacement and repair activities beyond those currently budgeted by the City in its CIP are not warranted.

Meter Testing, Repair, and Replacement

The City has ongoing programs to test, repair, and replace water meters for its customers. In 2010, the City spent about $110,000 on meter testing and repair efforts, which allowed for the testing of selected commercial and irrigation account meters, plus some residential meters. Additional testing and repair efforts are scheduled for next year to expand the coverage into more residential and City accounts. The meter testing program may be renewed or expanded depending on the results of the system wide audit.

The City also has an ongoing program to install radio read technology on all of its customer's meters to improve data collection efforts, and in the future assist in leak detection.

Expanded Sub metering and System Testing

One specific data collection and system evaluation program that the City is interested in conducting relates to combining Sub metering of the City's distribution system with focused data collection using the new automated meter reading (AMR) technology that the City has been installing on all its customer meters. The concept would be for the City to place sub meters strategically on water mains in its distribution system and performing water balance tests in real time using alternative meter reading scenarios. The water balance analyses would be used to identify distribution system leaks and local meter inaccuracies.

Water Rate Studies and Water Rate Increases

The City currently employs an inclining rate block structure for all its potable water customers. Because the City does include 2,000 gallons in its base rate for residential water use, its customers are paying $6.23 per 1,000 gallons for the first 2,000 gallons of water they use.[20] The cost of the next 1,000 gallons of water is $2.12, and it increases to $2.78 for over 10,000 gallons of water use (or $3.06 for the same tier in the summer). For this reason, the tiered structure the City uses could be improved by either providing more water with the base rate, or by raising the tiered rates. However, the City would need to evaluate the effect of either adjustment on its gross and net cash flow before implementing the change.

[20] Industrial and commercial rates are even more misaligned, with the cost of the first 2,000 gallons of water priced at $12.46 and the next 1,000 gallons priced at $2.12 for the next 2,000 to 100,000 gallons, at which point the per 1,000 gallon rate increases to $2.78 or $3.06 depending on the season.

For this reason, the City would benefit from conducting a water rate study that would improve the water rate structure and evaluate the options for the City to raise water rates as per connection water use continues to decrease. One potential outcome of the water rate study would be to allow for small percentage increases each year (noting that Durango's water rates were set in 2007) for the rates and/or base fee. This is an approached used successfully by many other Colorado communities.

Data Collection

Although this activity is not specifically a water use efficiency measure and program, it was identified during the previous task since the City acknowledges its need to improve its data collection efforts, especially with the flexibility and effectiveness of the new AMR system that it has installed. Overall, the City needs to improve its overall data collection and evaluation procedures to effectively implement this Water Efficiency Management Plan. The City currently collects water use data and bills monthly for its customer segments (residential, duplex, and commercial). The City could improve tracking of key customer water use behaviors with the following revisions:

- Track City water use (including both potable and non-potable uses) as a separate customer segment, and
- Further differentiate commercial use into commercial, multi-family residential, and industrial (industrial is important given that the City maintains a water rate for commercial and industrial customers).

In this way, the City would be able to identify more readily effects of investments in water use efficiency related to the City's operations (e.g., irrigation controllers purchased for parks, implementation of the 2003 water audits, etc.). There is minimal cost to the City to make these minor upgrades to the customer tracking process.

Other improvements in data collection and water use tracking may be identified during the system-wide audit process. A cost of $2,500 per year is estimated for implementation of new data collection and management efforts resulting from the system-wide audit.

Management of Ongoing Water Use

The CWCB has three levels of measures and programs associated with management of ongoing water use:

- Improve water use efficiency at City facilities;
- Conduct evaluations and provide technical assistance to better understand the needs of the City's customers; and
- Provide incentives and/or perform retrofitting of customer facilities.

The City is focused on improving those water uses that it controls first (i.e., improvement of water use efficiency at City-owned facilities), then it will evaluate the need and efficacy of

conducting technical assistance for its customers. To this point, the City will first focus on conducting audits and assessments to better understand its own water use and plan infrastructure improvements to address recommendations of the audits and assessments.

City Facility Audits

The City is interested in auditing indoor water use at its own facilities, which include the City administrative buildings, recreation facilities, and water and wastewater treatment plants. In all there are ten different buildings that house public and staff bathrooms, and staff kitchen facilities. The audits, which are a follow-up to audits conducted in 2003, would be used to identify opportunities for improvements in water use efficiencies.

Although the City facilities are not tracked as a unique customer segment, City water use was calculated during the 2003 audit. In this audit, it is estimated the City facilities use about 13.5 million gallons of potable water per year for both indoor and outdoor use.[21] Based on these numbers a water audit, combined with a follow-up of appropriate retrofits of each facility, could potentially reduce current water demands by 15 to 30 percent or reduce indoor demands by up to 4 million gallons per year. Audits for City facilities are estimated to cost approximately $12,500, or $1,000 per acre-feet of saved water. In addition, auditing and retrofitting the City's facilities is an important step in the City's overall messaging related to the importance and need for water use efficiency to its customers and service area.

Outdoor irrigation audits of watering at the City's 25 landscape and park irrigation areas could also save significant amounts of treated and/or non-potable water. The City currently uses about 35-40 million gallons of water per year. A modest savings related to improved operations of the City's irrigation system could reduce non-potable water use by 5 percent, or about 2 million gallons a year at a cost of approximately $1,000 per audit plus the cost of equipment upgrades and retrofits. For the purposes of this Plan, a water demand reduction was attributed to performing the audits; however, a reduction of water use associated with improved outdoor watering efficiency is not included.[22]

The City could potentially characterize its carbon footprint and the potential reduction of its footprint based on the proposed water audit program. This would be achieved by incorporating the impact and cost of water treatment and delivery, and wastewater collection and treatment, as well as the cost of energy used to heat water. The audits would therefore support both water use efficiency program implementation and sustainability evaluations.

Residential Outdoor Irrigation Audits

Residential water use, although a large percentage of the City's water use, is not substantial enough to warrant a separate audit program. The best return on investment will be provided to the City in working with its largest customers and water users. However, the

[21] This does not include use for watering City parks and other strictly outdoor uses.

[22] The audits will be used to estimate potential water demand reductions for each of the City's 25 parks.

City is interested in identifying those residential customers that do not currently have metered outdoor water use. [23]

To identify potential residential connections that are not currently metering outdoor water use, the City will conduct a data review of residential accounts in areas with older homes. These accounts will be reviewed and targeted based on apparent outdoor water use. Audits will be conducted on those targeted homes to identify and test outdoor water metering occurrences and accuracy. Fifteen residential outdoor audits a year for three years has been included in the evaluations contained herein.

Given that the average residential customer uses about 40,000 gallons of water for outdoor irrigation per year, metering ten homes that are currently unmetered would cost about $5,000 (assuming meters and meter vaults would be needed at each home) and recoup about $1,000 per year in water use fees, indicating a return on investment in about 5 years.

Commercial and Irrigation Customer Audits

The City is also interested in conducting audits to support water use efficiency efforts of its largest commercial and irrigation customers. These audits would focus on the largest and in some cases oldest, customers. The City's largest treated water users are listed below with water usage in gallons for September 2010:

Commercial and Irrigation Accounts Top 20 Users	Water Use (Gallons)	Account Type
Fort Lewis College	4,415	Commercial
School District 9R – Escalante Middle	2,184	Irrigation Only
La Plata County Fair Grounds – Ball Field & Concession Stands	1,354	Commercial
GRVP – Three Springs	1,033	Irrigation Only
Mercy Regional Hospital	950	Irrigation Only
Doubletree Hotel Durango	847	Commercial
Ted Cooper – Mobile Home Park	844	Commercial
School District 9R – Buckley Park	757	Irrigation Only
Mercy Regional Hospital	721	Commercial
Holiday Inn Durango	624	Commercial
DSNG Railroad (high pressure washing of the locomotives)	600	Commercial
Pinon Heights Condo	587	Commercial
Wal-Mart Stores	415	Irrigation Only
Best Western Hotel	409	Commercial
Four Corners Health Center	409	Commercial
Strater Hotel Terrace	408	Commercial
Erick Arnwine – Rapid Car Wash	401	Commercial
Rocky Mountain Chocolate Factory	390	Commercial
Fathead Enterprises – Ska Brewery	338	Commercial
Quality Inn/Suites	331	Commercial

[23] Older residential customers had water meters installed inside the home at a location after the irrigation line came off of the water main. For these customers, residential outdoor water use is currently unmetered.

The City's audit program would be designed to address both the potable and non-potable water users, although more research is needed to evaluate and select the best customers. The above listing simply provides some information that will allow for the quantification of potential water savings. At a cost of $1,500 to $2,000 per audit, the potential water savings are in the range of 15 to 25 percent of total water use (Vickers, 2001), which for the listed water customers would be about 40 million gallons, or about 130 acre-feet of water of combined potable and non-potable water use. Note that the City would have to support specific retrofit activities in these selected facilities to realize a significant portion of these estimated water savings.

Nonetheless, water savings associated with the audits, independent of the follow-up retrofitting of inefficient fixtures and appliances are expected. Water savings that can be realized simply through the audit process relate to identifying and repairing ongoing leaks. For this reason, water savings are predicted for all City supported customer audits. However, the water savings from the audits are predicted to be only a fraction of the 15 to 25 percent savings that are possible when follow-up retrofits have been implemented.

The predicted water savings related to the audits for commercial and irrigation customers (estimated to be 1 percent of average annual water use for each audited facility) is proportional to the amount of water, on average, each customer uses. The potential water savings related to the various audits is:

- Greatest for Fort Lewis College, which uses on average about 34 million gallons of treated water annually;
- Then commercial customers, who use on average 2.3 million gallons per connection of treated water annually; and
- Finally irrigation customers, who collectively use on average about 105 million gallons of water annually for outdoor use.[24]

Therefore, irrigation audits and commercial audits are expected to be the most cost-effective of the audits the City plans to conduct. For purposes of the evaluations presented herein, it has been assumed that 5 commercial and 5 irrigation audits will be conducted yearly starting in 2014; as well as an audit of the Fort Lewis treated water use, which will occur in 2013.

Other Technical Assistance Efforts

The City has considered doing specific technical assistance programs in conjunction with the audits and various customer education and outreach efforts, as a means to maintain a consistent message of outdoor water use efficiency with it residential and irrigation customers. Although the City has considered doing technical assistance workshops for targeted audiences, current limitations on staff availability and follow-up has focused the City on developing a Xeriscape demonstration garden.

[24] The exact number of raw water taps utilized by the City's customers is not currently known.

Specific interest exists in developing a Xeriscape demonstration garden in conjunction with the botanical garden being developed along the Animas Trail. The demonstration garden will include signage indicating the types of plants. It is possible that the garden could be developed in cooperation with a local High School work study program with the effort focused on developing a sustainable plot that adheres to the seven principals of Xeriscape gardening and is maintained by an all volunteer staff. The garden would then not only create a learning environment for interested students, but it will be available for local residents, tourists and businesses to use as a learning tool.

Rebates and Retrofits

For purposes of this discussion, retrofits will be those fixture and appliance upgrades that are conducted for a finite period of time using grant funding whenever possible, whereas rebates will be ongoing programs that are funded by and administered by the City.

Indoor Retrofits for City Facilities and Commercial Customers

The City has a number of opportunities to conduct either rebates or retrofits as a service to its customer base. First and foremost, the City desires to retrofit its own facilities with high-efficiency fixtures and appliances, where such an action is determined to be cost-effective and practical. It is anticipated, for example, that the City would be able to install high-efficiency (i.e., 0.5 gpm) faucet aerators on bathrooms sinks in all of its facilities. Given that sink aerators are inexpensive and relatively simple to replace, this retrofit effort could be completed during the audit process described above. Similarly, high-efficiency showerheads (i.e., 1.5 gpm) could be installed at the City's recreation center and police station, again as part of the audit process. It is anticipated that retrofitting sink aerators and showerheads will not only reduce future water demand for the City, but it will also reduce future energy demand as well by reducing hot water use. Therefore, these two retrofits would be of value to the City even if installed prior to completing the cost benefit analyses that will result from the facility audits. For purposes of this planning effort, it was assumed that 100 sinks and 34 showerheads would be retrofit during the audit process.

Other more expansive retrofitting on the City's facilities (e.g., high efficiency toilets, low flow or waterless urinals, etc.) would not be warranted until after the audit analyses have been completed and a cost-benefit analysis can be completed. For the purpose of this planning effort, it has been assumed that 90 toilets in the City's facilities and 25 urinals in the City's facilities would be replaced after the audits have been completed.

Similar to the City program, the commercial retrofits would be conducted in phases, with sink aerators, and whenever possible showerheads, installed during the audits, and toilets and urinals, and other high efficiency devices (e.g., washing machines, ice makers, etc.) installed only after a cost-benefit analyses has been conducted based on data collected during the audit. For cost purposes it was assumed that 50 faucet aerators per year would be installed in conjunction with the commercial audits. Although it may be that the audits find specific benefits for conducting additional commercial retrofits, no other fixtures or

appliances are included for installation at existing commercial customers in the current planning period.

Outdoor Retrofits and Rebates for Commercial and Irrigation Customers

The City's water conservation goals are partially focused on reducing summertime peak water use. For this reason, the City will be implementing water efficiency measures at its own facilities based in part on the 2003 audit recommendations; as revised based on those facility audits conducted as part of implementation of this plan. For the City facilities, only the costs and related water savings for implementing equipment improvements at those facilities that were audited in 2003 are included in the Plan. For the City's 25 parks, the costs to make water irrigation efficiency improvements will only be developed after the audits are performed in 2014.

The City is also is considering implementing an outdoor irrigation equipment rebate for its largest commercial and irrigation customers. The irrigation equipment rebate program would focus on reducing outdoor irrigation by improving individual customer efficiencies with evapotranspiration (ET) controllers, rainfall sensors, and replacement MP Rotators (which will replace existing pop-up spray heads).

ET controllers are effective in improving outdoor water use efficiency by reducing the number of watering days and by improving the manner in which the irrigation water is applied to the turf and plant materials. For purposes of this planning effort it was estimated that ET Controllers would improve the efficiency of outdoor irrigation application by about 12 percent over existing efficiencies, noting that ET Water, a manufacturer of ET controllers and other water management devices estimates savings between 30 to 50 percent (www.etwater.com). For cost purposes, it was assumed that twenty $250 rebates per year would be provided under the City's future ET Controller residential rebate program.

The use of rainfall sensors would also reduce outdoor water use. However, rainfall sensors only impact whether or not a scheduled irrigation event will occur or not, compared to an ET controller which can alter irrigation timing and water application rates. Rainfall sensors were assumed to improve irrigation efficiency by about 5.5 percent. For cost purposes it was assumed that twenty $50 rebates per year would be provided for under the City's future rainfall sensor rebate program.

Finally, the City would provide replacement pop-up spray heads using MP rotators, which improve irrigation application efficiency by about 20 percent (Hunter, 2010). For cost purposes, it was assumed that 30 new MP rotators would be provided to each of 15 customers per year at a cost of $300 per facility. The customer would be responsible for obtaining the MP rotators from the City for $300 and completing the installation. The City would have to go to the facility/park/outdoor use area and verify installation before the rebate check would be provided to the customer.

Ordinances

The City currently has a watering ordinance that restricts and controls landscape design, construction and irrigation for non-residential construction. A copy of this ordinance is provided in Appendix C. This ordinance which defines landscape and irrigation system requirements; and includes time of day and water waste restrictions, does not currently include any definition of fines and penalties for overwatering or wasteful watering practices. The City desires to increase its policing of wasteful watering practices in two ways:

i) To increase its level of enforcement during periods of seasonal irrigation watering; and

ii) By expanding these program requirements to existing (rather than only new) construction, and to include residential irrigation practices.[25]

Currently there is not adequate data to estimate costs and benefits of implementing the ordinances listed above, in part because the ordinances have either been sparingly enforced (e.g., water waste ordinance) or have not been in place long enough to provide for estimating ongoing water savings (e.g., green residential building code). Implementation of these ordinances will therefore require that appropriate data be collected to indicate the value of the effort and to verify that water demand reductions are actually occurring.

Education and Outreach

The City currently conducts limited education of and outreach to its customers. The City does not anticipate increasing its educational efforts substantially although it will need to advertise its new programs, especially its residential programs, to increase participation. Education and outreach will be conducted therefore by including information on the City's website, supporting K-12 education (through the Water Information program), creating printed materials that can be placed in high visibility areas, and creating published articles regarding the City's efforts, beginning with the publicity around the creation and implementation of this Plan.

To increase public understanding and awareness of this Plan and other water resource management activities that the City is currently conducting, the City will consider instituting a water messaging program that will coordinate all of its outreach and educational efforts under a single messaging campaign, to help brand the City's activities and promote its efforts to local businesses. The messaging campaign will include

[25] The ordinance would not be necessarily expanded to include required landscape and irrigation design plan submittal and approval for all residential properties; but would include the provisions for time of day watering, water waste practices, etc.

developing themed recognition to those commercial facilities and organizations that participate in the audit programs and receive retrofits and/or rebates.

Finally, the Public Works Department maintains a Water Commission that is used to engage the community and create feedback mechanisms for the development of policy and programs. This organization has been in existence for decades and will continue into the future to inform the adaptive management components of the Plan during implementation.

The City currently budgets $2,000 per year for education and outreach. This cost will continue into the future and will need to be increased to include the cost for messaging.

Summary

The City will be increasing its active water efficiency program based on the results of this Plan. The specific water efficiency measures and programs that the City has chosen to implement are summarized below: Tables 14 summarize those measures and programs associated with foundational water savings, and Table 15 summarizes measures and programs associated with ongoing water uses.[26] The process of implementation, including a discussion of the timing, staging, and priority of these measures and programs will be presented in Section 9.

Table 16 was created to give the reader the ability to review and understand the real cost of achieving meaning water use efficiencies, since performing individual measures and/or programs as listed in Tables 13 and 14 do not necessarily create water demand reductions given that selected measures and programs need to be coupled together to be effective.

[26] Appendix F contains the detailed analyses of estimated costs and water savings for each of the selected alternatives.

Table 14 - Selected Foundational Water Use Efficiency Measures and Programs

Selected Measure and Program	Year(s) of Implementation	Total Estimated Cost for Implementation	Estimated Total Annual Water Saved (AF)
Leak Detection and Repair			
Conduct System-Wide Water Audit, Identify Unmetered and Unbilled Uses & Implement Recommendations	2011-2020	$90,000	-
Leak Repair (Potable & Non-potable)	2011-2020	$4,152,000	-
Isolation and Testing of Selected Areas	2012	$15,000	-
Meter Improvements			
Install Meters on Unmetered Uses	2011-2015	$39,000	-
Install New Valving/Sub metering Based on Audit Recommendations	2013	$20,000	-
Meter Replacements & Radio Read installs	2011	$150,000	-
Ongoing Meter Testing & Replacement Program	2011-2020	$1,100,000	-
Other			
Water Rate Increase (annually)	2011-2020	-	-
Water Rate Studies	2013-2014	$79,000	-
Total Estimated Cost through 2020 (Foundational)		$5,615,000	-
Estimated Reduction In Apparent Losses (Low to High range)			140 to 245 AF
Estimated Reduction in Real Losses (Low to High range)			75 to 180 AF

Table 15 - Selected Water Use Efficiency Measures and Programs for Ongoing Water Use

Selected Measure and Program	Year(s) of Implementation	Total Estimated Cost for Implementation	Estimated Total Annual Water Saved (AF)
Audits			
Conduct Audit of City Facilities (follow-up to 2003 audits)	2011	$13,500	0.4
Conduct Audit of City Parks	2014	$25,000	0.5
Conduct Audit of Residential Outdoor Use (15 audits/year)	2012-2014	$22,500	0.1
Conduct Audit of Largest Commercial Customers (5/year)	2014-2020	$52,500	2.0
Conduct Audit of Fort Lewis College Treated Water Use	2013-2015	$30,000	1.0
Conduct Audit of Largest Irrigation Customers (5/year)	2014-2020	$42,000	0.3
Rebates and Retrofits[1]			
Retrofits - City Facilities Indoor	2011-2012	$56,198	4.3
Retrofits - City Facilities Outdoor	2011-2013	$7,360	6.4
Retrofits - Commercial Indoor Fixtures/Appliances	2014-2020	$56,250	27
Retrofits - Fort Lewis College	2013-2015	$41,025	19
Rebates - Commercial/Irrigation Equipment (various)	2014-2020	$63,000	92
Xeriscape Garden	2015-2020	$10,500	0.0
Total Estimated Cost through 2020 (Ongoing Water Uses)		$421,983	
Estimated Water Savings (AF)			153 AF

[1] – The effectiveness and success of the retrofit and rebate programs are dependent on conducting audits first to target and prioritize the placement of high-efficiency fixtures.

Table 16 – Per Acre-Feet Costs for Selected Water Use Efficiency Measures and Programs

Selected Measure and Programs	Components Included	Estimated Demand Reductions (AF)	Estimated Cost ($/AF)
Leak Detection and Repair with Meter Improvements	System Wide Audit, Identify and Resolve Unbilled Uses, Leak Repair, Meter Testing and Replacement, Install Meters on Unmetered Uses, and Other Related Projects	75 to 180 AF	$30,000 – 75,000[27]
City Facility Audits and Retrofits	Indoor Water Use Audits of City Facilities with Selected Fixture Retrofits	4.7	$15,000
City Facility Audits and Retrofits	Outdoor Water Use Audits of City Facilities with Selected Fixture Retrofits	6.9	$4,700
Audits and Retrofits of Largest Commercial Facilities	Indoor Water Use Audits of Selected Commercial Facilities with Selected Fixture Retrofits	29	$3,750
Audits and Retrofits of Largest Commercial and Irrigation Facilities	Outdoor Water Use Audits of Selected Facilities and Properties with Selected Retrofits	92	$1,250
Audits and Retrofits of Fort Lewis College Facilities	Indoor and Outdoor Water Use Audits with Selected Fixture Retrofits	20	$3,600
Education (including Xeriscape Demonstration Garden)	City website, Billing and Newsletters, Demo Garden, etc.	0	-

[27] Costs for these measures and programs are offset by an estimated increase in water sales of $96,000 to $170,000 per year.

Section 9
Modified Demand Forecast and Other Impacts

The City is planning to implement water efficiency measures and programs as discussed in the prior section for purposes of reducing future potable and non-potable water demands; and reducing real and apparent system losses while at least maintaining current levels of water sales revenues.

The estimated water savings that the City will realize through the implementation of proposed water efficiency efforts over the next ten years are summarized in Table 17. Appendix F provides the assumptions and analysis used to develop the estimated water savings. Actual water savings will depend upon numerous internal and external forces influencing customer water use. Therefore, the City will monitor the progress of its proposed water efficiency programs, such that the actual water savings are tracked and reported on a regular basis to the City Council and its operating committees.

Table 17 - Estimated Future Water Demand Reductions

Year	Estimated Total Annual Water Savings Potable (acre-feet)[1]	Estimated Total Annual Water Savings Non-Potable (acre-feet)	Total Water Demand Reductions (acre-feet)
2011	21	0	21
2012	39	0	39
2013	76	0	76
2014	98	0	98
2015	123	15	138
2016	145	31	175
2017	167	46	212
2018	186	61	247
2019	205	76	282
2020	225	92	317

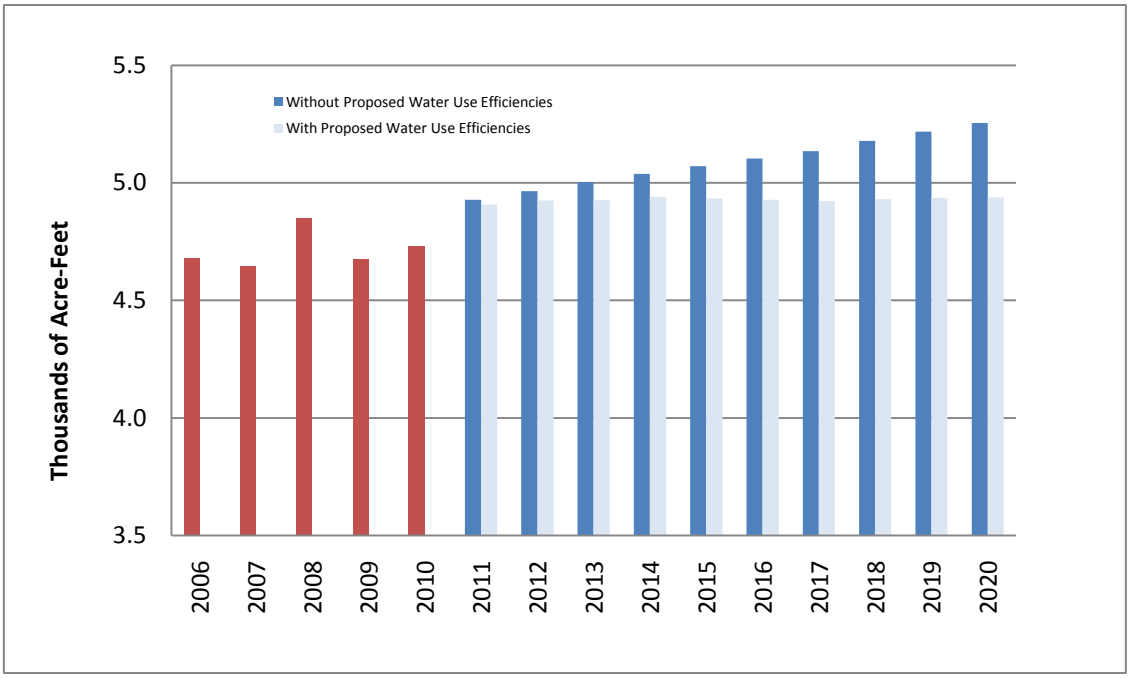
[1] Assumes the estimated high level of reduction in real losses.

The overall cost to implement this plan is estimated to just over $6 million over the next ten years; noting that about $5.25 million of these costs are already accounted for in the Public Works capital improvement budget over the planning horizon. Therefore, this plan includes an additional set of expenditures up to about $750,000, or approximately $75,000 per year from now until 2020. It is possible that a portion of the annual budget for water efficiency could be paid for using State grant programs currently administrated by the CWCB. These

grant programs could be used to match City funding (in-kind and cash) to conduct those activities that will best support the City's overall goals and objectives for its water efficiency measures and programs.

Figures 7 illustrates the trend of future water demand over the next ten years for total water use with and without the effects of the proposed water efficiency measures and programs. Based on the rate of predicted growth the proposed water efficiency measures and programs roughly offset the increased demand of water over the next ten years. Since the forecast assumed that raw water demand would not increase or decrease over the next ten years, the proposed water efficiency measures and programs roughly offset predicted increases in treated water demand over the next ten years.

Figure 7 - Estimated Reduction in Future Water Demand



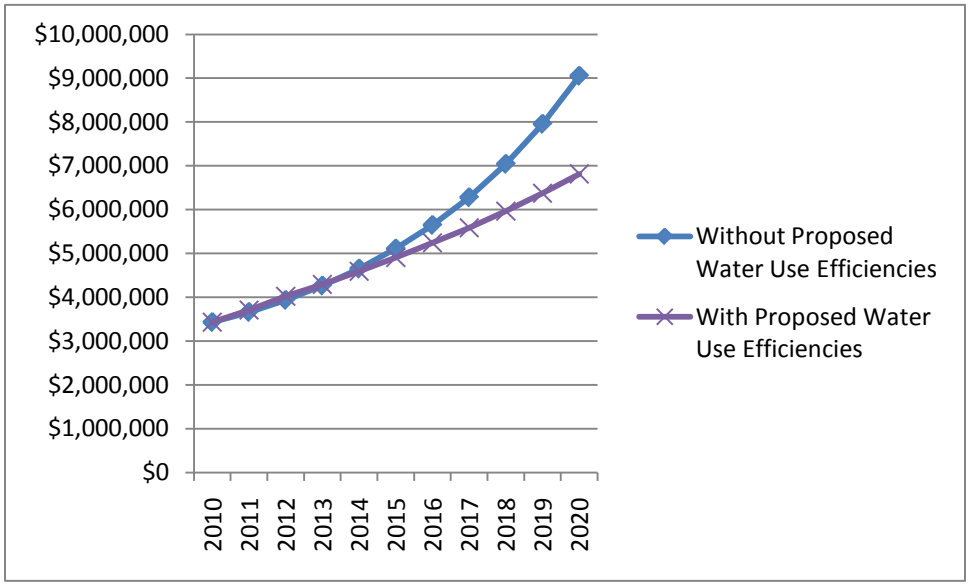
The impact of the proposed water efficiency efforts on City cash flow and revenue is not as dramatic as the impact on future water demands, although future water sales will be reduced if the proposed water efficiency measures and programs are implemented. Figure 8 presents the estimated revenue for the City from water sales with and without water efficiency.[28] As water efficiency efforts are implemented revenues are roughly equivalent between the two scenarios until about 2015. The equivalent revenue over this period is

[28] For the purposes of this Plan, it was assumed that water rates would increase at a rate of 2.5% annually over the planning horizon. Also note that Figure 11 includes the effects of avoided costs for treatment and distribution associated with the reduction of real water losses at a rate of $1.50 per thousand gallons.

expected as revenue impacts from reducing real and apparent losses offset the reduced water demand.

Beginning in 2015, water sales revenue is expected to diverge from water sales revenue projections without the proposed water efficiencies implemented. Water sales revenue associated with the proposed water efficiency program, which will increase over current levels by about a factor of two by 2020, are about 75% of water sales revenue without the proposed water efficiency program.

Figure 8 - Estimated Total Annual Water Revenue With and Without Water Efficiency Program



Section 10
Implementation Plan

The City has identified those measures and programs that it chooses to implement to reduce future customer water demand; however the specific staging and order of measure and program implementation is clarified in this implementation plan. Clearly the City will earnestly pursue meaningful water conservation in compliance with the elements of this Plan and the direction of City Council. Future capital funding and annual budgets will be developed in accordance with the funding requirements laid out in the preceding chapters. However, future appropriations of City funding for the various measures and programs contained herein cannot be guaranteed given that the nature of future City priorities may change due to acts of God, public health issues, or other unforeseeable issues.

To this point, the implementation plan for water use efficiency by Public Works Department needs to maintain flexibility to adapt to the changing needs and requirements of not only the City's resources, but the water use efficiency program as well. For as portions of the water use efficiency program are implemented, new data and information will be acquired which may dictate or influence future water use efficiency programs needs not predicted at the time of this planning effort. Therefore, this Plan will be implemented in an adaptive management approach, incorporating changing conditions and influences into the year to year, and month to month, water use efficiency activities planned and executed by the City.

Given this framework and understanding of how water use efficiency will be best implemented in the City, the Plan is best served through the identification of the staging, or sequencing, of the various selected water use efficiency measures and programs; and a listing of those measures and programs that are of the highest priority to the City as of this writing. In this way, the first set of measures and programs that the City plans to implement can be identified (i.e., those measures and programs that will be implemented in the next 1 to 2 years). As new information becomes available over the next 1 to 2 years, the City will revise and update its water efficiency methods to best address the circumstances at that time (with regard to data collected, current fiscal resources, changing customer needs, etc.).

Sequencing

Although the City understands and supports the implementation of meaningful water conservation, its resources are not unlimited; therefore, it has chosen to sequence the implementation of its selected water use efficiency measures and programs in accordance with its current needs, expectations for future fund allocations, and perhaps most

importantly due to the logical connection and interaction between specific measures and programs. For example, retrofitting existing City facilities with high efficiency toilets and urinals is best conducted after the facilities are audited to determine the cost and benefit related to any specific installation. Similarly, a system-wide audit of the City's water treatment, distribution and billing systems will be used to inform decisions to implement new meter testing, repair, and/or installation activities.

Figure 9 presents a diagram illustrating the expected sequencing of the water use efficiency measures and programs selected by the City for implementation. From this diagram it can be seen that there are a number of measures and programs that are spread out over a three-year period starting in 2011. These activities, many of which are one time efforts, will be used to collect data and information to better characterize the current water use and practices within the City such that more meaningful water use efficiency measures and programs can be devised and implemented. These data will be used to identify data gaps, develop cost-benefit analyses, and prepare grant requests in support of the City's water use efficiency efforts.

Appendix F presents a summary of the estimated annual costs for selected water use efficiency measures and programs as understood at this time. The costs have been developed based on the following assumptions:

- Individual water customers of the City's will be interested and participate in the various measures and programs, especially the residential and commercial rebates;
- The System-wide audit will help to identify areas for City improvement regarding measuring and billing non-revenue water uses; and
- The City will coordinate the budgeting of its Capital Improvement Projects with the annual water conservation budget.

Priorities

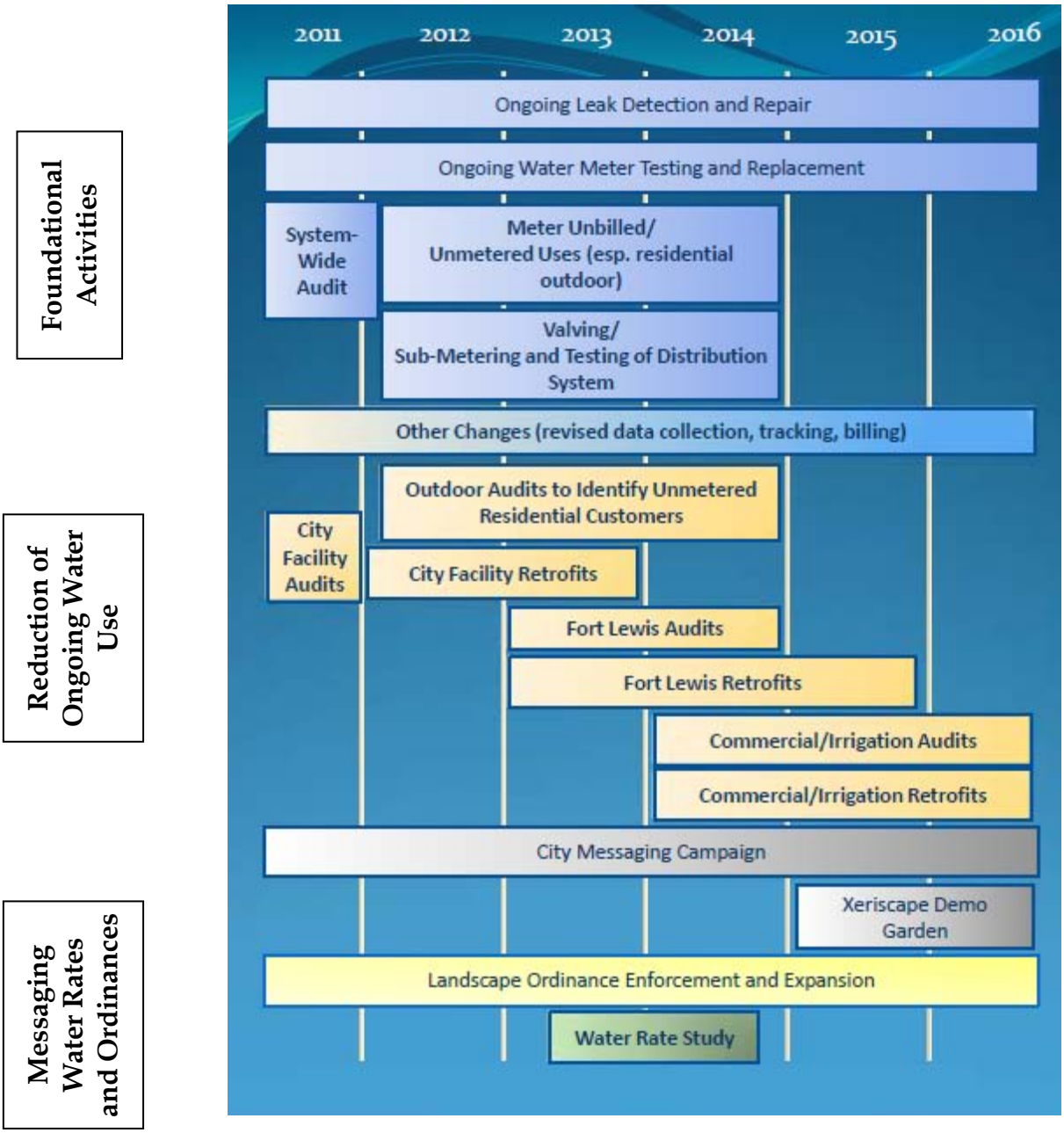
For the City, the implementation of water conservation to support future demand reduction begins with the management of current non-revenue water (which aligns with one of the State-defined foundational water use efficiency elements). Non-revenue water includes both apparent losses that effect City billings and revenue; as well as real losses, which effect City operational costs. The City is focused on reducing the current level of non-revenue water, estimated to be about 20% of total treated water to about 13% in the next 10 years. To achieve this goal, the City will need to:

- Plan for and conduct a system-wide water audit to better characterize current non-revenue water and identify areas for utility improvements (e.g., revising the

customer billing categories, identifying unmetered uses, developing cost estimates for making various proposed improvements to current water accounting practices);

- Improve meter reading accuracy on existing accounts;
- Identify and measure unmetered water uses; and

Figure 9 –Schedule for City Selected Water Use Efficiency Measures and Programs



- Continue testing and repair of water distribution lines to manage leaks and other real losses between the treatment works and customer meters.

These are therefore the greatest current priorities for the City.

Pricing of the City's water – both respect to the generation of revenue to cover actual fixed and variable costs; and to promote water use efficiency by its customers – is another high priority set of activities. To this end, the City will continue with annual water rate increases and will conduct a complete evaluation of its water rates in 2015.

The next highest priority for the City will be to conduct those measures and programs that improve the water use efficiency of the City's nine facilities. These measures and programs include facility audits and appropriate retrofits and replacements.

Other water use efficiency measures and programs that will support a better understanding of specific customer uses and improve their water use efficiencies, while considered important to the management of future water demand are considered less important than those measures and programs discussed above.

Public Input

The summary of public input will be provided after the comment period has closed. Public comment was initiated in March 2011. The public comment period was announced through the City's webpage and a notice placed in the local newspaper. Copies of the Final Draft plan were made available at River City Hall and the Durango Public Library. Appendix G contains copies of the public notices used by the City to advertize the public comment period.

Public comment was continued for 60 days during which time City Council and the Public Works Department collected public comments. The Plan was finalized after the public comment period was completed at a City Council meeting held on June 20, 2011. All public comments and the action taken by the City Council are included in the Council minutes included in Appendix G. Note that the response to the public comments is included in the Council minutes.

Section 11
Monitoring and Evaluation of Measures and Programs

It is important to identify an approach to monitoring as many of the measures and programs as possible so the value of each program can be evaluated as it is implemented. In this way, adaptive management of the Plan components can be performed, and resources from the City allocated.

Generally, the City has selected water use efficiency measures and programs that can be tracked.[29] However, some measures and programs such as customer education and increasing water rates cannot be measured directly. For these measures and programs, overall customer water use metrics such as per capita residential water use and total per capita water use will be tracked. Other measures and programs, such as the audits conducted on large commercial water users or Fort Lewis College can be monitored on an individual basis.

Monitoring efforts and metrics that the City proposes are summarized in Table 18.

Table 18 - Summary of Monitoring Methods for Estimating Water Savings

Use Efficiency Measure/Program	Real Water Losses	Apparent Water Loss Reductions	Quantity of Audits/Rebates	Individual Water Use	Per Capita Water Use	Peak Monthly Demand
System-Wide Audit	X	X				
Leak Repair	X					
New Meter Installation and Replacement	X	X				
Water Rate Increase					X	X
Residential Audits	X	X	X	X	X	
City/Fort Lewis/Commercial Audits		X	X	X	X	X
City/Fort Lewis/Commercial Rebates/Retrofits		X	X	X		X
Irrigation Rebates		X	X	X		X

[29] The City may have to implement some changes to its current protocols to track targeted customer water use, such as the City's water use and raw water uses, to complement the City's active water conservation efforts.

Plan Updates and Revisions

On an annual basis the City will monitor the metrics proposed in Table 18. The results will be reported to the Water Commission and City Council. These annual reports will help prepare the City for updating the Water Efficiency Plan every five to seven years, as required by the CWCB. It is the City's intent to update this Plan at the end of 2015.

Appendix A

Long-Range Water Efficiency Management Plan

Long-Range Water Efficiency Management Plan

for the City of Durango and the properties served by the City's water utility system

The stated goals of the 1998 Water Conservation Plan were to develop a comprehensive program of conserving water that is cost effective, achieves reliable and permanent reductions in per capita demand, and maintains the current quality of life in Durango. The programs should promote the efficient use of water and ensure a smooth transition to a reduction in demand during times of drought.

Specific goals of the 2001 Water Efficiency Management Plan are to set up a program which:

- Promotes awareness that Durango is located on the edge of a high desert and that its water resources are limited and could be seriously affected by long-term drought conditions;
- Reduces the operating costs of the Public Works Department;
- Reduces peak day per capita water demands;
- Preserves the capacity of the City's physical system, thereby delaying the costs and environmental impacts of new water supply facilities;
- Educates the public in water efficient techniques that apply to indoor and outdoor water use;
- Provides leadership through example by demonstrating practical and attractive water efficient devices and landscapes on all City lands.
- Continues to allow the scenic beauty of the area to be maintained;
- Is supported by residents of the City;
- Can be evaluated and revised as necessary to reflect and enhance the effectiveness of its various elements.

These goals could be accomplished by applying the following strategies.

Measure #1. PLANNING AND OVERALL APPROACH

The City shall initiate the following actions:

A) Encourage efficient use of water, both indoors and outdoors, for all City utility customers.

B) Evaluate existing land use planning and zoning laws affecting water use and revise them to be consistent with the efficiency strategy.

C) Apply stringent requirements to City-owned facilities to set an example within the community.

D) Develop staff membership and communication with local, state and regional organizations in order to keep up with current water efficiency technology and trends.

E) Promote the regional awareness and planning that is essential to all water resource management in the San Juan Basin such as the following:
   1. A long-range water resource planning process which incorporates the goal of sustainable growth;
   2. Inclusion of other (city, county and tribal) governments and water users in the planning process;
   3. Addressing water quality and quantity issues.

Measure #2. RATES

The City shall consider the following measures to encourage water use efficiency in a fiscally responsible manner.

A) A 3rd tier rate for users of large amounts of water upon completion of an analysis of alternative surcharge rates and their impact on different categories of water customers.

B) Reviewing the rate structure periodically to ensure that the system generates adequate revenues to pay the costs of operation and maintenance.
C) Retaining residential sewer rates based on average January water usage.
D) Investigate charging residential plant investment fees according to maximum demand of the proposed use.

Measure #3. EDUCATION / PUBLIC AWARENESS

The City may consider or continue the following approaches to educate and get feedback from the community about water efficiency issues.

A) Instituting a more aggressive, comprehensive and visible public education campaign on water efficiency. Provide adequate funding to effectively inform the public of the need for efficient water use. Possible methods are:
   1. Distribute information through a wide range of media including the internet and nurseries.
   2. Carry out public education prior to implementation of rate changes.
   3. Emphasize good watering practices and provide more information on the benefits of Xeriscape since such a large portion of water use goes to outdoor irrigation.
   4. Provide technical assistance in converting existing landscapes to conform to the seven principles of Xeriscape.
   5. During the watering season, provide a daily Lawn Watering Guide to the Durango Herald, showing how much water a lawn might need if it hadn't been watered for three, five or seven days.
   6. Create a Xeriscape exhibit that can be placed at active locations and community events.
   7. Include a bar chart of the previous month's usage and the current month's usage on the monthly bill, in addition to tips and information about how to use water more efficiently.
   8. Actively encourage owners to replace high volume fixtures with low volume ones and evaluate their landscaping approach whenever a building permit is obtained.
   9. Identify and particularly target the highest residential and commercial customers and work with them more directly to help them reduce their water bills.
   10. Provide information on the most current water-savings technologies.
   11. Offer to speak to students in all schools about water efficiency, possibly showing videos and distributing activity books.
   12. Cooperatively, with the School District 9R, the Bureau of Reclamation and other interested entities, create and employ an ongoing ecological program (possibly through hiring a K-12 environmental education specialist) for water efficiency and related environmental issues in our schools. Such a program might include distribution of retrofit kits ("Learning To Be Waterwise" conservation kits), videos and/or activity books, classroom presentations, poster contests, etc.
   13. Collaborate with existing community organizations to promote water efficiency.
B) Funding the Water Information Program.
C) Annual participation in the Children's Water Fest.
D) A water audit program to help homeowners learn how to improve their efficiency of water use. (This would include such things as evaluating sprinkler systems for proper coverage, replacing damaged heads, realigning heads, teaching owners how to program their controllers, prepare watering schedules based on weather conditions and how to repair leaking faucets or toilets.)
E) Providing a means to enforce any regulations which may be developed to support efficient water use.

Measure #4. RESIDENTIAL USE / PLUMBING

The City shall consider the following measures to reduce interior / plumbing uses.

(A) Encourage water-efficient plumbing fixtures and appliances for all customers, including toilets, urinals, showerheads, and faucets.

(B) Encourage owners to replace high volume toilets with low- flow toilets whenever a building permit is obtained.

(C) A voluntary residential fixture retrofit program to install water-saving retrofit devices in existing residential development.

(D) A 1.6 gallon-per-flush, low-volume toilet rebate program (after a through study of the effects) with rebates for each toilet replacement of three gallons or more per flush toilets for all residential and commercial customers.

(E) Encourage plumbing fixture wholesalers and retailers to sell only low-flow plumbing fixtures.

Measure #5. LANDSCAPING WATER WASTE

The City shall consider the following measures to support low water-use landscapes and efficient irrigation.

(A) Adopt the proposed "Water Efficient Landscape Ordinance" which makes compliance with outdoor water efficiency measures a condition of water service for new commercial customers of the Durango water utility system and is voluntary for single- or two-family residents and existing commercial accounts. It includes the following:

1. Provision of landscape and irrigation plans and schedules;
2. Xeriscape principles shall be applied to all new development;
3. Limitations of water features;
4. No watering in May through September between 10:00 a.m. and 6:00 p.m.;
5. Discourages fugitive water from entering the public right-of-way or adjacent property;
6. No high water use plants on slopes greater than 1:4, or in areas less than eight feet in any dimension;
7. Efficient new irrigation systems;
8. Installation of new sprinkler heads at least eight inches from the curb.

(B) Combine all City of Durango information / requirements regarding landscaping into one document; eliminate conflicts with the efficiency strategy.

(C) Initiate a Xeriscape education program including:

1. Creation of Xeriscape demonstration gardens;
2. Distribute Xeriscape information to citizens acquiring building permits.
3. Investigate the establishment of evapotranspiration stations and associated public education including a lawn watering guide;
4. Provide information regarding irrigation auditor training and certification programs;
5. Cooperation with other agencies on public workshops, gardens, tours, videos, newsletters, events, etc.

(D) Establish evapo-transpiration stations and publicize a program to assist residents, the Parks Department, school district, golf course, and Fort Lewis College in applying the proper amount of water for irrigation.

(E) Institute a voluntary certification program for sprinkler contractors, with the qualification being the satisfactory completion of a test on water-efficient irrigation design.

(F) Investigate Xeriscape landscape retrofit and rebate program for replacement of high water use turf and landscape plants with low or medium water use turf and plants.

(G) Investigate efficient irrigation system retrofit and rebate program offering rebates or credits for replacement of old, inefficient irrigation systems with approved water-efficient systems.

(H) Initiate continued effective water waste enforcement:

1. Establish fees for offenders with increasingly higher fees for repeat offenders;
2. Assess fee on first violation observed by enforcement officers;
3. Apply fees to water bill.

Measure #6. INSTITUTIONAL, COMMERCIAL, AND INDUSTRIAL USE (ICI).

The City shall consider the following measures to reduce water use in the Commercial billing classifications.

(A) Expanding the unaccounted-for-water loss reduction program including:

1. Maintain the leak detection program to locate and repair the water distribution system on a continuous basis;
2. Continue meter maintenance and replacement program to identify, repair, and/or replace inaccurate or malfunctioning meters;

(B) An approach for reducing excess water use for City facilities or services.

1. Repair leaks quickly at all City facilities.
2. Perform an audit of water use at City-owned facilities and implement recommendations as soon as feasible.
3. Ensure that all newly developed City-owned property complies with the water efficiency standards for landscape and irrigation that are required of all other new developments.
4. Provide ongoing training programs about efficient watering for all City employees who are involved with irrigation of City-owned landscapes.
5. Consider installing raw water irrigation systems for all City lands when it is available and economically feasible.
6. Investigate the implementation of central irrigation control for irrigated City-owned landscaping.
7. Activate a public building plumbing fixture retrofit program, if cost-effective.

(C) Assisting Fort Lewis College and the golf course in developing water efficiency plans.

(D) A program to assess the efficiency of water use at area businesses.

(E) Explore the possibilities of potable and non-potable water reuse systems.

Appendix B

City of Durango Landscape Ordinance (Ordinance 0-2007-30)

10-5-12.5 Water efficient landscaping standards.

(a)

Purpose: The purpose of this section is to protect and enhance the community's environmental, economic, recreational, and aesthetic resources by promoting efficient use of water in public and private landscapes within the city, reducing water waste, and establishing procedures for the design, installation and maintenance of water-efficient landscapes throughout the area. The city council has made the following findings:

(1)

That Durango is located in a semi-arid climate where drought-like conditions periodically occur;

(2)

That the limited supply of water is subject to ever increasing demands;

(3)

That Durango's economic prosperity and quality of life depends upon adequate supplies of water;

(4)

That landscapes provide recreational areas, improve community aesthetics; clean the air and water, reduce heat and glare radiated by the built environment, buffer the potential negative effects that more intensive land uses may have upon adjacent lands, reduce soil erosion by slowing storm water runoff, offer fire protection, and replace ecosystems displaced by development;

(5)

That landscape design, installation and maintenance can and should be water efficient; and

(6)

That the city should implement a policy that promotes preservation and efficient use of water and other natural resources through the use of drought-tolerant plantings and xeriscape landscaping principles.

It is the purpose of this section to establish regulations which will:

(1)

Promote the values and benefits of landscapes while recognizing the need to invest water and other resources as efficiently as possible;

(2)

Provide for the protection of native vegetation;

(3)

Assist in reducing the overall per capita use of treated water within the city;

(4)

Reduce peak summer usage;

(5)

Reduce outdoor water waste;

(6)

Reduce damage to publicly owned streets and the public expenditures necessary to repair the damage caused by wasted water;

(7)

Increase street safety by reducing the potential of frozen water resulting from irrigation-related water waste on public rights-of-way;

(8)

Reduce irrigation water usage without sacrificing landscape quality by using lower water use plants, improved design and planting practices, different watering practices, and better irrigation system design and maintenance;

(9)

Establish a procedure for designing, installing and maintaining water efficient landscapes in new projects;

(10)

Promote the conservation of energy resources through the use of landscape design and material that can have a beneficial effect upon energy consumption; and

(11)

Establish a regulatory framework for the administration of landscape and irrigation design, plan review and inspection.

(b)

Requirements for new or rehabilitated landscapes:

(1)

Applicability:

a.

Except as provided in subsection (c) below, this section shall apply to all projects within the city limits or served by the municipal utility that are required to submit a landscape plan to the city as part of the development review process. The requirements and recommendations of this section are not required when designing landscapes for single-family and two-family dwellings, but are encouraged.

b.

Projects subject to this section shall conform to the requirements set forth herein.

c.

This section shall not apply to:

1.

Approved subdivision plats for which a site plan has been approved prior to the adoption of this section, if the site is developed in accordance with the approved plan;

2.

Parklands; and

3.

Ecological restoration sites (i.e. wetlands) which are intentionally altered to establish a defined, indigenous, historic ecosystem that does not require a permanent irrigation system.

(2)

Landscape documentation package:

a.

A copy of the landscape documentation package shall be submitted to the city. No permit shall be issued until the city reviews and approves the landscape documentation package.

b.

Each landscape documentation package shall include the following elements:

1.

Water efficient landscape concept statement;

2.

Landscape design plan; and

3.

Irrigation design plan.

(3)

Elements of landscape documentation package:

a.

Water efficient landscape concept statement. Each landscape documentation package shall include a Water Efficient Landscape Concept Statement (form provided by the city) that serves as a checklist to verify that the landscape design plan, irrigation design plan and a narrative summary of the project have been completed. The narrative should address and accommodate the soil quality and compaction.

b.

Landscape design plan. All landscaping plans that are required as part of the development review process shall be designed to incorporate water efficient materials and techniques through application of xeriscape landscaping principles. Existing mature vegetation and features shall be protected whenever possible and landscapes shall be maintained to provide year round interest. Soil types, drainage factors and microclimates shall be taken into account. Artificial turf or plants, paving of areas not required for walkways or parking, bare ground and weed covered ground are surface treatments which do not comply with the standards of this section.

Xeriscape landscaping principles are:

1. Grouping plants with similar water requirements together on the same irrigation hydrozone;
2. Limiting high-irrigation turf and plantings to appropriate high-use areas with high visibility and functional needs;
3. Use of native and low-water demanding plants and turf where practicable;
4. Use of efficient irrigation systems;
5. Incorporation of soil improvements;
6. Use of mulches; and
7. Provision of regular attentive maintenance.

A landscape design plan prepared by a landscape professional meeting the following conditions shall be submitted as part of the Landscape Documentation Package. The plan must be accurate and clear, drawn to scale and based upon the final grading plan. The plan must show the layout of all landscape components for a development site and their specifications.

1. Plant selection and grouping requirements:

(i) High water use plants, other than plants or trees growing produce for human consumption, shall not exceed fifty (50) percent of the landscape area or ten (10) percent of the total site, whichever is greater.

(ii) Low water use plants are required on slopes greater than four (4) feet of horizontal distance per one (1) foot of vertical change (4:1).

(iii) Mulch, such as leaves, bark, straw, stone or other materials left loose or other water saving treatments applied to the soil surface at a depth or two (2) inches-four (4) inches shall be used for all plantings areas except turf in order to help maintain soil moisture and inhibit weeds.

(iv) Plants shall be compatible with project soils.

2. Plant selection and grouping recommendations:

(i)

Plants shall be appropriately selected based upon their adaptability to the climatic, geologic, and topographical conditions of the site. A list of preferred plant species that are suited to the Durango urban environment is available from the city. This "Durango Plant List" is arranged according to the water needs of the plants.

(ii)

Plants shall be healthy, vigorous nursery stock with a growth habit normal to the species and variety and free of diseases, insects and injuries.

(iii)

Landscaping should be designed to minimize water runoff and take advantage of the water that runs on to the site.

(iv)

Protection and preservation of native species, drainage ways and natural areas is encouraged.

(v)

Plants having similar water use should be grouped together on the same hydrozone if irrigated automatically.

(vi)

The landscaping should be designed with an efficient irrigation layout in mind so that overspray is minimized.

(vii)

Turf areas should be primarily located to minimize glare and reduce heat near buildings and their openings, including windows and patios, or to serve as an active play area. Cemeteries and recreational areas such as golf courses, public parks, schools and athletic fields are considered appropriate areas for turf grasses.

(viii)

Low water use plants are encouraged in all areas less than eight (8) feet in width and in other areas that are difficult to efficiently irrigate and manage.

(ix)

Consideration should be given to tree placement and selection in order to provide for summer cooling and winter solar heat gain.

(x)

Spacing should allow for adequate growth of plants at maturity and intersection visibility.

(xi)

Rocks greater than three-fourths (¾) inches and less than four (4) inches in size are not allowed within the above-ground landscaped areas of the public right-of-way.

3.

Water features.

(i)

The total water surface of installed artificial features shall not exceed one-half of one percent (0.5%) of the lot area of the development.

(ii)

Raw water storage may exceed the above area limitation.

(iii)

Re-circulating water systems shall be used for decorative water features such as fountains or ponds.

(iv)

Water features shall be designed to prevent water seepage or leaking.

(c)

Irrigation plan. A water-efficient irrigation system is required for all new landscape plantings. Special attention shall be given to avoid runoff on slopes and to avoid overspray in narrow planting areas and median strips by using irrigation methods with low precipitation rates. The use of raw water for irrigation is encouraged and will be evaluated on a case by case basis.

If automated, an irrigation design plan prepared by an irrigation professional, which meets the following conditions shall be submitted as part of the Landscape Documentation Package. It shall be accurate and clear and drawn to the same scale as the associated landscape plan. The plan must show the layout of all irrigation components for a development site and their specifications. It shall be approved by city staff prior to the issuance of a building permit. A copy of the approved drawing must be on site at all times during construction.

1.

Irrigation design criteria.

(i)

Soil types and infiltration rate must be taken into account when designing irrigation systems.

(ii)

All irrigation systems shall be designed to water only vegetated areas and avoid runoff, overspray, low head drainage, or other conditions where water flows onto adjacent property, non-irrigated areas, walks, roadways, or structures.

(iii)

The irrigation method shall be selected to correlate with the plant density. For example, drip irrigation or bubblers should be used for sparsely planted trees and shrubs, and sprinklers should be used for turf grass.

(iv)

Plants that require different amounts of water shall be irrigated by separate valves.

(v)

Where practical, areas with significantly different solar exposure shall be zoned differently.

(vi)

All automated overhead sprinkler irrigation during the period beginning on May 1 and ending on October 1 of each year must occur between 7:00 p.m. and 9:00 a.m. This restriction does not apply to drip irrigation and low precipitation bubblers, hand watering, or watering of containerized plants and plant stock. This restriction also does not apply to periodic maintenance and repair of overhead systems.

(vii)

Irrigation necessary for the establishment of newly sodded lawns and landscaping within the first thirty (30) days of planting or watering of newly seeded turf within the first year of planting is not subject to these requirements.

(viii)

Where untreated water is available, it should be considered as a water source and installations shall be identified by distinguishing equipment naming or coloring to assure public safety.

(ix)

Storm runoff shall be directed toward landscaping where practical.

2.

Equipment. For all new landscapes and reconstructed landscapes with a new irrigation system, the irrigation shall comply with the following:

(i)

Separate landscape water meters shall be installed for all projects with a landscaped area of more than two thousand (2,000) square feet, except for single-family or two-family homes.

(ii)

Automatic control systems must be able to accommodate all aspects of the design including repeat start times and programmable seven-day watering schedules.

(iii)

Pressure regulating devices used to reduce water pressure are required wherever incoming pressure exceeds eighty (80) psi.

(iv)

Sprinkler heads shall be selected for proper area coverage, precipitation rate, operating pressure, adjustment capability, and ease of maintenance.

(v)

Rain sensing override devices shall be required on all irrigation systems in order to interrupt sprinklers in the event of a significant rainfall.

(vi)

Anti-drain (check) valves shall be installed in strategic points to minimize or prevent low-head drainage.

(vii)

Automatic drain valves are not allowed.

3.

Irrigation plan specifications. Irrigation systems shall be designed to be consistent with hydrozones. The irrigation plan shall be accurate and clear, drawn on project sheets. It shall be separate from, but use the same format as, the landscape plan. The scale shall be the same as that used for the landscape plan.

The irrigation plan shall accurately and clearly identify:

(i)

Location and size of water meter for the landscape.

(ii)

Location, type and size of all components of the irrigation system, including automatic controllers, main and lateral lines, valves, sprinkler heads, bubblers, drip emitters, maximum distance between sprinklers, moisture sensing devices, rain sensing devices, and quick couplers.

(iii)

Water service pressure at the irrigation point of connection to the public water supply;

(iv)

Flow rate (gallons per minute), precipitation rate (inches per hour), and design operating pressure (psi) for each hydrozone.

A general note stating that "Any field adjustments or redesign of this irrigation system must conform to the City of Durango Irrigation Standards" must be included on the plans.

(4)

Certification.

a.

Certification shall be accomplished by completing a certificate of substantial completion (form provided by the city) and delivering it to the city and to the owner of record.

b.

A licensed landscape architect or contractor, irrigation designer, or other landscape/irrigation professional shall conduct a final field observation and fill out the certificate of substantial completion. The certificate shall clearly indicate that plants were installed as specified, and that the irrigation system was installed as designed, along with a

list of any observed deficiencies. Substitutions will be allowed only if they are of similar style and value.

c.

The city reserves the right to perform site inspections at any time, before, during or after irrigation system and landscape installation, and to require corrective measures if requirements of this section are not satisfied.

d.

As-built plans must be submitted to the city prior to the issuance of a certificate of occupancy or prior to the release of any financial guarantee provided pursuant to subparagraph e. below. A copy of the as-built plans must also be maintained on-site.

e.

If the landscaping requirements set forth in this section 10-5-12.5 cannot be completed prior to the issuance of a certificate of occupancy, an on-site improvements agreement shall be prepared, identifying the unfinished items and estimated costs and completion dates. Adequate security, as determined by the city, must then be provided to guarantee construction of the improvements listed on the on-site improvements agreement, prior to the issuance of the certificate of occupancy.

(5)

Maintenance. All landscaping elements shall be maintained in good condition.

(c)

Definitions. For the purposes of this section, the following definitions shall apply, unless the context clearly indicates or requires a different meaning:

Automatic controller. A mechanical or solid state timer capable of operating valve zones to set the days and length of time water is applied.

Drip irrigation. Low pressure, low volume irrigation applied slowly, near or at ground level near the plants root zone, to minimize runoff and loss to evaporation. Also known as irrigation applicators, the output is measured in gallons per hour (gph). Does not include micro-sprays.

Emitter. Drip irrigation fittings that deliver water slowly from the system to the soil.

Flow rate. The rate at which water flows through pipes and valves (gallons per minute or cubic feet per second).

Hardscape. Impermeable area including patios, decks and paths, driveways and sidewalks.

High water use plants. Annuals, plants in containers, turf and other plants characterizes by high transpiration rates, shallow rooting, the need for large volumes and/or frequent application of water to maintain optimum appearance and prevent

dormancy throughout their life or with exposure to hot and drying climatic conditions. These are specified in the "Durango Plant List" published by the city.

Hydrozone. A portion of the landscaped area having plants with similar water needs and climatic requirements. A hydrozone may be irrigated or non-irrigated. A naturalized area planted with native vegetation that will not need supplemental irrigation once established is a non-irrigated hydrozone. Irrigated hydrozones may be served by one (1) valve or set of valves with the same schedule and include, but are not limited to, turf, high, medium or low water use plants, different microclimates, and partially hardscaped areas with plants, pool areas and water-use features.

Infiltration rate. The amount of water absorbed by the soil per unit of time, usually expressed in inches per hour.

Landscaped area. All outdoor permeable ground surfaces including the public right-of-way and/or water features. Hardscapes and areas dedicated to edible plants, such as orchards or vegetable gardens are not included.

Lateral line. The water delivery pipeline that supplies water to the emitters or sprinklers from the valve.

Low water use plants. Plants which are able to survive on two (2) irrigation cycles or less per month during the summer months once established, as specified in the "Durango Plant List" published by the city.

Medium water use plants. Plants, including turf, which require moderate volumes and/or frequency of application of water once established, as specified in the "Durango Plant List" published by the city.

Microclimate. The climate of a specific area in the landscape that has substantially differing sun exposure, including that from reflective surfaces, temperature or wind, than the surrounding area or the area as a whole.

Operating pressure. The pressure at which a system of sprinklers is designed to operate, usually indicated at the base of a sprinkler.

Overhead sprinkler irrigation. An irrigation method with generally high flow rates that delivers water to the landscape in the form of small particles or droplets or in a stream-like manner from above-ground irrigation nozzles with output expressed in gallons per minute (includes, pop-ups, impulse sprinklers, rotors and misters).

Overspray. The water that is delivered beyond the landscaped area during windless conditions onto any adjacent hardscapes or other non-landscaped area during an irrigation cycle.

Precipitation rate. The amount of water the irrigation system applies to an area over time (expressed in inches per hour).

Rain sensing device. A device connected to an irrigation controller that overrides scheduled irrigation when significant precipitation has been detected.

Runoff. Irrigation water which is not absorbed by the soil or landscape to which it is applied and which flows on to other areas. Runoff occurs when the precipitation rate exceeds the infiltration rate. This definition applies to irrigation water and does not apply to stormwater runoff.

Sprinkler head. A device that projects water through the air in the form of small particles or droplets.

Turf. A surface layer of earth containing mowed grass with a shallow root system.

Valve. A device use to control the flow of water in the irrigation system.

Water waste. The intentional or unintentional use of water for a non-beneficial use. Non-beneficial uses include, but are not restricted to:

(1)

Landscape water applied in such a manner, rate and/or quantity that it overflows the landscaped area being watered and runs onto adjacent property, public rights-of-way or into drainage ways, including gutters and storm sewers.

(2)

Landscape water which leaves a sprinkler, sprinkler system, or other application device in such a manner or direction as to spray onto adjacent property or public rights-of-way.

(3)

Failing to repair any irrigation system that is broken or leaking.

(4)

Applying water to hard surfaces such as parking lots, aprons, pads, driveways, or other surfaced areas, such as wood or gravel, when water is supplied in sufficient quantity to flow from that surface onto adjacent property or public rights-of-way.

Appendix C

Colorado Revised Statute 37-60-126

37-60-126. Water conservation and drought mitigation planning - programs - relationship to state assistance for water facilities - guidelines - water efficiency grant program - repeal.

(1) As used in this section and section 37-60-126.5, unless the context otherwise requires:

(a) "Agency" means a public or private entity whose primary purpose includes the promotion of water resource conservation.

(b) "Covered entity" means each municipality, agency, utility, including any privately owned utility, or other publicly owned entity with a legal obligation to supply, distribute, or otherwise provide water at retail to domestic, commercial, industrial, or public facility customers, and that has a total demand for such customers of two thousand acre-feet or more.

(c) "Grant program" means the water efficiency grant program established pursuant to subsection (12) of this section.

(d) "Office" means the office of water conservation and drought planning created in section 37-60-124.

(e) "Plan elements" means those components of water conservation plans that address water-saving measures and programs, implementation review, water-saving goals, and the actions a covered entity shall take to develop, implement, monitor, review, and revise its water conservation plan.

(f) "Public facility" means any facility operated by an instrument of government for the benefit of the public, including, but not limited to, a government building; park or other recreational facility; school, college, university, or other educational institution; highway; hospital; or stadium.

(g) "Water conservation" means water use efficiency, wise water use, water transmission and distribution system efficiency, and supply substitution. The objective of water conservation is a long-term increase in the productive use of water supply in order to satisfy water supply needs without compromising desired water services.

(h) "Water conservation plan", "water use efficiency plan", or "plan" means a plan adopted in accordance with this section.

(i) "Water-saving measures and programs" includes a device, a practice, hardware, or equipment that reduces water demands and a program that uses a combination of measures and incentives that allow for an increase in the productive use of a local water supply.

(2) (a) Each covered entity shall, subject to section 37-60-127, develop, adopt, make publicly available, and implement a plan pursuant to which such covered entity shall encourage its domestic, commercial, industrial, and public facility customers to use water more efficiently. Any state or local governmental entity that is not a covered entity may develop, adopt, make publicly available, and implement such a plan.

(b) The office shall review previously submitted conservation plans to evaluate their consistency with the provisions of this section and the guidelines established pursuant to paragraph (a) of

subsection (7) of this section.

(c) On and after July 1, 2006, a covered entity that seeks financial assistance from either the board or the Colorado water resources and power development authority shall submit to the board a new or revised plan to meet water conservation goals adopted by the covered entity, in accordance with this section, for the board's approval prior to the release of new loan proceeds.

(3) The manner in which the covered entity develops, adopts, makes publicly available, and implements a plan established pursuant to subsection (2) of this section shall be determined by the covered entity in accordance with this section. The plan shall be accompanied by a schedule for its implementation. The plans and schedules shall be provided to the office within ninety days after their adoption. For those entities seeking financial assistance, the office shall then notify the covered entity and the appropriate financing authority that the plan has been reviewed and whether the plan has been approved in accordance with this section.

(4) A plan developed by a covered entity pursuant to subsection (2) of this section shall, at a minimum, include a full evaluation of the following plan elements:

(a) The water-saving measures and programs to be used by the covered entity for water conservation. In developing these measures and programs, each covered entity shall, at a minimum, consider the following:

(I) Water-efficient fixtures and appliances, including toilets, urinals, clothes washers, showerheads, and faucet aerators;

(II) Low water use landscapes, drought-resistant vegetation, removal of phreatophytes, and efficient irrigation;

(III) Water-efficient industrial and commercial water-using processes;

(IV) Water reuse systems;

(V) Distribution system leak identification and repair;

(VI) Dissemination of information regarding water use efficiency measures, including by public education, customer water use audits, and water-saving demonstrations;

(VII) (A) Water rate structures and billing systems designed to encourage water use efficiency in a fiscally responsible manner.

(B) The department of local affairs may provide technical assistance to covered entities that are local governments to implement water billing systems that show customer water usage and that implement tiered billing systems.

(VIII) Regulatory measures designed to encourage water conservation;

(IX) Incentives to implement water conservation techniques, including rebates to customers to encourage the installation of water conservation measures;

(b) A section stating the covered entity's best judgment of the role of water conservation plans in the covered entity's water supply planning;

(c) The steps the covered entity used to develop, and will use to implement, monitor, review, and revise, its water conservation plan;

(d) The time period, not to exceed seven years, after which the covered entity will review and update its adopted plan; and

(e) Either as a percentage or in acre-foot increments, an estimate of the amount of water that has been saved through a previously implemented conservation plan and an estimate of the amount of water that will be saved through conservation when the plan is implemented.

(4.5) (a) On an annual basis starting no later than June 30, 2014, covered entities shall report water use and conservation data, to be used for statewide water supply planning, following board guidelines pursuant to paragraph (b) of this subsection (4.5), to the board by the end of the second quarter of each year for the previous calendar year.

(b) No later than February 1, 2012, the board shall adopt guidelines regarding the reporting of water use and conservation data by covered entities and shall provide a report to the senate agriculture and natural resources committee and the house of representatives agriculture, livestock, and natural resources committee, or their successor committees, regarding the guidelines. These guidelines shall:

(I) Be adopted pursuant to the board's public participation process and shall include outreach to stakeholders from water providers with geographic and demographic diversity, nongovernmental organizations, and water conservation professionals; and

(II) Include clear descriptions of: Categories of customers, uses, and measurements; how guidelines will be implemented; and how data will be reported to the board.

(c) (I) No later than February 1, 2019, the board shall report to the senate agriculture and natural resources committee and the house of representatives agriculture, livestock, and natural resources committee, or their successor committees, on the guidelines and data collected by the board under the guidelines.

(II) This paragraph (c) is repealed, effective July 1, 2020.

(5) Each covered entity and other state or local governmental entity that adopts a plan shall follow the entity's rules, codes, or ordinances to make the draft plan available for public review and comment. If there are no rules, codes, or ordinances governing the entity's public planning process, then each entity shall publish a draft plan, give public notice of the plan, make such plan publicly available, and solicit comments from the public for a period of not less than sixty days after the date on which the draft plan is made publicly available. Reference shall be made in the public notice to the elements of a plan that have already been implemented.

(6) The board is hereby authorized to recommend the appropriation and expenditure of such revenues as are necessary from the unobligated balance of the five percent share of the operational account of the severance tax trust fund designated for use by the board for the purpose of the office providing assistance to covered entities to develop water conservation plans that meet the provisions of this section.

(7) (a) The board shall adopt guidelines for the office to review water conservation plans submitted by covered entities and other state or local governmental entities. The guidelines shall define the method for submitting plans to the office, the methods for office review and approval of the plans, and the interest rate surcharge provided for in paragraph (a) of subsection (9) of this section.

(b) If no other applicable guidelines exist as of June 1, 2007, the board shall adopt guidelines by July 31, 2007, for the office to use in reviewing applications submitted by covered entities, other state or local governmental entities, and agencies for grants from the grant program and from the grant program established in section 37-60-126.5 (3). The guidelines shall establish deadlines and procedures for covered entities, other state or local governmental entities, and agencies to follow in applying for grants and the criteria to be used by the office and the board in prioritizing and awarding grants.

(8) A covered entity may at any time adopt changes to an approved plan in accordance with this section after notifying and receiving concurrence from the office. If the proposed changes are major, the covered entity shall give public notice of the changes, make the changes available in draft form, and provide the public an opportunity to comment on such changes before adopting them in accordance with subsection (5) of this section.

(9) (a) Neither the board nor the Colorado water resources and power development authority shall release grant or loan proceeds to a covered entity unless the covered entity provides a copy of the water conservation plan adopted pursuant to this section; except that the board or the authority may release the grant or loan proceeds notwithstanding a covered entity's failure to comply with the reporting requirements of subsection (4.5) of this section or if the board or the authority, as applicable, determines that an unforseen emergency exists in relation to the covered entity's loan application, in which case the board or the authority, as applicable, may impose a grant or loan surcharge upon the covered entity that may be rebated or reduced if the covered entity submits and adopts a plan in compliance with this section in a timely manner as determined by the board or the authority, as applicable.

(b) The board and the Colorado water resources and power development authority, to which any covered entity has applied for financial assistance for the construction of a water diversion, storage, conveyance, water treatment, or wastewater treatment facility, shall consider any water conservation plan filed pursuant to this section in determining whether to render financial assistance to such entity. Such consideration shall be carried out within the discretion accorded the board and the Colorado water resources and power development authority pursuant to which such board and authority render such financial assistance to such covered entity.

(c) The board and the Colorado water resources and power development authority may enter into a memorandum of understanding with each other for the purposes of avoiding delay in the processing of applications for financial assistance covered by this section and avoiding duplication in the consideration required by this subsection (9).

(10) Repealed.

(11) (a) Any section of a restrictive covenant that prohibits or limits xeriscape, prohibits or limits the installation or use of drought-tolerant vegetative landscapes, or requires cultivated vegetation to consist exclusively or primarily of turf grass is hereby declared contrary to public policy and,

on that basis, that section of the covenant shall be unenforceable.

(b) As used in this subsection (11):

(I) "Executive board policy or practice" includes any additional procedural step or burden, financial or otherwise, placed on a unit owner who seeks approval for a landscaping change by the executive board of a unit owners' association, as defined in section 38-33.3-103, C.R.S., and not included in the existing declaration or bylaws of the association. An "executive board policy or practice" includes, without limitation, the requirement of:

(A) An architect's stamp;

(B) Preapproval by an architect or landscape architect retained by the executive board;

(C) An analysis of water usage under the proposed new landscape plan or a history of water usage under the unit owner's existing landscape plan; and

(D) The adoption of a landscaping change fee.

(II) "Restrictive covenant" means any covenant, restriction, bylaw, executive board policy or practice, or condition applicable to real property for the purpose of controlling land use, but does not include any covenant, restriction, or condition imposed on such real property by any governmental entity.

(III) "Turf grass" means continuous plant coverage consisting of hybridized grasses that, when regularly mowed, form a dense growth of leaf blades and roots.

(IV) "Xeriscape" means the application of the principles of landscape planning and design, soil analysis and improvement, appropriate plant selection, limitation of turf area, use of mulches, irrigation efficiency, and appropriate maintenance that results in water use efficiency and water-saving practices.

(c) Nothing in this subsection (11) shall preclude the executive board of a common interest community from taking enforcement action against a unit owner who allows his or her existing landscaping to die; except that:

(I) Such enforcement action shall be suspended during a period of water use restrictions declared by the jurisdiction in which the common interest community is located, in which case the unit owner shall comply with any watering restrictions imposed by the water provider for the common interest community;

(II) Enforcement shall be consistent within the community and not arbitrary or capricious; and

(III) Once the drought emergency is lifted, the unit owner shall be allowed a reasonable and practical opportunity, as defined by the association's executive board, with consideration of applicable local growing seasons or practical limitations, to reseed and revive turf grass before being required to replace it with new sod.

(12) (a) (I) There is hereby created the water efficiency grant program for purposes of providing state funding to aid in the planning and implementation of water conservation plans developed in accordance with the requirements of this section and to promote the benefits of water efficiency.

The board is authorized to distribute grants to covered entities, other state or local governmental entities, and agencies in accordance with its guidelines from the moneys transferred to and appropriated from the water efficiency grant program cash fund, which is hereby created in the state treasury.

(II) Moneys in the water efficiency grant program cash fund are hereby continuously appropriated to the board for the purposes of this subsection (12) and shall be available for use until the programs and projects financed using the grants have been completed.

(III) For each fiscal year beginning on or after July 1, 2010, the general assembly shall appropriate from the fund to the board up to five hundred thousand dollars annually for the purpose of providing grants to covered entities, other state and local governmental entities, and agencies in accordance with this subsection (12). Commencing July 1, 2008, the general assembly shall also appropriate from the fund to the board fifty thousand dollars each fiscal year to cover the costs associated with the administration of the grant program and the requirements of section 37-60-124. Moneys appropriated pursuant to this subparagraph (III) shall remain available until expended or until June 30, 2020, whichever occurs first.

(IV) Any moneys remaining in the fund on June 30, 2020, shall be transferred to the operational account of the severance tax trust fund described in section 39-29-109 (2) (b), C.R.S.

(b) Any covered entity or state or local governmental entity that has adopted a water conservation plan and that supplies, distributes, or otherwise provides water at retail to customers may apply for a grant to aid in the implementation of the water efficiency goals of the plan. Any agency may apply for a grant to fund outreach or education programs aimed at demonstrating the benefits of water efficiency. The office shall review the applications and make recommendations to the board regarding the awarding and distribution of grants to applicants who satisfy the criteria outlined in this subsection (12) and the guidelines developed pursuant to subsection (7) of this section.

(c) This subsection (12) is repealed, effective July 1, 2020.

Source: L. 91: Entire section added, p. 2023, § 4, effective June 4. **L. 99:** (10) repealed, p. 25, § 3, effective March 5. **L. 2003:** (4)(g) amended and (11) added, p. 1368, § 4, effective April 25. **L. 2004:** Entire section amended, p. 1779, § 3, effective August 4. **L. 2005:** (11) amended, p. 1372, § 1, effective June 6; (1), (2)(b), and (7) amended and (12) added, p. 1481, § 1, effective June 7. **L. 2007:** (1)(a), (2)(a), (5), (7), and (12) amended, p. 1890, § 1, effective June 1. **L. 2008:** IP(4) amended, p. 1575, § 30, effective May 29; (12)(a) amended, p. 1873, § 14, effective June 2. **L. 2009:** (12)(a) amended, (HB 09-1017), ch. 297, p. 1593, § 1, effective May 21; (9)(a) amended, (SB 09-106), ch. 386, p. 2091, § 3, effective July 1. **L. 2010:** (4)(a)(I) and (9)(a) amended and (4.5) added, (HB 10-1051), ch. 378, p. 1772, § 1, effective June 7; (12)(a)(III), (12)(a)(IV), and (12)(c) amended, (SB 10-025), ch. 379, p. 1774, § 1, effective June 7.

Editor's note: (1) Subsection (12) was originally enacted as subsection (13) in House Bill 05-1254 but was renumbered on revision for ease of location.

(2) Section 2 of chapter 378, Session Laws of Colorado 2010, provides that the act amending subsections (4)(a)(I) and (9)(a) and adding subsection (4.5) applies to conduct occurring on or after June 7, 2010.

Cross references: (1) In 1991, this entire section was added by the "Water Conservation Act of 1991". For the short title and the legislative declaration, see sections 1 and 2 of chapter 328, Session Laws of Colorado 1991.

(2) For the legislative declaration contained in the 2004 act amending this section, see section 1 of chapter 373, Session Laws of Colorado 2004.

Appendix D

Summary of the Water Demand Forecasting

This Appendix contains summary tables created to support the water demand forecast modeling. Included are the following:

Two tables showing the results of forecasting the annual water use demand by customer category, including treated and raw water uses, for the two conditions – without passive savings and with passive savings.

- The "without passive savings" demand forecast scenario was created for the average and dry years (a dry year is one standard deviation away from a normal year).
- The "with passive savings" demand forecast was created for average, dry and very dry years (a very dry year is two standard deviations away from a normal year).

One table showing the results of the calculations used to estimate future passive water savings expected in the residential water use customer categories during the planning period.

Projection of Future Water Demand without Passive Savings
City of Durango

Normal Conditions w/o Passive

		Connections									
	Service Area Population	Res-Inside	Res-Out	Duplex - In	Duplex - Out	Com - Inside	Com -Out	Com-Meter	Res In	Res Out	Duplex - In
2006	19,054	4,006	351	232	4	1,100	92	4	349,014	35,885	26,976
2007	19,344	4,146	352	231	4	1,089	95	4	353,056	35,111	25,423
2008	19,636	4,264	364	232	4	1,107	85	4	359,699	35,937	26,611
2009	19,636	4,328	361	233	4	1,136	86	4	380,750	36,243	26,780
2010	20,239	4,389	360	234	4	1,149	86	4	379,512	36,792	25,031
2011	20,842	4,516	362	239	4	1,163	86	4	392,748	36,348	26,892
2012	21,445	4,657	363	236	4	1,176	86	4	405,011	36,449	26,555
2013	22,048	4,796	365	237	4	1,187	86	4	417,099	36,650	26,667
2014	22,651	4,935	367	238	4	1,197	86	4	429,188	36,850	26,780
2015	23,254	5,075	368	239	4	1,206	86	4	441,364	36,951	26,892
2016	23,857	5,214	370	240	4	1,213	86	4	453,452	37,152	27,005
2017	24,460	5,354	371	241	4	1,219	86	4	465,628	37,252	27,117
2018	25,064	5,493	373	242	4	1,224	86	4	477,716	37,453	27,230
2019	25,667	5,633	375	243	4	1,227	86	4	489,892	37,654	27,342
2020	26,270	5,773	376	244	4	1,229	86	4	502,067	37,754	27,455

Dry Conditions w/o Passive

		Connections									
	Service Area Population	Res-Inside	Res-Out	Duplex - In	Duplex - Out	Com - Inside	Com -Out	Com-Meter	Res In	Res Out	Duplex - In
2006	19,054	4,006	351	232	4	1,100	92	4	349,014	35,885	26,976
2007	19,344	4,146	352	231	4	1,089	95	4	353,056	35,111	25,423
2008	19,636	4,264	364	232	4	1,107	85	4	359,699	35,937	26,611
2009	19,636	4,328	361	233	4	1,136	86	4	380,750	36,243	26,780
2010	20,239	4,389	360	234	4	1,149	86	4	379,512	36,792	25,031
2011	20,842	4,516	362	239	4	1,163	86	4	439,804	39,544	28,767
2012	21,445	4,657	363	236	4	1,176	86	4	453,536	39,653	28,406
2013	22,048	4,796	365	237	4	1,187	86	4	467,073	39,872	28,526
2014	22,651	4,935	367	238	4	1,197	86	4	480,610	40,090	28,647
2015	23,254	5,075	368	239	4	1,206	86	4	494,244	40,199	28,767
2016	23,857	5,214	370	240	4	1,213	86	4	507,781	40,418	28,887
2017	24,460	5,354	371	241	4	1,219	86	4	521,416	40,527	29,008
2018	25,064	5,493	373	242	4	1,224	86	4	534,953	40,746	29,128
2019	25,667	5,633	375	243	4	1,227	86	4	548,587	40,964	29,249
2020	26,270	5,773	376	244	4	1,229	86	4	562,221	41,073	29,369

Projection of Future Water Demand without Passive Savings
City of Durango

Treated Water Use (1,000 gallons)										Total Water Use (1,000 gallons)			
Duplex - Out	Com - Inside	Com -Out	Com-Meter	Animas	Ft. Lewis	Unaccounted For	Total Treated Water	Factor for Unaccounted For Water	GPCD	Total Raw Water	Total Water Use	Total Water Use (af)	GPCD
358	505,199	22,107	6,862	1,042	32,642	281,383	1,261,468	28.7%	**181**	263,607	1,525,075	4,680	**219**
477	517,078	26,790	6,556	968	34,336	254,830	1,254,625	25.5%	**178**	259,784	1,514,409	4,648	**214**
470	539,535	25,137	7,088	1,182	36,648	250,675	1,282,982	24.3%	**179**	297,203	1,580,185	4,849	**220**
169	522,271	36,007	5,057	1,383	33,761	231,226	1,273,647	22.2%	**178**	249,623	1,523,270	4,675	**213**
439	484,239	45,269	4,254	1,503	31,985	278,080	1,287,105	27.6%	**174**	255,195	1,542,300	4,733	**209**
383	519,886	40,660	4,656	1,504	33,874	271,049	1,328,000		**175**	267,884	1,595,885	4,898	**210**
383	525,547	40,660	4,656	1,650	33,874	275,622	1,350,406		**173**	267,884	1,618,290	4,966	**207**
383	530,615	40,660	4,656	1,796	33,874	280,140	1,372,540		**171**	267,884	1,640,424	5,034	**204**
383	535,091	40,660	4,656	1,942	33,874	284,505	1,393,928		**169**	267,884	1,661,813	5,100	**201**
383	538,973	40,660	4,656	2,088	33,874	288,715	1,414,555		**167**	267,884	1,682,439	5,163	**198**
383	542,262	40,660	4,656	2,234	33,874	292,776	1,434,453		**165**	267,884	1,702,337	5,224	**195**
383	544,958	40,660	4,656	2,380	33,874	296,682	1,453,589	25.6%	**163**	267,884	1,721,474	5,283	**193**
383	547,061	40,660	4,656	2,526	33,874	300,439	1,471,997		**161**	267,884	1,739,881	5,340	**190**
383	548,571	40,660	4,656	2,672	33,874	304,067	1,489,769		**159**	267,884	1,757,653	5,394	**188**
383	549,487	40,660	4,656	2,817	33,874	307,516	1,506,670		**157**	267,884	1,774,554	5,446	**185**

Treated Water Use (1,000 gallons)										Total Water Use (1,000 gallons)			
Duplex - Out	Com - Inside	Com -Out	Com-Meter	Animas	Ft. Lewis	Unaccounted For	Total Treated Water	Factor for Unaccounted For Water	GPCD	Total Raw Water	Total Water Use	Total Water Use (af)	GPCD
358	505,199	22,107	6,862	1,042	32,642	281,383	1,261,468	28.7%	**181**	263,607	1,525,075	4,680	**219**
477	517,078	26,790	6,556	968	34,336	254,830	1,254,625	25.5%	**178**	259,784	1,514,409	4,648	**214**
470	539,535	25,137	7,088	1,182	36,648	250,675	1,282,982	24.3%	**179**	297,203	1,580,185	4,849	**220**
169	522,271	36,007	5,057	1,383	33,761	231,226	1,273,647	22.2%	**178**	249,623	1,523,270	4,675	**213**
439	484,239	45,269	4,254	1,503	31,985	278,080	1,287,105	27.6%	**174**	255,195	1,542,300	4,733	**209**
494	543,607	38,310	6,908	1,756	35,970	291,105	1,426,265		**187**	285,764	1,712,029	5,254	**225**
494	549,526	38,310	6,908	1,902	35,970	296,118	1,450,822		**185**	285,764	1,736,586	5,329	**222**
494	554,826	38,310	6,908	2,048	35,970	301,072	1,475,099		**183**	285,764	1,760,863	5,404	**219**
494	559,505	38,310	6,908	2,194	35,970	305,868	1,498,595		**181**	285,764	1,784,359	5,476	**216**
494	563,564	38,310	6,908	2,340	35,970	310,502	1,521,298		**179**	285,764	1,807,062	5,546	**213**
494	567,004	38,310	6,908	2,486	35,970	314,980	1,543,237		**177**	285,764	1,829,001	5,613	**210**
494	569,823	38,310	6,908	2,632	35,970	319,295	1,564,381		**175**	285,764	1,850,145	5,678	**207**
494	572,021	38,310	6,908	2,778	35,970	323,455	1,584,762		**173**	285,764	1,870,526	5,740	**204**
494	573,600	38,310	6,908	2,923	35,970	327,481	1,604,485		**171**	285,764	1,890,249	5,801	**202**
494	574,559	38,310	6,908	3,069	35,970	331,319	1,623,292		**169**	285,764	1,909,056	5,859	**199**

Projection of Future Water Demand With Passive Savings
City of Durango

Normal Conditions w/ Passive

		Connections										
	Service Area Population	Res-Inside	Res-Out	Duplex - In	Duplex - Out	Com - Inside	Com -Out	Com-Meter	Res In	Res Out	Duplex - In	Duplex - Out
2006	19,054	4,006	351	232	4	1,100	92	4	349,014	35,885	26,976	358
2007	19,344	4,146	352	231	4	1,089	95	4	353,056	35,111	25,423	477
2008	19,636	4,264	364	232	4	1,107	85	4	359,699	35,937	26,611	470
2009	19,636	4,328	361	233	4	1,136	86	4	380,750	36,243	26,780	169
2010	20,239	4,389	360	234	4	1,149	86	4	379,512	36,792	25,031	439
2011	20,842	4,516	362	239	4	1,163	86	4	388,687	35,969	26,680	380
2012	21,445	4,657	363	236	4	1,176	86	4	396,889	35,690	26,131	377
2013	22,048	4,796	365	237	4	1,187	86	4	404,916	35,512	26,031	373
2014	22,651	4,935	367	238	4	1,197	86	4	412,944	35,333	25,931	370
2015	23,254	5,075	368	239	4	1,206	86	4	421,058	35,055	25,832	367
2016	23,857	5,214	370	240	4	1,213	86	4	429,454	34,922	25,759	364
2017	24,460	5,354	371	241	4	1,219	86	4	437,937	34,690	25,686	362
2018	25,064	5,493	373	242	4	1,224	86	4	447,992	34,710	25,698	360
2019	25,667	5,633	375	243	4	1,227	86	4	458,134	34,730	25,709	359
2020	26,270	5,773	376	244	4	1,229	86	4	468,276	34,650	25,721	358
						7.0%			6.7%	8.2%	6.3%	6.6%

Dry Conditions w/ Passive

		Connections										
	Service Area Population	Res-Inside	Res-Out	Duplex - In	Duplex - Out	Com - Inside	Com -Out	Com-Meter	Res In	Res Out	Duplex - In	Duplex - Out
2006	19,054	4,006	351	232	4	1,100	92	4	349,014	35,885	26,976	358
2007	19,344	4,146	352	231	4	1,089	95	4	353,056	35,111	25,423	477
2008	19,636	4,264	364	232	4	1,107	85	4	359,699	35,937	26,611	470
2009	19,636	4,328	361	233	4	1,136	86	4	380,750	36,243	26,780	169
2010	20,239	4,389	360	234	4	1,149	86	4	379,512	36,792	25,031	439
2011	20,842	4,516	362	239	4	1,163	86	4	435,743	39,165	28,555	491
2012	21,445	4,657	363	236	4	1,176	86	4	445,414	38,895	27,982	488
2013	22,048	4,796	365	237	4	1,187	86	4	454,890	38,734	27,890	485
2014	22,651	4,935	367	238	4	1,197	86	4	464,366	38,573	27,799	482
2015	23,254	5,075	368	239	4	1,206	86	4	473,939	38,303	27,707	479
2016	23,857	5,214	370	240	4	1,213	86	4	483,783	38,189	27,642	476
2017	24,460	5,354	371	241	4	1,219	86	4	493,725	37,965	27,577	473
2018	25,064	5,493	373	242	4	1,224	86	4	505,229	38,003	27,596	472
2019	25,667	5,633	375	243	4	1,227	86	4	516,829	38,040	27,615	470
2020	26,270	5,773	376	244	4	1,229	86	4	528,430	37,969	27,635	469

Projection of Future Water Demand With Passive Savings
City of Durango

Very Dry Conditions w/ Passive

		Connections										
	Service Area Population	Res-Inside	Res-Out	Duplex - In	Duplex - Out	Com - Inside	Com -Out	Com-Meter	Res In	Res Out	Duplex - In	Duplex - Out
2006	19,054	4,006	351	232	4	1,100	92	4	349,014	35,885	26,976	358
2007	19,344	4,146	352	231	4	1,089	95	4	353,056	35,111	25,423	477
2008	19,636	4,264	364	232	4	1,107	85	4	359,699	35,937	26,611	470
2009	19,636	4,328	361	233	4	1,136	86	4	380,750	36,243	26,780	169
2010	20,239	4,389	360	234	4	1,149	86	4	379,512	36,792	25,031	439
2011	20,842	4,516	362	239	4	1,163	86	4	482,800	42,361	30,430	602
2012	21,445	4,657	363	236	4	1,176	86	4	493,939	42,099	29,833	599
2013	22,048	4,796	365	237	4	1,187	86	4	504,864	41,956	29,749	596
2014	22,651	4,935	367	238	4	1,197	86	4	515,788	41,813	29,666	593
2015	23,254	5,075	368	239	4	1,206	86	4	526,820	41,552	29,582	590
2016	23,857	5,214	370	240	4	1,213	86	4	538,113	41,455	29,525	587
2017	24,460	5,354	371	241	4	1,219	86	4	549,513	41,240	29,467	584
2018	25,064	5,493	373	242	4	1,224	86	4	562,465	41,296	29,495	583
2019	25,667	5,633	375	243	4	1,227	86	4	575,524	41,351	29,522	582
2020	26,270	5,773	376	244	4	1,229	86	4	588,584	41,288	29,549	580

Projection of Future Water Demand With Passive Savings
City of Durango

Treated Water Use (1,000 gallons)								Total Water Use (1,000 gallons)			
Com - Inside	Com -Out	Com-Meter	Animas	Ft. Lewis	Unaccounted For	Total Treated Water	**GPCD Total Treated Water Use**	Total Raw Water	Total Water Use	Total Water Use (af)	**GPCD Total Water Use**
505,199	22,107	6,862	1,042	32,642	281,383	1,261,468	**181**	263,607	1,525,075	4,680	**219**
517,078	26,790	6,556	968	34,336	254,830	1,254,625	**178**	259,784	1,514,409	4,648	**214**
539,535	25,137	7,088	1,182	36,648	250,675	1,282,982	**179**	297,203	1,580,185	4,849	**220**
522,271	36,007	5,057	1,383	33,761	231,226	1,273,647	**178**	249,623	1,523,270	4,675	**213**
484,239	45,269	4,254	1,503	31,985	278,080	1,287,105	**174**	255,195	1,542,300	4,733	**209**
532,322	40,660	4,656	1,504	33,874	273,044	1,337,776	**176**	267,884	1,605,660	4,928	**211**
534,493	40,660	4,656	1,650	33,874	275,529	1,349,948	**172**	267,884	1,617,832	4,965	**207**
536,290	40,660	4,656	1,796	33,874	278,013	1,362,121	**169**	267,884	1,630,005	5,002	**203**
537,714	40,660	4,656	1,942	33,874	280,403	1,373,828	**166**	267,884	1,641,712	5,038	**199**
538,326	40,660	4,656	2,088	33,874	282,580	1,384,495	**163**	267,884	1,652,380	5,071	**195**
538,493	40,660	4,656	2,234	33,874	284,760	1,395,177	**160**	267,884	1,663,061	5,104	**191**
538,303	40,660	4,656	2,380	33,874	286,845	1,405,393	**157**	267,884	1,673,277	5,135	**187**
539,139	40,660	4,656	2,526	33,874	289,683	1,419,297	**155**	267,884	1,687,182	5,178	**184**
539,179	40,660	4,656	2,672	33,874	292,339	1,432,312	**153**	267,884	1,700,196	5,218	**181**
538,429	40,660	4,656	2,817	33,874	294,767	1,444,207	**151**	267,884	1,712,091	5,254	**179**
2.0%	0.0%	0.0%	0.0%	0.0%	4.1%	4.1%					

Treated Water Use (1,000 gallons)								Total Water Use (1,000 gallons)			
Com - Inside	Com -Out	Com-Meter	Animas	Ft. Lewis	Unaccounted For	Total Treated Water	**GPCD**	Total Raw Water	Total Water Use	Total Water Use (af)	**GPCD Total Water Use**
505,199	22,107	6,862	1,042	32,642	281,383	1,261,468	**181**	263,607	1,525,075	4,680	**219**
517,078	26,790	6,556	968	34,336	254,830	1,254,625	**178**	259,784	1,514,409	4,648	**214**
539,535	25,137	7,088	1,182	36,648	250,675	1,282,982	**179**	297,203	1,580,185	4,849	**220**
522,271	36,007	5,057	1,383	33,761	231,226	1,273,647	**178**	249,623	1,523,270	4,675	**213**
484,239	45,269	4,254	1,503	31,985	278,080	1,287,105	**174**	255,195	1,542,300	4,733	**209**
556,042	48,702	5,600	1,756	35,970	295,430	1,447,455	**190**	285,764	1,733,218	5,319	**228**
558,472	48,702	5,600	1,902	35,970	298,354	1,461,779	**187**	285,764	1,747,543	5,363	**223**
560,500	48,702	5,600	2,048	35,970	301,276	1,476,094	**183**	285,764	1,761,858	5,407	**219**
562,129	48,702	5,600	2,194	35,970	304,095	1,489,909	**180**	285,764	1,775,673	5,449	**215**
562,917	48,702	5,600	2,340	35,970	306,696	1,502,653	**177**	285,764	1,788,417	5,488	**211**
563,235	48,702	5,600	2,486	35,970	309,293	1,515,375	**174**	285,764	1,801,139	5,528	**207**
563,168	48,702	5,600	2,632	35,970	311,788	1,527,600	**171**	285,764	1,813,364	5,565	**203**
564,099	48,702	5,600	2,778	35,970	315,028	1,543,476	**169**	285,764	1,829,240	5,614	**200**
564,208	48,702	5,600	2,923	35,970	318,083	1,558,442	**166**	285,764	1,844,206	5,660	**197**
563,500	48,702	5,600	3,069	35,970	320,900	1,572,244	**164**	285,764	1,858,008	5,702	**194**

Projection of Future Water Demand With Passive Savings
City of Durango

Treated Water Use (1,000 gallons)								Total Water Use (1,000 gallons)			
Com - Inside	Com -Out	Com-Meter	Animas	Ft. Lewis	Unaccounted For	Total Treated Water	**GPCD**	Total Raw Water	Total Water Use	Total Water Use (af)	**GPCD Total Water Use**
505,199	22,107	6,862	1,042	32,642	281,383	1,261,468	**181**	263,607	1,525,075	4,680	**219**
517,078	26,790	6,556	968	34,336	254,830	1,254,625	**178**	259,784	1,514,409	4,648	**214**
539,535	25,137	7,088	1,182	36,648	250,675	1,282,982	**179**	297,203	1,580,185	4,849	**220**
522,271	36,007	5,057	1,383	33,761	231,226	1,273,647	**178**	249,623	1,523,270	4,675	**213**
484,239	45,269	4,254	1,503	31,985	278,080	1,287,105	**174**	255,195	1,542,300	4,733	**209**
579,763	56,745	7,852	2,008	38,065	318,151	1,558,776	**205**	303,644	1,862,420	5,716	**245**
582,451	56,745	7,852	2,154	38,065	321,514	1,575,253	**201**	303,644	1,878,896	5,766	**240**
584,710	56,745	7,852	2,300	38,065	324,873	1,591,710	**198**	303,644	1,895,354	5,817	**236**
586,543	56,745	7,852	2,446	38,065	328,123	1,607,634	**194**	303,644	1,911,277	5,866	**231**
587,509	56,745	7,852	2,592	38,065	331,148	1,622,454	**191**	303,644	1,926,098	5,911	**227**
587,977	56,745	7,852	2,738	38,065	334,161	1,637,217	**188**	303,644	1,940,860	5,956	**223**
588,033	56,745	7,852	2,883	38,065	337,066	1,651,449	**185**	303,644	1,955,093	6,000	**219**
589,060	56,745	7,852	3,029	38,065	340,709	1,669,299	**182**	303,644	1,972,942	6,055	**216**
589,238	56,745	7,852	3,175	38,065	344,162	1,686,216	**180**	303,644	1,989,860	6,107	**212**
588,571	56,745	7,852	3,321	38,065	347,368	1,701,924	**177**	303,644	2,005,567	6,155	**209**

Appendix E

Identification and Screening of Candidate Water Use Efficiency Measures and Programs

Identification of Candidate Water Conservation Measures and Programs
City of Durango

		State Statute Requirement[1]	CWW BP[2]	Comment	Specific Issues	Screening Results
Foundational Water Conservation						
	Metering	**V, VII**	BP 1			
	Submetering of Large Water Users for Indoor and Outdoor Uses			The City has not separated its commercial indoor and outdoor uses for those entities using potable water supplies; although some of the City's largest outdoor water users (e.g., Ft. Lewis, City parks, Golf Course) are on non-potable supplies and those uses are separately metered.	New and rehabilitated landscape over 2,000 square feet (for non-residential customers) are required by 2007 ordinance to have separate meters. Additional submetering of existing landscapes needs to be evaluated by the City for its commercial and institutional customers.	Perform as outcome of commercial and City facility audits
	AMR Installation and Operations			The City has AMR technology in place at 95% of al its customer meters and uses drive by reading methods to colelct water use data. The City is in the process of converting all of its meter reading devices to those that will utilize fixed receiver system to eliminate the need for drive-by water use data collection.	The City would benefit from having the radio-read technology in place, which should be completed in 2011. The City is currently reading customer meters and billing monthly.	Do not move forward to evaluation
	Identify Unmetered and/or Unbilled Treated Water Uses			The City needs to identify current unmetered and/or unbilled treated water uses and remedy the situation with new meter installations and/or processes to minimize unbilled treated water.	The City needs to improve its understanding of non-revenue water.	Move to evaluations
	Meter Testing and Replacement			The City currently has a meter repair and replacement budget. Repairs and replacements are conducted upon request.	The City would benefit from more aggressive meter testing and replacement especially for its larger water use customers	Do not move forward to evaluation, make contingent on future audits
	Meter Upgrades (to higher accuracy/lower incremental reading)			The City is interested in improving the accuracy of its meters to less than 1,000 gallon increments; however the large scale replacement of 6,000 meters is cost prohibitive.		Do not move forward to evaluation
	Conservation Oriented Rates	**VII, VIII**	BP 1			
	Water Rate Increase			The City will need to re-evaluate its cash flow needs in light of water conservation, metering and billing needs, and overall revenue projections by 2015.		Move to evaluations
	Inclining Block Rate Adjustments			The City, which has tiered rate structure for all its customer classes, could benefit from adding an additional tier to discourage very high water uses.		Move to evaluations, combine with water rate assessment
	Water Budgets			The City does not currently have the means to develop lot and customer specific water budgets.		Do not move forward to evaluation
	Tap Fees with Water Conservation Incentives			The City currently provides a 10% discount to non-residential developers that can demonstrate a 20% reduction of typical water demand during summer months through the use of "water saving fixtures and landscape efficiencies."	City could benefit from expanding this program to cover residential development.	Move to evaluations, combine with water rate assessment
	System Water Loss Control	**V**	BP 3			
	System Wide Water Audit (AWWA M-36 Methodology)			The City may benefit from conducting an AWWA audit of its system wide water uses and tracking to help identify sources and magnitude of non-revenue water, characterization of unaccounted for water and discrepancies between billing and water department monthly reports.	The City may benefit from changing some of its monitoring and tracking methods - and in revising some policies that allow for unbilled uses of water on metered accounts.	Move to evaluations
	Leak Detection Programs Using Isolation Valving and Meters			The City plans to better characterize real and apparent water losses to reduce its non-revenue water using isolation valving and metering to test and evaluate portions of its distribution system.	The City may need to increase the level of accuracy used for preliminary analysis and commit more resources to better characterize non-revenue water	Move to evaluations
	Improved Water Use Monitoring			The City desires permanently improving the accuracy and regularity of data collection used to characterize it and its customer water use.	This is linked to better meter testing and replacement for large water users, data collection and tracking, and AMR fixed receiver installs and operation.	Perform as outcome of systemwide water audit, facility audits, and AMR installation and operations
	Pipe Replacement			The City currently has budgeted a number of pipeline replacement projects budgeted over the next 10 years.		Do no tmove forward to evaluations since City is doing this through the CIP program
	Leak Detection and Repair Programs			The City would benefit from a more aggressive infrastructure replacement program; which will identify the time period for the entire replacement of its water transmission and distribution system, and set aside funds for that repalcement schedule on a yearly basis.	The City will need to perform this task independent of the Water Conservation Plan, but should include language in the Plan related to it being conducted.	Do no tmove forward to evaluations since City is doing this through the CIP program
	Data Collection - Monitoring and Verification		BP 2			
	Customer Categorization in Billing System			The City currently tracks residential single family and duplex, commercial and irrigation water use. It could benefit by more specific tracking of City water use(s) and tracking of commercial and irrigation water uses by industry code, including separating multi-family use from other commercial uses..	The City is large enough that these additional customer tracking efforts would benefit the City in the management of its water sales and customer water use behaviors	No specific cost/benefit analysis will be performed; will be recommended as part of the Water Conservation Plan

Identification of Candidate Water Conservation Measures and Programs
City of Durango

		State Statute Requirement[1]	CWW BP[2]	Comment	Specific Issues	Screening Results
	Monthly Meter Reading and Billing			The City currently reads all meters in the City on a monthly basis. It will be improving its ability to collect water use data more often and in a more explicit fashion that will allow for detecting bad meters, doing analyses, etc. in the future using the AMR fixed receiver technology currently being installed.		Do not move forward to evaluation
	AMR Installation and Operations			The City has installed AMR devices on the meters of 95% of its customers. The City will work to improve its data collection and data mining efforts as the fixed receiver data collection system is installed and operated.		No specific cost/benefit analysis will be performed; will be recommended as part of the Water Conservation Plan
	Integrated Resource Planning		BP 2	The City currently links its water conservation plan with its water supply planning, wastewater planning, and its overall water resources planning.	IRP is currently occuring at the City.	Do not move forward to evaluation
	Conservation Coordinator		BP 4	The City is not large enough to support a full time water conservation professional.		This issue will be considered as part of other candidate measures and programs
Ongoing Water Use						
	City Facility Evaluations and Retrofits	I, II, VI	BP 10, 14			
	Facility Indoor Audits			The City conducted water audits in 2003 at all of its facilities. The recommendations from these audits will be recommended for implementation to the extent that the recommendations have not already been implemented.	Will need to perform some follow-up audits to determine extent to which 2003 recommendations were implemented	Move to evaluations
	Facility Retrofits - Indoor			The City conducted water audits in 2003 at all of its facilities. The recommendations from these audits will be recommended for implementation.	Replace faucet aerators, showerheads, toilets and/or urinals; fix and repair leaks	Move to evaluations
	Irrigation Equipment Upgrades			The City conducted water audits in 2003 at all of its facilities. The recommendations from these audits will be recommended for implementation.	Replace sprinkler heads, install pressure reducing values, upgrade controllers, fix leaks and improve values/value boxes	Move to evaluations
	Existing Customer Water Audits	VI	BP 10, 13, 14			
	Residential Indoor			Conduct residential indoor water audits	Residential per capita water use is currently about 60 gpcd, which indicates a level of water efficiency is already in place.	Do not move forward to evaluation
	Residential Outdoor			Conduct residential outdoor irrigation audits	Residential outdoor water use may be unmetered in some cases; such that audits may be helpful in identifying those unmetered accounts	Move to evaluations
	Commercial Facilities (treated water uses)			Conduct commercial facility indoor and outdoor water audits	Focus on high water use facilities	Move to evaluations
	Fort Lewis College Audits (both raw and treated water uses)			Conduct indoor and outdoor water audits at the College	Connect with current on-campus sustainability efforts; focus on treated water uses	Move to evaluations
	Irrigation Customers (raw water uses only)			Conduct irrigation customer audits	Focus on high water use facilities	Move to evaluations
	Existing Customer Technical Assistance	III, VI	BP 9			
	Landscape Design and Maintenance Workshops			Focus workshops on landscape design for homeowners, HOA Boards, landscape designers	Requires tracking of participants and their water use before and after the workshop - difficult to track non-resident businesses and contractors.	Do not move forward to evaluation
	Xeriscape Demonstration Garden			Create and maintain City sponsored Xeriscape Garden (could be a value program sponsored by the City and conducted by the High School)		Move to evaluations
	Residential Customer Water Use Workshops			Focus workshops on residential outdoor water use and xeriscape concepts	Requires tracking of participants and their water use before and after the workshop	Do not move forward to evaluation
	Commercial Customer Water Use Workshops			Focus workshops on specific types of commercial water use - e.g., restaurants and bars, etc.	Requires tracking of participants and their water use before and after the workshop; however, corporations are biggest water users, not local store owners, so workshops may not be effective	Do not move forward to evaluation
	Irrigation Customer Water Use Workshops			Focus workshops on irrigation practices and technologies for HOA Boards, irrigation contractors, landscape contractors	Requires tracking of participants and their water use before and after the workshop	Do not move forward to evaluation
	Existing Customer Rebates and Retrofits	X	BP 12			
	Residential Indoor Fixture and Appliance Rebates/Retrofits			Based on the findings of the audits, the City may choose to implement selected indoor fixture and/or appliance rebates	Residential indoor per capita water use is currently about 60 gpcd.	Do not move forward to evaluation
	Residential Outdoor Meter Installations			Based on the findings of the audits, the City may choose to install meters on unmetered outdoor residential uses		Move to evaluations
	Commercial Indoor Fixture and Appliance Rebates/Retrofits			Based on the findings of the audits, the City may choose to implement selected indoor fixture and/or appliance rebates		Move to evaluations

Identification of Candidate Water Conservation Measures and Programs
City of Durango

		State Statute Requirement[1]	CWW BP[2]	Comment	Specific Issues	Screening Results
	Irrigation Equipment Rebates/Retrofits			Based on the findings of the audits, the City may choose to implement selected outdoor irrigation upgrades and/or rebates		Move to evaluations
	Turf Replacement Programs/Xeriscape Incentives			The City may decide to provide incentives for its customers to remove turf and replace it with native plant materials and/or Xeric landscaping	City will focus on new construction controls of plant materials as more cost effective than turf replacement programs to manage future demand	Do not move forward to evaluation
Ordinances						
	Water Waste Ordinance		BP 5			
	Time of Day Watering Restrictions			Utilize existing ordinance that includes time of day water restrictions from 9 am to 7 pm for all days in the months from May to September for new and rehabilitated non-residential landscapes.	City may consider expanding the ordinance to include all outdoor irrigation including residential and City facilities.	Move to evaluations
	Day of the Week Watering Restrictions			Utilize "Day of the Week" watering restrictions limiting watering to every second or third day is not something that City Council will pass.		Do not move forward to evaluation
	Water Overspray Limitations			Utilize existing ordinance that includes avoidance requirements for overspray, low head drainage, and other conditions for new and rehabilitated non-residential landscapes.	City may consider expanding the ordinance to include all outdoor irrigation including residential and City facilities.	Move to evaluations
	Commercial Wise Water Use Certifications (Car Washes, Restaurants, etc.)			Develop certification program for water efficient commercial businesses in City	Cost is for seasonal employees. City does not have the staff to do any inspections or site visits.	Do not move forward to evaluation
	Landscape Design and Installation Rules and Regulations	III	BP 8			
	Landscaper Certification and Training			Develop and implement landscaper certification program - must be connected with City permitting and planning processes (including inspections and awarding of certificates of occupancy)	City lacks resources at this time to implement; however City has landscape requirements for new construction, so planning and permitting effforts address future irrigation practices	Do not move forward to evaluation
	Irrigation System Installer Certification and Training			Develop and implement irrigation installer certification program - must be connected with City permitting and planning processes (including inspections and awarding of certificates of occupancy)	City lacks resources at this time to implement; however City has landscape requirements for new construction, so planning and permitting effforts address future irrigation practices	Do not move forward to evaluation
	Rules for New Construction	IX	BP 11			
	Reduced Water Use Incentives			The City current operates a Water Treatment Investment Fee incentive program for non-residential construction that provides a 10% reduction in the investment fee with a demonstration of 20% reduced water demand.	City may consider expanding the ordinance to include all residential construction.	Do not move forward to evaluation
	Indoor Plumbing Requirements			The City current operates a Water Treatment Investment Fee incentive program for non-residential construction that provides a 10% reduction in the investment fee with a demonstration of 20% reduced water demand.	City may consider expanding the ordinance to include all residential construction.	Do not move forward to evaluation
	Outdoor Irrigation Requirements			City has landscape ordinance that requires irrigation and landscape plan, and certification of finished compliance with the plans, for new and rehabilitation of non-residential landscapes.	City may consider expanding the ordinance to include all residential construction.	Do not move forward to evaluation
	Commercial Cooling and Process Water Requirements			Develop and implement commercial cooling and process water requirements for new homes and/or businesses - must be connected with City permitting and planning processes (including inspections and awarding of certificates of occupancy)	City lacks resources at this time to implement, and the City has few commercial customers with cooling tower uses.	Do not move forward to evaluation
	City Facility Requirements			Develop and implement City facility water use requirements for new facilities - must be connected with City permitting and planning processes (including inspections and awarding of certificates of occupancy)	The City has no current plans to construct new municipal facilities.	Do not move forward to evaluation
	Rules for Existing Construction	IX	BP 8, 9			
	Point of Sales (POS) Requirements			Develop and implement POS requirements for real estate sales and transactions	City lacks resources at this time to implement.	Do not move forward to evaluation
	Alternative Water Supply Options (greywater, rainwater harvesting)			Develop and implement alternative water supply regulations for City	The State of Colorado is currently working on new regulations for greywater use, etc. It is premature for the City to evaluate this program until the State completes its efforts.	Do not move forward to evaluation
	Commercial Cooling and Process Water Requirements			Develop and implement commercial cooling and process water requirements for existing facilities	City lacks resources at this time to implement, and the City has few commercial customers with cooling tower uses.	Do not move forward to evaluation

Identification of Candidate Water Conservation Measures and Programs
City of Durango

		State Statute Requirement[1]	CWW BP[2]	Comment	Specific Issues	Screening Results
	Outdoor Irrigation Requirements			Develop and implement outdoor irrigation system requirements (e.g., ET Controller requirements).	The City has residential per captia water use currently and it will decrease in the future as passive savings are realized	Do not move forward to evaluation
Education		VI	BP 6			
	One Way					
	Bill stuffers, Newsletter, Mailings			City currently maintains a website with water conservation tips, newsletters and bill stuffers	Need to link any expenditures for printing and mailing to overall City water messaging campaign	No specific cost/benefit analysis will be performed; will be recommended as part of the Water Conservation Plan
	Two Way					
	K-12 Education			The City is interested in support local K-12 water education	The City will evaluate methods to create K-12 education programs	No specific cost/benefit analysis will be performed; will be recommended as part of the Water Conservation Plan
	Message Development/ Campaign			The City does not have a water messaging campaign; it relies on messaging within the media shed.	The City would benefit from a messaging campaign to link its various water conservation efforts with water rates; water waste ordinances; etc.	Move to evaluations
	Engaged					
	Citizens Advisory Group			The City current maintains a Citizens Advisory Board on water and other issues	The City currently maintains a Water Commission in addition to the City Council.	No specific cost/benefit analysis will be performed; will be recommended as part of the Water Conservation Plan
	Customer Surveys			The City does not currently utilize surveys		Do not move forward to evaluation
	[1] **under State Statute CRS 37-60-126 4 (a)**					

Appendix F

Analyses for Costs of Candidate Water Use Efficiency Measures and Programs and Estimated Water Savings

Preliminary Estimate of Costs for Measures and Programs
City of Durango

			Potential Benefit								
			Save Water	Reduce Operating Costs	Generate Additional Revenue	Improve Understanding of Customer Water Use/Track Water Savings	2011		2012		2013
Foundational											
Funded in Current CIP and/or Ongoing Programs											
	Leak Detection and Repair - Waterline Replacements		x	x	x	x	$ 300,000		$ 300,000		$ 300,000
	Leak Detection and Repair - Riverview Waterline		x	x	x	x	$ -		$ 1,152,000		$ -
	Meters - Replacements- Radio Reading Meter Upgrades for Commercial Users		x	x	x	x	$ 150,000		$ -		$ -
	Meters - Ongoing Testing and Replacement		x	x	x	x	$ 110,000		$ 110,000		$ 110,000
Recommended for Implementation											
System Water Loss Control											
	System Wide Water Audit (using AWWA M-36 methology)		x	x	x	x	$ 25,000		$ 2,500		$ 2,500
	Leak Detection Using Isolation Valving and AMR Meters		x	x	x	x	$ -		$ 15,000		
Metering											
	Identify Unmetered and Unbilled Treated Water Use by City, Others				x	x	$ 5,000		$ 15,000		$ 5,000
	Install New Meters on Unbilled Accounts (residential, other) (15/year)		x		x	x	$ -		$ 9,750		$ 9,750
Water Rates											
	Water Rate Increases		x		x		$ -		$ -		$ 35,000
	Revisions/Additions to Inclining Rate Block Structure (link to rate increases)		x		x		$ -		$ -		$ -
Data Collection											
	Improve Tracking of City Water Use		x	x		x	$ 2,500		$ 2,500		$ -
							$ 592,500		$ 1,606,750		$ 462,250
	Water Savings										
	High Estimate for Revenue										
		Apparent Loss Savings						26,368,185		26,624,480	
		Real Loss Savings						1,845,773		1,863,714	
	High Estimate for Water Savings										
		Apparent Loss Savings						23,072,162		23,296,420	
		Real Loss Savings						5,141,796		5,191,774	
								5,141,796		10,333,570	
Ongoing Water Uses											
Recommended for Implementation											
City Facilities											
	Revisit 2003 Audits		x			x	$ 13,500	133,620	$ -		$ -
	Conduct 25 Audits on City Parks		x			x	$ -		$ -		$ -
	Implement 2003 Recommendations - Indoor		x				$ 1,860	1,108,000	$ 54,338	307,500	$ -
	Implement 2003 Recommendations - Outdoor		x				$ 1,200	334,050	$ 2,936	639,126	$ 3,224
	Implement Recommendations for Park Audits						$ -		$ -		$ -
	Obtain Grants for City Facility Retrofits and Upgrades						$ -		$ 2,500	-	$ -
Existing Customers											
	Audits										
		Residential Outdoor (15/yr)	x		x	x	$ -		$ 7,500	9,450	$ 7,500
		Commercial (5/yr)	x			x	$ -		$ -		$ -
		Fort Lewis Treated Water Uses	x			x	$ -		$ -		$ 25,000
		Irrigation (raw water uses) (5/yr)	x			x	$ -		$ -		
	Technical Assistance										
		Xeriscape Demostration Garden	x				$ -		$ -		$ -
	Rebates and Retrofits										
		Commercial Indoor (based on the audits)	x	x		x	$ -		$ -		$ -
		Fort Lewis Retrofits	x	x		x	$ -		$ -		$ 9,000
		Irrigation Equipment (raw and treated water)(based on the audits)	x	x		x	$ -	-	$ -	-	$ -
							$ 16,560		$ 67,274		$ 44,724
	Water Savings										
		treated						1,575,670		956,076	
		raw						-		-	
	Cumulative										
		treated						1,575,670		2,531,746	
		raw						-		-	
Ordinances											
Funded in Current CIP and/or Ongoing Programs											
	Commercial Water Efficient Landscape Standards		x			x	$ -		$ -		$ -
Recommended for Implementation											
	Improve Water Waste Control										
		Improve Enforcement of Water Efficient Landscape Standards									
		for time of day watering	x				$ -		$ -		$ -
		for other water waste	x				$ -		$ -		$ -
		Expand Commercial Landscape Standards to Residential Construction	x				$ -		$ -		$ -
Education and Public Information											
Funded in Current CIP and/or Ongoing Programs											
	Citizen's Advisory Group		x	x	x	x	$ -		$ -		$ -
Recommended for Implementation											
	Bill Stuffers, Newsletter, Mailings, Website						$ 1,500		$ 1,500		$ 1,500
	K-12 Education, Water Fair		x			x	$ 500		$ 500		$ 500
	Message Development			x	x	x	$ 15,000		$ 12,000		$ 2,500
							$ 33,560		$ 81,274		$ 49,224
	Summary of Water Savings (AF)										
		Total Treated Water						21		39	
		Total Raw Water						-		-	
								21		39	

Preliminary Estimate of Costs for Measures and Programs
City of Durango

Foundational				2014		2015		2016		2017		2018	
Funded in Current CIP and/or Ongoing Programs													
	Leak Detection and Repair - Waterline Replacements			$ 300,000		$ 300,000		$ 300,000		$ 300,000		$ 300,000	
	Leak Detection and Repair - Riverview Waterline			$ -		$ -		$ -		$ -		$ -	
	Meters - Replacements- Radio Reading Meter Upgrades for Commercial Users			$ -		$ -		$ -		$ -		$ -	
	Meters - Ongoing Testing and Replacement			$ 110,000		$ 110,000		$ 110,000		$ 110,000		$ 110,000	
Recommended for Implementation													
System Water Loss Control													
	System Wide Water Audit (using AWWA M-36 methology)			$ 2,500		$ 2,500		$ 2,500		$ 2,500		$ 2,500	
	Leak Detection Using Isolation Valving and AMR Meters												
Metering													
	Identify Unmetered and Unbilled Treated Water Use by City, Others			$ 2,500		$ 2,500		$ 2,500		$ 2,500		$ 2,500	
	Install New Meters on Unbilled Accounts (residential, other) (15/year)			$ 9,750		$ 9,750		$ -		$ -		$ -	
Water Rates													
	Water Rate Increases			$ 32,000		$ -		$ -		$ -		$ -	
	Revisions/Additions to Inclining Rate Block Structure (link to rate increases)			$ 12,000		$ -		$ -		$ -		$ -	
Data Collection													
	Improve Tracking of City Water Use			$ -		$ -		$ -		$ -		$ -	
				$ 468,750		$ 424,750		$ 415,000		$ 415,000		$ 415,000	
	Water Savings												
	High Estimate for Revenue												
		Apparent Loss Savings	26,875,334		-		-		-		-		-
		Real Loss Savings	1,881,273		1,897,790		1,913,240		1,928,947		1,943,588		1,962,680
	High Estimate for Water Savings												
		Apparent Loss Savings	-		-		-		-		-		-
		Real Loss Savings	5,240,690		5,286,701		5,329,739		5,373,496		5,414,281		5,467,464
			15,574,260		20,860,961		26,190,700		31,564,196		36,978,477		42,445,941
Ongoing Water Uses													
Recommended for Implementation													
City Facilities													
	Revisit 2003 Audits			$ -		$ -		$ -		$ -		$ -	
	Conduct 25 Audits on City Parks			$ 25,000	172,993	$ -		$ -		$ -		$ -	
	Implement 2003 Recommendations - Indoor			$ -		$ -		$ -		$ -		$ -	
	Implement 2003 Recommendations - Outdoor	1,095,644		$ -		$ -		$ -		$ -		$ -	
	Implement Recommendations for Park Audits			$ -		$ -		$ -		$ -		$ -	
	Obtain Grants for City Facility Retrofits and Upgrades			$ -		$ -		$ -		$ -		$ -	
Existing Customers													
	Audits												
		Residential Outdoor (15/yr)	9,450	$ 7,500	9,450	$ -		$ -		$ -		$ -	
		Commercial (5/yr)		$ 7,500	114,482	$ 7,500	114,482	$ 7,500	114,482	$ 7,500	114,482	$ 7,500	114,482
		Fort Lewis Treated Water Uses	287,934	$ 2,500	25,406	$ 2,500	25,406	$ -		$ -		$ -	
		Irrigation (raw water uses) (5/yr)		$ 6,000	11,561	$ 6,000	11,561	$ 6,000	11,561	$ 6,000	11,561	$ 6,000	11,561
	Technical Assistance												
		Xeriscape Demostration Garden		$ -		$ 3,500		$ 3,500		$ 1,200		$ 650	
	Rebates and Retrofits												
		Commercial Indoor (based on the audits)		$ 7,850	1,620,000	$ 7,850	1,620,000	$ 7,850	1,620,000	$ 7,850	1,620,000	$ 9,150	720,000
		Fort Lewis Retrofits	5,120,000	$ 25,375	150,000	$ 6,650	926,000	$ -	-	$ -	-	$ -	-
		Irrigation Equipment (raw and treated water)(based on the audits)	-	$ -	-	$ 10,500	4,971,391	$ 10,500	4,971,391	$ 10,500	4,971,391	$ 10,500	4,971,391
				$ 81,725		$ 44,500		$ 35,350		$ 33,050		$ 33,800	
	Water Savings												
		treated	6,513,028		2,092,331		2,685,888		1,734,482		1,734,482		834,482
		raw	-		11,561		4,982,953		4,982,953		4,982,953		4,982,953
	Cumulative												
		treated	9,044,774		11,137,105		13,822,993		15,557,475		17,291,957		18,126,440
		raw	-		11,561		4,994,514		9,977,467		14,960,419		19,943,372
Ordinances													
Funded in Current CIP and/or Ongoing Programs													
	Commercial Water Efficient Landscape Standards			$ -		$ -		$ -		$ -		$ -	
Recommended for Implementation													
	Improve Water Waste Control												
		Improve Enforcement of Water Efficient Landscape Standards											
		for time of day watering		$ -		$ -		$ -		$ -		$ -	
		for other water waste		$ -		$ -		$ -		$ -		$ -	
		Expand Commercial Landscape Standards to Residential Construction		$ -		$ -		$ -		$ -		$ -	
Education and Public Information													
Funded in Current CIP and/or Ongoing Programs													
	Citizen's Advisory Group			$ -		$ -		$ -		$ -		$ -	
Recommended for Implementation													
	Bill Stuffers, Newsletter, Mailings, Website			$ 1,500		$ 1,500		$ 1,500		$ 1,500		$ 1,500	
	K-12 Education, Water Fair			$ 500		$ 500		$ 500		$ 500		$ 500	
	Message Development			$ 2,500		$ 2,500		$ 2,500		$ 2,500		$ 2,500	
				$ 86,225		$ 49,000		$ 39,850		$ 37,550		$ 38,300	
	Summary of Water Savings (AF)												
		Total Treated Water	76		98		123		145		167		186
		Total Raw Water	-		0		15		31		46		61
			76		98		138		175		212		247

Preliminary Estimate of Costs for Measures and Programs
City of Durango

Foundational			2019		2020	
Funded in Current CIP and/or Ongoing Programs						
	Leak Detection and Repair - Waterline Replacements		$ 300,000		$ 300,000	
	Leak Detection and Repair - Riverview Waterline		$ -		$ -	
	Meters - Replacements- Radio Reading Meter Upgrades for Commercial Users		$ -		$ -	
	Meters - Ongoing Testing and Replacement		$ 110,000		$ 110,000	
Recommended for Implementation						
System Water Loss Control						
	System Wide Water Audit (using AWWA M-36 methology)		$ 2,500		$ 2,500	
	Leak Detection Using Isolation Valving and AMR Meters					
Metering						
	Identify Unmetered and Unbilled Treated Water Use by City, Others		$ 2,500		$ 2,500	
	Install New Meters on Unbilled Accounts (residential, other) (15/year)		$ -		$ -	
Water Rates						
	Water Rate Increases		$ -		$ -	
	Revisions/Additions to Inclining Rate Block Structure (link to rate increases)		$ -		$ -	
Data Collection						
	Improve Tracking of City Water Use		$ -		$ -	
			$ 415,000		$ 415,000	
	Water Savings					
	High Estimate for Revenue					
		Apparent Loss Savings		-		-
		Real Loss Savings		1,980,881		1,997,862
	High Estimate for Water Savings					
		Apparent Loss Savings		-		-
		Real Loss Savings		5,518,168		5,565,473
				47,964,109		53,529,582
Ongoing Water Uses						
Recommended for Implementation						
City Facilities						
	Revisit 2003 Audits		$ -		$ -	
	Conduct 25 Audits on City Parks		$ -		$ -	
	Implement 2003 Recommendations - Indoor		$ -		$ -	
	Implement 2003 Recommendations - Outdoor		$ -		$ -	
	Implement Recommendations for Park Audits		$ -		$ -	
	Obtain Grants for City Facility Retrofits and Upgrades		$ -		$ -	
Existing Customers						
	Audits					
		Residential Outdoor (15/yr)	$ -		$ -	
		Commercial (5/yr)	$ 7,500	114,482	$ 7,500	114,482
		Fort Lewis Treated Water Uses	$ -		$ -	
		Irrigation (raw water uses) (5/yr)	$ 6,000	11,561	$ 6,000	11,561
	Technical Assistance					
		Xeriscape Demostration Garden	$ 650		$ 650	
	Rebates and Retrofits					
		Commercial Indoor (based on the audits)	$ 7,850	720,000	$ 7,850	720,000
		Fort Lewis Retrofits	$ -	-	$ -	-
		Irrigation Equipment (raw and treated water)(based on the audits)	$ 10,500	4,971,391	$ 10,500	4,971,391
			$ 32,500		$ 32,500	
	Water Savings					
		treated		834,482		834,482
		raw		4,982,953		4,982,953
	Cumulative					
		treated		18,960,922		19,795,404
		raw		24,926,325		29,909,277
Ordinances						
Funded in Current CIP and/or Ongoing Programs						
	Commercial Water Efficient Landscape Standards		$ -		$ -	
Recommended for Implementation						
	Improve Water Waste Control					
		Improve Enforcement of Water Efficient Landscape Standards				
		for time of day watering	$ -		$ -	
		for other water waste	$ -		$ -	
		Expand Commercial Landscape Standards to Residential Construction	$ -		$ -	
Education and Public Information						
Funded in Current CIP and/or Ongoing Programs						
	Citizen's Advisory Group		$ -		$ -	
Recommended for Implementation						
	Bill Stuffers, Newsletter, Mailings, Website		$ 1,500		$ 1,500	
	K-12 Education, Water Fair		$ 500		$ 500	
	Message Development		$ 2,500		$ 2,500	
			$ 37,000		$ 37,000	
	Summary of Water Savings (AF)					
		Total Treated Water		205		225
		Total Raw Water		76		92
				282		317

Appendix G

Public Comment Notice, Public Comments, and City Council Action

PROOF OF PUBLICATION

County of La Plata, State of Colorado } ss.

the Durango Herald

Drawer A, Durango, Colorado 81302

I, Karen Thompson, do solemnly swear that I am the ***customer service representative*** of the Durango Herald, and that I have personal knowledge of the essential facts stated herein; that the same is a daily newspaper printed in whole, and published in the County of La Plata, State of Colorado, and has a general circulation therein; that said newspaper has been published continuously and uninterruptedly in said County of La Plata for a period of more than twelve months next prior to the first publication of the annexed Legal notice or advertisement; that said newspaper has been admitted to the United States mails as second-class matter under a provision 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.

That the annexed legal notice or advertisement was published in the regular and entire editions of said daily newspaper one time only, June 12, 2011 once each day for XXXXX consecutive issue days; once each week on the same day of each week for XXXXX consecutive insertions; and that the first publication of said notice was in the issue period of said newspaper dated XXXXX and that the last publication of said notice was in the issue of said newspaper dated XXXXX A .D., ***2011***

In witness whereof I have hereunto set my hand this 13th day of June, 2011

Karen Thompson

Subscribed and sworn before me, a notary public in and for the County of La Plata, State of Colorado this 13th day of June, A.D., ***2011.***

Angela D. Stevens

Notary Public

ANGELA D. STEVENS NOTARY PUBLIC STATE OF COLORADO My Commission Expires 9-4-13

My Commission expires

31195

NOTICE OF PUBLIC HEARING BEFORE THE DURANGO CITY COUNCIL

NOTICE IS HEREBY GIVEN that the Durango City Council will conduct a public hearing on **Monday, June 20, 2011 at 6:30 p.m.** in the Council Chambers of City Hall, 949 Second Avenue. Said Public Hearing is to consider the adoption of the 2011 Draft Water Efficiency Management Plan

NOTICE IS FURTHER GIVEN that the public is invited to attend and present written and/or oral testimony regarding the proposal. **Written comments from those who cannot attend but want their opinions considered in Council's deliberations must be received by noon on Monday, June 20, in the City Clerk's office, 949 Second Avenue, Durango, CO 81301.** Further information concerning the proposal is available for review between the hours of 7:30 a.m. and 4:30 p.m. in the Public Works Department at 1235 Camino Del Rio, Durango, Colorado. The telephone number is (970) 375-4800. Dated in Durango, Colorado this 8th day of June 2011.

BY ORDER OF THE DURANGO CITY COUNCIL

/s/ Amy Phillips
City Clerk

PUBLISH: Sunday June 12, 2011

Media Contact:
Jack Rogers
Ph. 970-375-4809
Email:
RogersOJ@ci.durango.co.us

949 E. 2nd Avenue
Durango, CO 81301
www.durangogov.org

Follow us on Twitter at:
www.twitter.com/CityofDurango

FOR IMMEDIATE RELEASE, MARCH 14, 2011

NEWS RELEASE

Comments Requested on Water Efficiency Management Plan

Durango, CO: The City of Durango has begun work on revisions to its Water Efficiency Management Plan, the plan that describes how water conservation and other measures will be implemented to more efficiently use the water resources in the area, reduce water system operating costs, postpone the need for investments in city infrastructure, and reduce the need for water rate increases to its customers.

Using a grant from the Colorado Water Conservation Board, the City and its consultant, the Great Western Institute, have prepared a draft plan for review by the citizens of Durango. The draft plan will be available for review for a 60-day period, after which it will be considered for approval by the Durango City Council. The draft plan describes the existing conditions in the City of Durango including per capita consumption of water, water losses in the distribution system and ongoing programs to reduce water waste, and describes new programs the City should consider to postpone the need to invest in new water treatment facilities and alternate supply sources.

The plan is available for review at the Durango Public Library or on-line at www.durangogov.org/pubworks/water.cfm. The public comment period will extend until 4:30 p.m. on May 15, 2011. Public comments need to be submitted in writing to:

City of Durango
Department of Public Works
949 East 2nd Avenue
Durango, Colorado 81301

Comments may also be submitted by email to ossegeja@ci.durango.co.us

A public hearing will be scheduled before the Durango City Council after the public comments have been reviewed in early summer of 2011. For questions, please contact the Public Works Department at 375-4802.

###

WESTERN RESOURCE
ADVOCATES

May 13, 2011

Julie Ossege
Department of Public Works
949 East 2nd Avenue
Durango, Colorado 81301

Re: Comments on the City of Durango Draft Water Efficiency Management Plan (March 2011)

INTRODUCTION

Western Resource Advocates (WRA) appreciates the opportunity to comment on the City of Durango Draft Water Efficiency Management Plan (herein as "Plan"). We hope the City will take the following comments into consideration when finalizing the Plan.

We compliment the City Manager's Office, the Durango Water Commission, and the City Public Works, Planning, and Parks and Recreation Departments for working together to steadily decrease from 2004 to the present the per capita water use of the City's service area. The Plan provides a full evaluation of all of the plan elements required in a statutorily mandated water conservation plan, and is evidence of the commitment of the Public Works Department and the City to promote conservation as an integral component of the development and management of the City's water resources portfolio. WRA commends and supports the City's proposal in the Plan to:

- Reduce the current level of non-revenue water from an estimated 20% of total treated water to 13% in the next 10 years.
- Reduce indoor and outdoor water use in City facilities and in the largest commercial and irrigation facilities.
- Conduct a water rate study to improve the City's water rate structure.
- Update the Plan at the end of 2015 as an adaptive management strategy.

That said, the draft Plan can be improved by prioritizing the implementation of a conservation-oriented water rate structure, hiring a full-time water conservation coordinator to supervise and coordinate the implementation of the Plan, and enacting a water waste ordinance. These 3 recommended actions should be foundational, no-excuse best practices in the Plan[1].

1. DEVELOPMENT AND ADOPTION OF A CONSERVATION-ORIENTED WATER RATE STRUCTURE SHOULD BE A FOUNDATIONAL PRIORITY OF THE PLAN

WRA fully supports the Plan's proposal to produce a water rate study. Nevertheless, the adoption of a truly conservation-oriented water rate structure should be included as a foundational priority. In addition, the Plan proposes yearly water rate increases, but it is important to underscore in the Plan that such increases must be *conservation-oriented* increases.

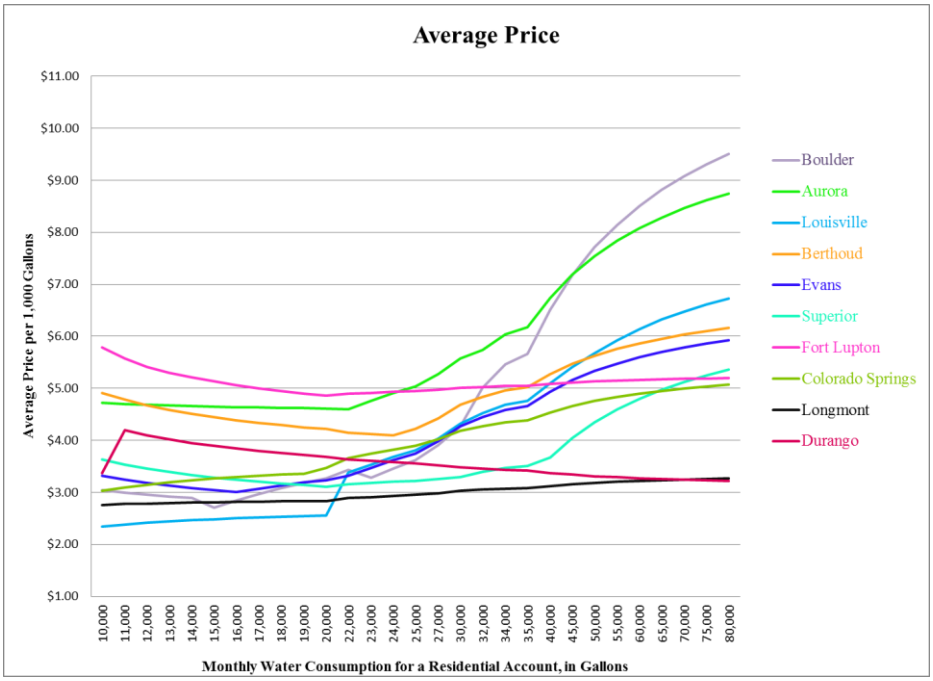
Rate structures are one of the most powerful water conservation tools. They play an essential role in communicating the value of water to customers. Inclining block rates are generally the most effective in communicating the value of water and providing an incentive for consumers to conserve. But even inclining rate structures must have key elements that need to be properly addressed in order to achieve a truly conservation-oriented rate structure. In a nutshell: Blocks need to be of the appropriate sizes, price differentials between the blocks should be meaningful, and rates should avoid high fixed service charges.

Water rates that promote efficiency will have an average price curve that slopes upwards, communicating to the customer that the more water she or he uses, the more expensive each additional gallon of water becomes. *See* Figure 1 below.

The slope of the average price curve is thus a good metric that can be used to find out whether the key elements of an inclining block rate structure have been integrated effectively. Because the sizes of the blocks, the price differentials between the blocks, and the fixed service charges may vary widely, not all increasing block rates are created equal.

[1] The three recommended actions are best practices considered essential for all utilities to have by the Colorado WaterWise Guidebook of Best Practices (2010). This guidebook is expected to be used in the future by the Colorado Water Conservation Board (CWCB) as a reference in the evaluation of municipal water conservation plans. A copy of the guidebook may be found at http://coloradowaterwise.org/Resources/Documents/BP%20Project/Best%20Practices%20Technical%20Guidebook%20-%20Oct%2018%202010.pdf

Figure 1. Average Price of Water Rate Structures of 10 Colorado Cities (Consumption Charges and Monthly Fees, for Individual Residential Water Accounts)



As can be seen in the figure above, the increasing block rate structure of the City of Durango has an average price curve with a negative slope that results in the opposite of what an inclining block rate is expected to produce - it communicates to the customer that the average price of water will be less expensive the more water the customer uses. Figure 1 was produced using the current summer water rates of the City of Durango and data from Western Resource Advocate's Front Range Water Meter Report (2007.)

The Plan mentions that the City is considering the possibility of developing water rate billing structures based on water budgets. Water budget-based rate structures have been successfully employed in Colorado by the Centennial Water & Sanitation District and the City of Boulder. Implementation of this type of rate structure provides an equitable way to share limited supply while preserving choice, improves the customer's linkage between who causes costs and who pays for them, and provides superior and equitable pricing control during times of drought.[2]

Providing a peer-to-peer comparison of water use on a customer's bill is a complementary approach that offers educational information to the customer and may result in decreased water use through social pressure. If an individual knows they are using more water than others on their block or in their neighborhood, they may be more likely to reduce their water use.

[2] Mayer, P. & DeOreo, W. 2008. Water Budgets and Rate Structures: Innovative Management Tools. Journal AWWA. May.

Tying sewer fees to water use fees, rather than having a set monthly fee, is another way to incentivize conservation that should be considered by the City. People who can save money on two parts of their water bill may be more apt to use water efficiently.

2. HIRING A FULL-TIME WATER CONSERVATION STAFF SHOULD BE A PRIORITY IN THE PLAN.

The Plan mentions that the Public Works Department does not currently have, nor does it plan to hire during the planning period, a full-time water conservation staff. Ironically, the reason the Plan gives for not having a full-time water conservation coordinator (lack of resources) is exactly the reason why the City should hire a full-time water conservation coordinator.

2.1. THE CITY WOULD GET BACK MORE THAN ITS INVESTMENT IN A FULL-TIME CONSERVATION STAFF, IF SUCH AN INVESTMENT ENSURES THE EFFECTIVE IMPLEMENTATION OF THE PLAN.

As mentioned in the Plan, a reduction of apparent water losses by one percent could translate into increased water sales of about 13 million gallons annually or an increase in water sales revenue of about $27,000 per year. A reduction of 7% (what the Plan proposes to do), would represent, according to these calculations, an increase in water sales revenue of approximately an additional $189,000 of cash-flow per year. As also mentioned in the Plan, if the implementation of the Plan results in capital projects being delayed by just one year, this would save the City $780,000. This seems to indicate that the City would get back much more from what it would invest in a full-time conservation staff, if such an investment ensures the effective implementation of the Plan.

It is doubtful that all of the elements and actions proposed in the Plan will be implemented within the next 10 years without a conservation coordinator working diligently in their implementation. Even though the City's 2001 and 2003 Plan included an outdoor water use conservation component, there has been an actual *increase* in outdoor water use in municipal facilities in the last 10 years (and it seems that this might also be the case for the City's 25 parks.) Two goals/tasks of the 2001 and 2003 Water Efficiency Plans were to "demonstrat[e] practical and attractive water-efficient devises and landscapes on all City lands," and to "apply stringent requirements to City-owned facilities." Although this is clearly written in the 2001 and 2003 Plans, audited City facilities increased their outdoor water use from .98 million gallons per year (2003) to 1.15 million gallons per year (2009; *see* Table 11, Draft Efficiency Management Plan.) This might be good evidence that supports our assumption that the City needs a full-time water conservation coordinator to ensure that the commendable Plan the City has developed on paper is actually implemented.

An excellent efficiency management Plan on paper does not mean much if the City does not have the human wherewithal to implement it. Real-world implementation of all of the Plan elements will probably require the coordination and supervision of a full-time water conservation coordinator. Hiring a water conservation staff to conduct work that would probably pay for itself in treble to implement a $6 million Plan makes sense from a financial perspective[3].

2.2. A CONSERVATION COORDINATOR MAY ALSO BRING SIGNIFICANT VALUE TO THE CITY BY WORKING WITH CITY OFFICIALS TO ENSURE THAT THERE IS ENOUGH WATER TO MAINTAIN DURANGO'S WORLD CLASS FISHING AND WATER RECREATION INDUSTRY.

We also hope that the City takes a broader look when assessing the value of water conservation and the cost-effectiveness of hiring a full time water conservation coordinator. Studies in Colorado have demonstrated that there is a direct correlation between instream flows and rafting and fishing expenses. Rafting and fishing have been found to increase with increases in river flow (rafting increases until the river is 100% bankfull; while fishing increases until the river is 70% bankfull). Conversely, it has been found that reducing instream flows would result in river rafting and fishing activity reductions. Specifically, a 25% reduction in instream flows in the Colorado River in Colorado would result in $18.7 million less in expenditures, 843 jobs lost, and $13.37 million dollars of lost income related to river rafting activities. The relationship between fishing and instream flows in the Colorado River in Colorado is even more dramatic: a 25% reduction in instream flows in the Colorado River would result in $49 million less in expenditures, more than 2,000 jobs lost, and $37.8 million dollars of lost income[4]. A conservation coordinator may bring significant value to the City by working with City officials in ensuring that there is enough water to maintain Durango's world class fishing and water recreation industry.

[3] The comparison between the estimated total annual water revenue without the proposed water use efficiencies with the revenue with the proposed efficiencies is misleading (*see* Plan at Figure 8, p.52). It gives the impression that saving water through efficiency is not a good investment for the City (for, as the Plan states, the City would receive by 2020 75% of the water sales revenue without the proposed water efficiency programs.) As explained in another section of the Plan and at the end of page 3 above, this is not true. It would be appropriate and fair, for example, to include with Figure 8 another figure that depicts the estimated total annual water expenditures for commercial, residential users, and the City with and without the water efficiency measures proposed by the Plan. The Plan's explanation of the estimated total annual water revenue with water efficiency also does not mention whether the cash flow from the expected 7% reduction of water losses the Plan proposes to achieve, and the expected savings in delayed capital projects are included in the estimated annual revenue analysis. The reduction of water losses revenue and potential savings from delayed capital projects should be part of this analysis if these have not been taken into account.

[4] Loomis, J. 2007. How the Economic Contribution of Angling and Rafting to the Colorado Economy Changes with Variation in Instream Flow. Colorado State University, Fort Collins, Colorado (USA).

3. AT MINIMUM, THE CITY SHOULD HAVE A WATER WASTE ORDINANCE.

The City of Durango currently does not have a water waste ordinance (either under the Nuisance or the Utility section of its Code). Water conservation ordinances play an important role in establishing water use rules and appropriate behavior. Municipal ordinances have played a critical role in promoting wise water use, protecting infrastructure, and assuring that municipalities in Colorado have an adequate water supply to support population growth. A water waste ordinance is the basic municipal water conservation ordinance that every town and city should have. There is no good reason why the City should not have an ordinance to prohibit the waste of water.

CONCLUSION

The City of Durango has achieved steady reductions in water use over the past 10 years, and we encourage the City to continue improving its water conservation practices. The City should include as one of its foundational priorities the development a conservation-oriented water rate structure. Overall, the City presents an excellent Plan, but we are doubtful whether the Plan can be implemented as proposed if the City does not provide additional funding for a water conservation staff. We believe the City should take a closer look at the benefits of having a full-time conservation coordinator that makes sure that a Plan that will cost the City $6 million dollars to implement is effectively implemented. Funding water conservation is imperative for the continued success of any conservation program, and WRA strongly encourages the City to designate additional funding for the implementation of the Plan and to ensure that the City's conservation goals during the planning period are met. We look forward to working with Durango as it moves further towards proactive, conservation-oriented solutions.

Respectfully,

Jorge Figueroa
Water Policy Analyst
Western Resource Advocates

CITY of DURANGO

STATE OF COLORADO)

COUNTY OF LA PLATA) ss.

CITY OF DURANGO)

I, hereby certify that the attached is a true and exact copy of the minutes from June 20, 2011 pertaining to item 9.2.1 ***Public Hearing to Consider the Adoption of the 2011 Draft Water Efficiency Management Plan.*** Councilor White moved to adopt the March 2011 Water Efficiency Management Plan for the City of Durango. Councilor Lyon seconded the motion. The motion passed with a 3-0 vote.

In witness whereof I have hereunto set my hand and the seal of the City of Durango this 6th day of July, 2011.

Amy Phillips, CMC
City Clerk

CITY CLERK SEAL CITY OF DURANGO, COLORADO

Legislative and Policy-related Hearings:

9.2.1. Public Hearing to Consider the Adoption of the 2011 Draft Water Efficiency Management Plan

Mr. Rogers explained that the City of Durango operates the community water system in and around the City of Durango. The City has provided safe, reliable potable water to its residents and commercial, industrial, and institutional water users for over 120 years. During that period of time, the City has been faced with various challenges in providing water to its customers including contamination of its only water supply by upstream mining interests, construction of treatment facilities to meet increasing public health requirements, and loss of raw water supplies due to wildfires in the drainage shed that serves the City. Throughout the long history of Durango, the City has been able to meet the needs of its citizens through sound planning and insightful forethought by City officials in the past.

Among the efforts to assure adequate water supplies for future generations, the City has invested in projects to increase raw water supplies and water treatment facilities and has undertaken investments in transmission and distribution lines throughout the community. In the 1970's a prolonged drought led the City to consider investments in other areas to assure an adequate water supply. Reservoirs were sealed to reduce seepage, leaking water lines were replaced and meters were added to residential accounts to reduce water wastage. Since the 1980's, a number of other steps have been taken to reduce the amount of water lost to the City so that future investments in new supplies, treatment works and transmission could be reduced or postponed through reduced water usage within the City. In 1997, the City produced a Water Efficiency Management Plan to describe a way for the City to meet the water needs of a growing population.

The efforts at improved efficiency in water delivery appear to have been beneficial because while the City population has increased by over 40% in the last 30 years, the City treated the same amount of water in 2010 as it did in 1980.

However, the City is not as efficient in using its water as it could be. The total per capita water consumption in Durango of 209 gallons per capita per day is higher than the Colorado average by a significant margin. The amount of water that goes unmetered from the treated water system is 20% of the water produced at the plant, an amount that is 7% above the national average. Institutional and commercial water users are unaware of their water wastage, or the measures available to them to reduce utility costs.

In 2010, the City received a grant from the Colorado Water Conservation Board (CWCB) to complete and update the City's Water Efficiency Management Plan. The State of Colorado encourages communities throughout the state to develop water conservation plans to meet the State's long-term goal of effectively utilizing the waters of the State to their greatest economic advantage. The encouragement lies in the ability of the State to eliminate grants and low interest loans for water projects in communities that fail to adopt and update water conservation plans.

The City engaged Great Western Institute to help in the preparation of a plan that would meet all state requirements and provide a practical plan that would lead to improved water efficiency. Great West Institute had developed the guidelines for water conservation plans that the CWCB distributes to all communities seeking to develop or update water conservation plans throughout Colorado.

Tracy Bouvet from Great Western Institute met with City staff and the City's Water Commission to identify needs and recommend solutions to problems the City has faced over the years with respect to efficient water delivery to its customers. The City's identified goals were:

1) Prepare a plan that would receive the approval of the City Council, and the CWCB, to identify the funding available to the City for future capital projects,
2) Define ways that the City could postpone or eliminate large capital investments in water infrastructure by reducing the amount of water needed for the growing population,
3) Reduce energy consumption and energy costs associated with the supplying and treating of water for the community, and
4) Assure that water users of the City are charged fairly for the water they use or waste in a manner that keeps water rates low enough to encourage adequate watering of lawns and gardens to make Durango a pleasant place to live.

The plan was developed in the fall of 2010 and after several reviews by the City Water Commission, the draft plan was announced and published on the City's website for public review in March of 2011. Per the

requirements of the CWCB a 60 day public comment period was established for review of the plan. On May 13, 2011 the only written comment on the plan was received. A six (6) page letter from Western Resources Advocates, a non-profit environmental law and policy organization based in Boulder, Colorado, recommended three specific changes to the plan. First, they recommend a revised rate structure to further encourage water conservation. Second, they recommend hiring a full-time staff for water conservation, and third, they recommend that the City have an ordinance that prohibits the waste of water.

They concluded:

"Overall the City presents an excellent Plan, but we are doubtful whether the Plan can be implemented as proposed if the City does not provide additional funding for a water conservation staff. We believe the City should take a closer look at the benefits of having a full-time conservation coordinator that makes sure that a Plan that will cost the City $6 million dollars to implement is effectively implemented..."

The draft plan included a description of the City's water system, its historic use of water, a summary of past and current water efficiency activities, and a forecast of future water demands. The draft plan provided goals and objectives for future water efficiency activities and identifies measures and programs to implement an effective program. Finally, the draft plan gave a summary of those measures and programs that will provide the greatest cost savings for the City and prioritizes where City investments should be made to achieve the greatest cost savings.

The plan recommended that the City continue with its on-going programs to reduce water losses in the system including its leak detection program and the program of replacing and repairing older water meters. It further recommended that the City re-examine the water audit of City facilities conducted in 2004 and pursue permanent improvements to reduce water wasting that happens in City buildings.

The plan does not identify specific quantities of water loss that occurs due to specific causes, such as water loss through leaks, water loss through flushing of hydrants and unmetered water that results from inaccurate meters or illegal connections. It does recommend that the City use its recently installed automatic metering equipment and software to identify areas of town where the greatest water loss is occurring.

The plan recommended a more detailed investigation of water uses in some of the larger water customers of the City to determine operations or activities that could be modified to reduce water billings to each customer while improving the accuracy of metering facilities. Finally, the plan recommended a more active campaign by the City to inform the citizens of the benefits and opportunities for water conservation and establish positive reinforcement of a water efficiency ethic in the community.

Actions proposed by the plan included the budgeting of specific amounts of money in future years for the implementation of plan recommendations.

In response to the recommendations of the Western Resource Advocates the following are proposed by City staff:

1. **Water Rates to Encourage Water Conservation**. The current city rate ordinance already includes what is termed an "inverted rate structure" which requires residents to pay a higher rate for water when monthly usage exceeds 10,000 gallons. Residents pay $2.12 per 1000 gallons for use under 10,000 gallons per month and $3.06 per 1000 gallons for water consumed in excess of 10,000 gallons per month. A third tier or greater difference between tiers has been considered in the past and has been rejected as being more complicated than necessary to encourage customers to limit water use. The draft plan recommends that the City undertake a comprehensive water rate study in 2013 to assure that water rates are being charged fairly to each of the customer classes currently served by the City. At that time, a consideration should be given to modifying the current "inverted rate structure" of the City.

2. **Hiring a Full-time Water Conservation Coordinator**. The creation of a full-time position in the water fund to work only on water conservation measures is not recommended at this time. At the present time, the water fund supports 16 full-time positions. The support of a full-time position would be difficult to justify in terms or return on investment for the water customers of the City. It would be more appropriate for managers of the water system to redirect the efforts of the existing staff to more aggressively pursue water efficiency programs. Capital projects funded in previous years to upgrade the City water treatment plant will be finished soon and staff who had

been working on those projects will be available to work on projects such as revisions to the water distribution system allowing for the metering of specific geographic areas to determine high water loss regions in the system. Meter readers who have spent 10 days each month in past years will be free to conduct water audits now that the automatic meter reading hardware was installed. Staff stated that improvements in water efficiency in City facilities are undertakings that are best administered by the general government management of the City.

3. Enacting a Water Waste Ordinance. The City at one time had an ordinance that said that no one was allowed to discharge water onto City streets. Over time, the wasting of water was discouraged through the imposition of water rates based on water consumption, which occurred in 1980. While overwatering of lawns has occurred on occasion in recent years, it has been the philosophy of the City to discourage this practice, but not to prohibit it because watering to achieve complete coverage of a yard sometimes practically requires water reaching the street. The City did not wish to engage in water policing activities for such limited occurrences. The City does have an ordinance that allows the City Manager to take significant measures to limit wastage during periods of declared water shortage.

In summary, it is the recommendation of City staff that the recommendations made from Water Resource Advocates be considered in future years, however no change should be made to the draft Water Efficiency Management Plan at this time.

Adoption of the Water Efficiency Management Plan of March 2011 does not directly affect the 2011 budget of the City. Implementation of the plan will require an investment of approximately $75,000 per year from the water fund in future years. Benefits of the implementation will be less easy to identify because results will redound in terms of delay in investments for public improvements in water treatment, and water pumping. Some results will show up in lower utility bills for City facilities. Other benefits may include reduced pumping costs and increased revenues from unmetered uses.

Mayor Rinderle opened the Public Hearing and Public Testimony portion of the Public Hearing at 8:02 p.m. No one was present to address the issue. Mayor Rinderle closed the Public Hearing at 8:04 p.m. Councilor White applauded the plan for defining a use matrix, relating water issues and concerns to educational issues and placing concerns in concert with sustainability for the long-term. Councilor Lyon called the plan large and complex, but a plan that is workable for all.

Councilor White moved to adopt the March 2011 Water Efficiency Management Plan for the City of Durango. Councilor Lyon seconded the motion. The motion passed with a 3-0 vote.
Passed: For: 3; Against: 0; Abstain: 0; Absent: 2

CITY ATTORNEY, David P. Smith

10.1. Discussion and Possible Action Concerning an Emergency Ordinance Extending a Moratorium on the Issuance of Business Licenses for Medical Marijuana Centers within the City of Durango

City Attorney David Smith reported that in the Fall of 2008, the Council adopted Amended Ordinance O-2009-18, which created a regulatory framework for the licensing and operation of medical marijuana dispensaries within the City. Subsequently, after comprehensive state statutes were enacted through House Bill 10-1284, the Council adopted revised regulations through the adoption of Amended Ordinance O-2010-13, which, among other provisions, precluded the issuance of licenses for marijuana growing operations within the City.

State legislation regarding the medical marijuana industry occurs during every legislative session. In the last session, the Legislature approved House Bill 11-1043, which was signed into law by the Governor on June 2nd. This bill adopts numerous amendments to Article 43.3 of Title 12, C.R.S., which regulates the cultivation, manufacture, distribution and sale of medical marijuana in the State. Section 12-43.3-106 of Article 43.3 specifically granted local governments the option to prohibit medical marijuana centers, optional premises cultivation operations and medical marijuana-infused products manufacturer's licenses within the local jurisdiction.

Among the provisions within House Bill 11-1043 is an amendment to §12-43.3-103 which allows a person or entity with an established license to transfer that license to a different jurisdiction within the State if the person or entity has lost the prior location due to a ban on medical marijuana within that jurisdiction adopted either by the voters or a majority of the elected officials. While the person or entity