
**Final**

# City of Las Animas

# Water Conservation and Water Use Efficiency Plan

**May 2015**

**Prepared in conjunction with the**

**Southeastern Colorado Water Conservancy District**

**With funding from**

**The US Bureau of Reclamation and the Colorado Water Conservation Board**

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# Section 1 - Water Conservation Plan Overview

The City of Las Animas is a statutory city that is the county seat of, and the only incorporated city in, Bent County, Colorado. The population in Las Animas was 2,410 based on the 2010 census. Las Animas is located in southeast Colorado east of Pueblo, near the historic Bent's Fort along the southern side of the Arkansas River (see Figure 1). The City contains about 1.7 square miles, and the water utility service area, which includes areas outside of the City limits including the local prison extends over about 2.2 square miles.

The City is one of the project participants in the Arkansas Valley Conduit (AVC) being developed by the Southeastern Colorado Water Conservancy District (hereafter the "District"), as the local sponsor for the US Bureau of Reclamation. To comply with the requirements of developing the AVC, the District prepared and implemented a Regional Water Conservation Plan, addressing regional and local water conservation and water use efficiency issues relevant to the project partners located throughout the lower Arkansas River valley east of Pueblo.

As part of the implementation of the District's Regional Water Conservation Plan, grant funding was obtained from Reclamation and the State of Colorado (through the Colorado Water Conservation Board Water Efficiency Grant Fund) to, among other things, support preparation of local water conservation plans in accordance with the guidelines set forth by the State of Colorado[1]. The City sought District financial and technical support to prepare a local water conservation plan as part of its overall water utility planning programs.

The key areas of interest for the City relative to local water conservation planning and implementation include:

- Maintaining appropriate and effective water loss management programs
- Developing and using appropriate customer water rates that reflect the cost of service, including, but not limited to the cost for maintaining and upgrading infrastructure; and
- Preparing for the transition from production wells to the AVC provided project water in the future.

Each of these key areas of interest are further explained and explored within the body of the water conservation plan.

[1] Although the State of Colorado regulations (CRS 37-60-126) are not directly applicable to most of the AVC project partners, since most project partners do not have annual retail municipal and industrial water sales equal to or greater than 2,000 acre-feet, the technical requirements contained within the statute have been used to guide the development of all local water conservation plans supported by the District.

# Section 2 - Overview of the City's Water Supply System

The City maintains a water and sewer utility, and a public power utility along with its public works department that supports street and road maintenance, stormwater management and public safety. In the census of 2000, there were 2,758 people, 1,091 households, and 716 families residing in the city. The population density was about 2,100 people per square mile. There were 1,264 housing units at an average density of just under 1,000 per square mile. Since 2000, the City has lost about 13% of its population.

**Figure 1 – City of Las Animas**


The median income for a household in the City was $26,157, and the median income for a family was $29,815. The per capita income for the City was $13,893. About 19.7% of families and 25.0% of the population were below the poverty line, including 39.3% of those under age 18 and 14.4% of those ages 65 or over.

In spite of these challenges, the City has maintained a water infrastructure maintenance and upgrade program that has included:

- Water distribution line replacement and upgrades;
- Water distribution system booster station improvements;
- Upgraded water treatment plant to reverse osmosis (RO) (1996 and upgraded in 2009);
- Installation of new customer water meters (about 25 per year) with radio read technology (or automated meter reading (AMR) technology) (about 20% of meters are currently outfitted with AMR).

Currently the City is carrying debt service related to these improvements through 2040.

## Water Supply System

The City maintains a water supply system that utilizes nine (9) groundwater production wells that pump water from the shallow alluvium adjacent to the Arkansas River, such that the water withdrawals require replacement (via either augmentation or Rule 10 replacement) to protect downstream senior water rights. The extracted groundwater is of such a quality that the City must use RO to remove salts and dissolved solids prior to distribution. RO reject is discharged by the City's wastewater treatment plant where it is combined with sewer flows from the City, mixed and returned to the Arkansas River, for which the City obtains return flow credits. The City also receives limited credits for lawn irrigation return flows (LIRFs).

Water production from each of the City's wells is measured at the RO Plant using master meters that are calibrated every three years in accordance with the requirements of the State Engineers Office (SEO). Metering also occurs within the RO plant to measure the brine waste flows. Finished water placed into distribution is not currently metered; it is estimated based on the well production rates less the RO brine waste.

A summary of the City's water production and population served is provided in Table 1. Figure 2 presents the monthly water pumped to distribution from the water treatment plant for the period January 2000 through February 2014. Based on these data, it can been seen that water production steadily declined during the first seven years of this century; however, beginning in 2008 water production increased through 2012. Although the steady decrease in water production is attributable to the decreasing service population; the observed increase after 2008 relates to water use in the prison,

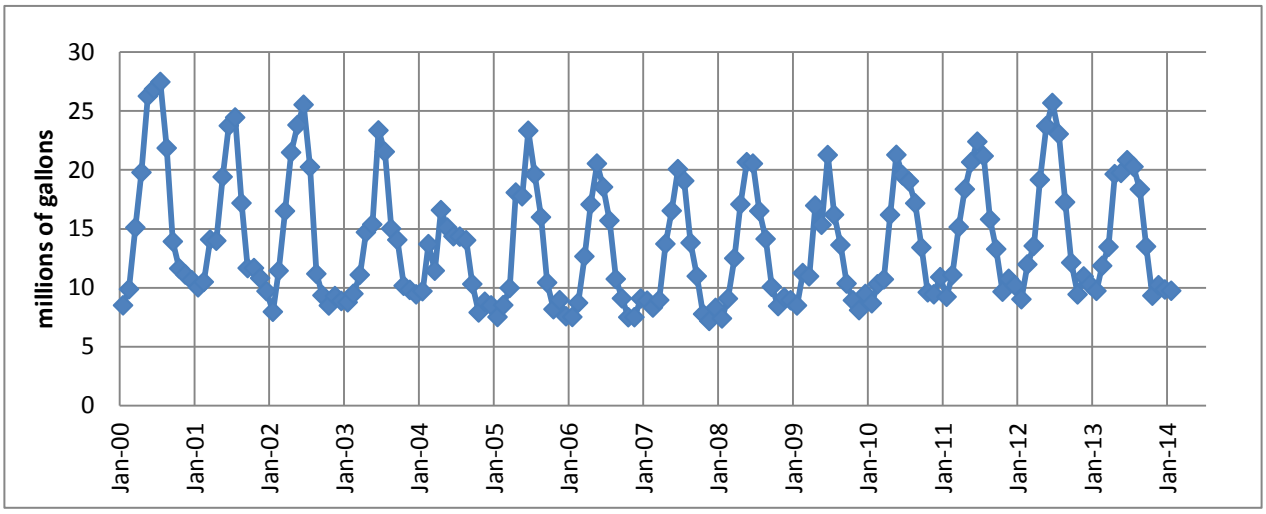
**Table 1**
**Summary of Water Production and Population Served 2000-2014**

| Year | Water to Distribution (million gallons) | Population Served* | Prison Water Demand (million gallons) |
|---|---|---|---|
| 2000 | 201.27 | 2,758 | n/a |
| 2001 | 178.19 | 2,723 | n/a |
| 2002 | 175.00 | 2,688 | n/a |
| 2003 | 162.25 | 2,654 | n/a |
| 2004 | 145.73 | 2,619 | n/a |
| 2005 | 156.83 | 2,584 | n/a |
| 2006 | 143.14 | 2,549 | n/a |
| 2007 | 144.37 | 2,514 | 21.72 |
| 2008 | 153.85 | 2,480 | 25.75 |
| 2009 | 150.43 | 2,445 | 36.28 |
| 2010 | 164.83 | 2,410 | 43.35 |
| 2011 | 178.46 | 2,413 | 41.91 |
| 2012 | 186.12 | 2,416 | 41.45 |
| 2013 | 177.18 | 2,418 | 46.61 |

*excludes the prison; based on linear interpolation between census conducted for period 2000 through 2010, and percentage change in customer taps for period 2010 through 2013.

which is the City's largest single customer. In fact, prison water use more than doubled from 2007 to 2012 (see Table 1). It currently constitutes over 25% of the total demand of the City's water use on average over the past four years. For this reason, per capita water use comparisons for the service area are not made based on total consumption.

**Figure 2 – Monthly Water to Distribution January 2000 through February 2014**




## Customer Attributes and Water Demand

The City maintains residential and commercial water customers inside and outside of the City Limits. The City also generates revenue from water sales to the prison, a nursing home and through bulk water sales. City water sales are tracked and billed monthly by the utility's finance department.

**Table 2**
**Summary of Number of Customer Connections – 2007 through 2013**

| | Inside Residential | Outside Residential | Inside Commercial | Outside Commercial | Prison | Nursing Home | Total |
|---|---|---|---|---|---|---|---|
| 2007 | 1,004 | 26 | 112 | 21 | 1 | 1 | 1,165 |
| 2008 | 1,006 | 28 | 112 | 17 | 1 | 1 | 1,165 |
| 2009 | 1,007 | 28 | 118 | 7 | 1 | 1 | 1,162 |
| 2010 | 998 | 29 | 120 | 6 | 1 | 1 | 1,155 |
| 2011 | 1,063 | 29 | 141 | 5 | 1 | 1 | 1,240 |
| 2012 | 982 | 31 | 117 | 5 | 1 | 1 | 1,137 |
| 2013 | 988 | 31 | 118 | 5 | 1 | 1 | 1,144 |

Table 2 presents a listing of the number of customer meters that have been active for the last 5 years. Information related to annual water produced and water sold by customer category for the period 2007 through 2013 is presented in Table 3 (presented on the following page).

From these data (Tables 2 and 3) a number of noteworthy observations can be made, as follows:

- Water sold has been rising along with the increased demand at the prison.
- Residential water demand has also increased from 2007 through 2012, reflected in an increase in per residential connection use over this same period (see Table 4).

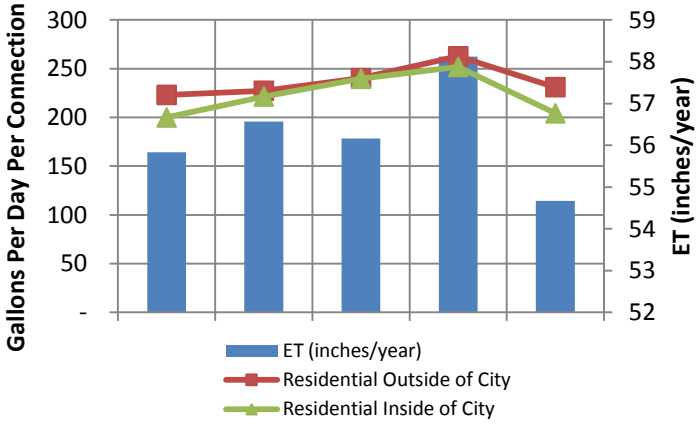
**Table 4**
**Per Connection Water Use and Estimated Evapotranspiration**

| | Per Connection Water Use (Gallons/Day) | | |
|---|---|---|---|
| **Year** | **Residential Inside** | **Residential Outside** | **Estimated ET (inches)*** |
| 2009 | 223.06 | 199.91 | 55.83 |
| 2010 | 227.31 | 221.42 | 56.57 |
| 2011 | 240.26 | 239.62 | 56.16 |
| 2012 | 262.64 | 251.73 | 58.12 |
| 2013 | 230.98 | 204.15 | 54.67 |

*evapotranspiration (ET) based on Blaney-Criddle method as estimated by the State Climatologist's Office (2014)

- The increase in residential per connection water use varies[2] by 8% over the years 2007 to 2014, whereas population varies by only 2%. Additionally, population during this period peaks in 2010, not 2012 (which is when demand is highest), decreasing by about 2.5% from 2010 to 2012 during which time residential water demand increased by over 10 million gallons or 12.5%. For this reason, it appears that the variation in residential water use per connection is correlated more closely to changes in ET then population change. This apparent correlation is illustrated in Figure 3, which compares ET to residential per connection water use. For the City, this trend appears to indicate that seasonal water use is impacting annual water production, as well as, total water sold.

**Figure 3 - Comparison of Annual ET to Residential Per Connection Water Use (for inside and outside of the City Limits) - 2009 to 2013**



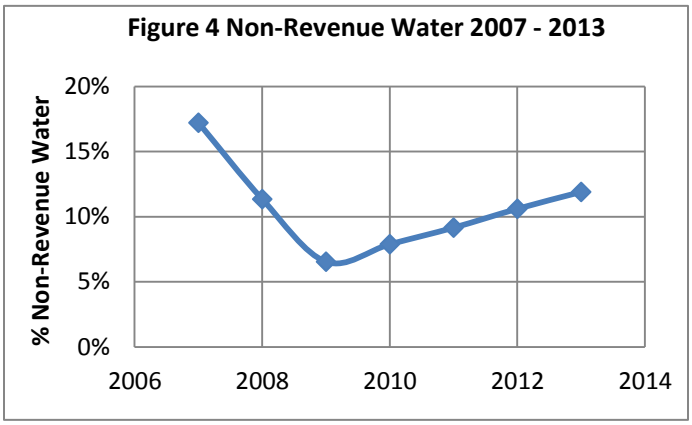

[2] Variability was estimated using the coefficient of variation, which is the ratio of standard deviation over mean assuming that the data is normally distributed.

**Table 3**
**Summary of Annual Water Production, Water Sold and Non-Revenue Water – 2007 through 2013**
(in millions of gallons)

| | | Total Delivered | | | | | | | | Non-Revenue* | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Total Produced | In Res | Out Res | In Com | Out Com | Prison | Nursing Home | Bulk Water Sales | Total Revenue Water | % Non-Revenue Water | Hydrant Flushing | Other Authorized Unbilled Uses | Total Authorized Unbilled Uses | Real and Apparent Losses |
| 2007 | 144.37 | 74.32 | 1.81 | 17.71 | 1.13 | 21.72 | 1.73 | 1.10 | 119.51 | 17.2% | 0.15 | 0 | 0.15 | 24.71 |
| 2008 | 153.85 | 86.97 | 2.09 | 17.98 | 1.01 | 25.75 | 2.47 | 0.10 | 136.39 | 11.3% | 0.15 | 0 | 0.15 | 17.31 |
| 2009 | 150.43 | 81.99 | 2.04 | 16.96 | 0.89 | 36.28 | 2.35 | 0.07 | 140.58 | 6.5% | 0.15 | 0 | 0.15 | 9.70 |
| 2010 | 164.83 | 82.80 | 2.34 | 20.55 | 0.45 | 43.35 | 2.26 | 0.07 | 151.83 | 7.9% | 0.15 | 0 | 0.15 | 12.85 |
| 2011 | 178.46 | 93.22 | 2.54 | 21.70 | 0.37 | 41.91 | 1.89 | 0.47 | 162.11 | 9.2% | 0.15 | 0 | 0.15 | 16.20 |
| 2012 | 186.12 | 94.14 | 2.85 | 25.41 | 0.58 | 41.45 | 1.85 | 0.12 | 166.38 | 10.6% | 0.15 | 0 | 0.15 | 19.60 |
| 2013 | 177.18 | 83.30 | 2.31 | 20.88 | 0.41 | 46.61 | 2.18 | 0.40 | 156.09 | 11.9% | 0.15 | 0 | 0.15 | 20.94 |

*estimated non-revenue water use includes accounting for authorized, unbilled uses ( e.g., hydrant flushing based on flow rates and times of flushing) and real and apparent losses. No estimates of either real or apparent losses (e.g., losses due to leaks that have been located and repaired, systematic billing errors, etc.) have been consistently tracked by the City.

- Non-revenue water (see Figure 4) which includes all of the water that is either lost from the distribution system or is not measured by the City has varied from 17% in 2007 to 12% in 2013. This variability has trended downward as prison water use increased from 2007 through 2009. However, this downward trend may be a result of reduced accuracy of estimating WTP effluent. Another observation is that for 2009 through 2012, non-revenue water increased from 6.5% to 10.6%. This increase may be due to changes in the accuracy of the meter at the prison, or may be a function of a trend of generally increasing combined apparent and real water losses. In either case, the City will be well served to better characterize water loss through improved metering, billing, and other water use accounting best management practices.




## Water Demand Forecast

The current forecast for future water demand in the City indicates that there is not an expected increase of water use from current levels of use. For the planning period, the State demographer has predicted a 0.31 to 0.36% growth rate in population for Bent County, noting that the growth rate predicted for the past five years was similar; whereas the actual growth rate was three to five times smaller than predicted.

In fact, since 2010, the City has had an increase in population of 8 persons while realizing a reduction in customer meters by 11. The major influences on water demand have therefore been weather and the prison. For this reason, it is not expected that any additional growth, or demand, will occur within the City service area over the planning period for this water conservation plan, which is 5 years (i.e., until 2020). This agrees with data presented in the AVC Environmental Impact Statement (EIS).

Even without growth, the City expects variability in future water demands to occur, due to changing water patterns, unforeseen leaks, variable customer demands, and other factors beyond the control of the utility. Assuming that the average water demand will continue to trend as it has over the past 3 to 4 years, since when the prison increased its rate of use, water sold is estimated to be for an average year to be about 477 acre-feet (AF), and range up to about 516 AF for a dry year (1 out of every 10 years[3]). This translates to water production from the treatment plant on an average year of about 525 AF, ranging up to about 569 AF for a dry year; noting that well production is an additional 35% more to account for RO brine water reject (or an additional 183 to 199 AF greater than the WTP production).

Note that some passive savings are expected to occur as customers retrofit their homes and businesses with more efficient bathroom fixtures and kitchen and laundry appliances. Passive savings could account

[3] This calculation assumes that the past water sold and well production data is normally distributed and that the dry year occurrence for 1 out of 10 years (or greater than 90% chance of occurring) is 1.28 standard deviations greater than the normal, or average, year occurrence.

for 10.6 to 13 gallons per connection per day[4] of additional reduction in water sold by 2020 (GWI, 2010). This translates to a total reduction of water sold of between 14 and 17 AF by 2020[5]. Table 6 summarizes these data.

**Table 6**
**Estimates of Future Water Demand and Well Production in 2020**

| | Water Sold (AF) | | Well Production (AF) | |
|---|---|---|---|---|
| | Average Year[a] | Dry Year[b] | Average Year[a] | Dry Year[b] |
| Without Passive Savings | 477 | 516 | 709 | 768 |
| With Passive Savings | 460 to 463 | 499 to 503 | 684 to 689 | 743 to 747 |

- [a] occurs about 5 out of every 10 years
- [b] occurs about 1 out of every 10 years

[4] Assuming 116 gallons per capita per day based on population and demand presented in Appendix A of Reclamation's EIS for the AVC (2012) and current per connection water use rates reported in Table 4 of this Plan.
[5] Passive savings are not impacted by seasonal variations in water demand since the passive savings relate to indoor water use efficiency only.

# Section 3 - Other Operational Issues Influencing Current and Future Water Conservation

## Data Collection and Metering

The City has had growing concerns with the interaction, and to some extent accuracy, of its data collection systems – most notably water production after treatment, and customer water use. This issue has been of concern for there are some months where billings exceed production, at least based on metered data. The City would benefit from improved metering at the RO plant, and in particular with a master meter after the RO brine has been separated from the produced water, such that an accurate measurement of water to distribution can be obtained. Without these measurements, water loss and non-revenue water characterization and management is to some extent compromised.

Noteworthy also is that the City has needs to improve its tracking of authorized, unbilled water use. For example, it has meters on each of its parks; however, this water is not billed to the water utility. For this reason, park water use is not consistently collected (which can be seen by its absence as a reported authorized use in Table 3). Fire department water use for training and fire fighting is not metered or billed, although this use is substantially less than water use in the City parks. In addition, water loss and/or use associated with hydrant flushing and construction water use is not metered; only estimated.

Given that these various authorized unmetered and/or unmeasured water "uses" should show up in the City's non-revenue water and water loss calculations, it is surprising that non-revenue water is not greater than 12% for 2013 (or 6.5% in 2009). Non-revenue water may be greater than estimated to account for City parks, etc. As indicated above, not having a master meter to measure water placed into distribution may compromise the accuracy of the calculation.

Another type of instrumentation that may benefit the City in characterizing water loss is the instantaneous monitoring of tank levels within the distribution system. As tank levels change, especially in periods when water use is expected to be very low (e.g., 3 am), the City could identify leak and use rates, as part of its water loss detection and management program.

Finally, the City may benefit from conducting an annual system wide water audit to review production and billing records and evaluate metering accuracy both at the treatment plant and at a representative group of customers (including the prison). The audit could also be used to evaluate the City's billing and finance department practices that track and activate customer meters, integrate manual and radio read data sets, and track municipal uses. It may also be of benefit to the City to incorporate limited meter testing and calibration with an annual audit to help characterize apparent losses related to both master meters and customer meters.

## Water Loss Management Improvements

The City has been struggling to maintain a proactive leak detection and repair program, given its limited resources and the other demands on its staff. It has both system flushing and valve exercise programs that are used to help manage distribution system water quality and reduce impacts of pressure induced mainline breaks, however, the demands of normal system operations, substantial mainline and serivce

line leaks, and various data collection activities related to meter reading, for example, limits the opportunities that staff have to perform these important tasks.

To improve the utilization of staff to support system operations, the City has been installing automated meter reading (AMR) devices on customer meters at a rate of about 25 devices per year for a cost of approximately $8,000 per year. Through this effort, about 250 meters are now radio read, constituting about 20% of those currently in service – leaving about 900 meters left as manual read devices. As long as the City continues to rely chielfy on mannually reading customer meters to support billings, the opportunities for improved system flushing and valve exercizing will be limited.

In addition, and in part due to the need for staff resources to be committed to customer meter reading, the City is continuously faced with leaks on its mains and/or customer service lines. Although the City has been consistently implementing water line improvements and repairs to address areas that have historically been subject to main line leaks, breaks continue to occur at a rate of 10 to 15 per year. Losses assocaited with main line leaks are estimated based on water tank level changes, with losses averaging about 50,000 gallons, and large leaks (in the range of 250,000 gallons) occuring on occasion. For this reason, losses due to leaks could be in the 500,000 to 1,000,000 gallons per year range[6].

To address these problems, the City will consider evaluting the costs and benefits of implementing a more comprehensive AMR installation program, with an expectation that real water losses related to leaks will be reduced once staff initiates regular preventive maintenance programs involving valve exercising and system flushing.

## Current Water Conservation Programs

The City has limited active water conservation programs due to the nature of its customer base and the overall needs of the community. Two City programs that are particularly important are:

- The use of time of day watering restrictions; and
- Tiered water rates established in December of 2004 that double the base rate of $1.50 after use of 30,000 per month (or 1,000 per day) for residential customers[7], and increases to $4.50 after 40,000 gallons per month of use.

These two programs were implemented to promote reduced customer water demand; however, the data related to customer water use does not indicate that the programs have necessarily created the desired impact over the long run. For example, the year after the tiered rate structure was put into place, water use was at a ten year low for the City. This trend continued into 2005; however starting in 2006 and continuing through the past year, average monthly water use has generally increased even as total population served has decreased, noting that water demand did decrease in 2012[8]; however, this reduction may be in partially related to weather related impacts (see Table 4) as ET dipped from 2012 levels.

[6] Losses due to leaks in this range are equivalent to less than 0.5% of water production.
[7] For commercial customers the rate change is the same, only the tier increases based on tap size. For example a 1 inch tap the rate change is 35,000 per month, for 1.5 inch tap the rate change is 40,000 gallons, etc.
[8] Residential use decreased by 12 to 19% per connection, and commercial use decreased by 18 to 29% per connection from 2011 to 2012.

To this point, the City should consider continuing to evaluate the benefits and impacts of continuing and/or strengthning these water conservation programs, as well as the potential benefits of other water conservation programs related to water loss management, customer meter reading, and customer demand management.

## Arkansas Valley Conduit (AVC)

In the long-term, the City will implement water conservation programs that will include regional cooperation with the Southeastern Colorado Water Conservancy District and the operation of the AVC. This project will supply the City with pre-treated Frying Pan–Arkansas River (Fry-Ark) Project Water, making the current RO treatment system substantially unnecessary, since the Project Water will replace, or substantially replace, the groundwater production that current constitutes the City's water supply. In doing so, the City will eliminate (or substantially reduce) the need for its RO treatment plant operations, and in doing so, eliminate (or substantially reduce) the solid waste management issues and costs related to the handling of the RO brine. Until the time that the AVC begins to deliver Project Water, the City will continue to have inefficiencies related to its treatment processes[9]. After the AVC is constructed and operated, the City will have an immediate reduction in its water supply needs as the RO brine waste (equivalent to 270 AF) is eliminated.

Note that since the RO brine provides a return flow credit to the City, and is placed back into the Arkansas River as surface water, the net change to regional water supplies is not substantial with the implementation of the AVC. However, the AVC will eliminate the generation of the concentrated salt brine waste for the City, thus improving the water quality within the receiving water.

[9] The actual amount of RO brine water that is generated, blended with treated wastewater and returned to the Arkansas River on an annual basis can only be estimated at this time, since the brine water is not measured directly. Current estimates are that the brine water is about 35% of the water produced by the City's wells, which is about 270 AF annually. Future improvements to the WTP effluent metering are proposed as part of the water conservation planning effort to better characterize RO brine and the amount of water pumped into the distribution system.

# Section 4 - Water Utility Expenses and Future Costs

The City has a number of expenses that it must fund on an annual basis that dominate the utility budget. Revenues from water sales and other revenue typically are in the range of about $700,000. Expenses related to power, chemical use, and other treatment costs constitute about 25% of all of the utility's operating expenses[10]. Costs related to salary and benefits constitute another 35%. Current debt service on past improvements make up about 13% of the utility's annual budget. The remaining 27% are spent on dept service, system and infrastructure maintenance and repairs, and other expenses. Capital construction related to the cost of implementing the utility's capital improvement projects (CIP) has comprised between 13 and 25% of the operating budget over the last 3 years, focusing on the replacement of old water line, along with installing new service lines, customer meters, values, tees, crosses, and other appurtenances related to new and upgraded water line installation.

Table 5 presents the capital construction costs incurred for each of the past 3 years. The budget for future capital improvements is expected to vary year to year, with $170,000 budgeted for 2014, and an average of about $75,000 per year expected after that due to reduced water use by the customers as rates increase. The focus of the future CIP will be to continue to replace customer meters and service lines, replace older distribution mains, and replace older/non-functioning values and hydrants.

**Table 5**
**Summary of Capital Construction for 2011 through 2013**

| | Capital Construction | Water Sales Revenue | Capital Construstion as a % of Utility Budget* |
|---|---|---|---|
| 2011 | $104,000 | $682,000 | 13% |
| 2012 | $212,000 | $714,000 | 25% |
| 2013 | $100,000 | $699,000 | 17% |

*Utility budget varies year to year depending on water sales revenue, new taps and other factors.

Note that for 2015, the City will be replacing the membrane in its RO treatment plant at a cost of approximately $40,000, leaving about $35,000 for water line and valve replacement, installation of a new prison water meter, and implementing the recommendations of this Water Conservation Plan.

Another expense that may require City funding in the future include new state solid waste regulations that may potentially impact the treatment and disposal of the RO reject using the City's wastewater treatment facility. If new RO reject treatment and/or disposal options are needed for the City to adhere to new state regulation's, the City may be faced with large expenses for not only waste treatment infrasturcure but replacement water as well, given that the RO reject is typically about 35% of the water pumped from the City's production wells.

The water conservation plan evaluations will consider potential measures and programs that may mitigate the new solid waste regulations associated with RO reject treatment (since this would constitue

[10] Operating expenses include various fixed costs related to salaries, retirement benefits, health insurance, etc. Fixed operating expenses include about $90,000 per year in debt service which is about 13% of average utility revenue.

a large water loss from not only the City's water portfolio, but from the Lower Arkansas River basin watershed). The water conservation plan will also evaluate improved data collection and water loss management programs given current funding options and considerations associated with ongoing water utility cash flow and debt service.

# Section 5 - Water Conservation Goals

The City of Las Animas has been providing water to a population that has dropped since 2000, but has generally stablized, and is not expected to grow by more than a fraction of a percent by 2020, and any growth in water demand is likley going to be offset by the effects of passive savings as more customers install efficient fixtures and appliances. However, the City has reason to improve its water use efficiency, given that it spends a substantial amount of its annual budget on energy costs, and that it may have increased costs assocaited with the treatment and disposal of RO brine in the future. In addition, the City will be improving its water loss management in the future, which will reduce losses due to leaks, and paper losses associated with meter inaccuracies and systematic data handling errors; while at the same time improving cash flow.

Therefore, City will be attempting to achieve the following goals during the planning horizon of 6 years (i.e., by the end of 2020) in its implementation of this water conservation plan:

- Reduce water loss (measured as the combination of apparent and real losses) by 10% for an average annual demand reduction of about 5 AF by the end of 2020; and
- Reduce summertime use with the goal of demand reducation by about 4 million gallons over the season, for an average annual demand reduction of about 12 AF by the end of 2020.

It is important to note that the actual non-revenue water, and associated real and apparent water losses may be masked by metering inaccuracies (e.g., prison meter under reading) or systematic errors (e.g., WTP effluent flow rate estimate is low based on poorly performing backwash flow meters). In addition, the City parks are metered and are using water but have not been consistently monitored. Therefore, it is possible that the WTP effluent flow and perecnt of non-revenue water are higher than currently estimated. If this is the case, then the goals stated above may be lower than will actually occur since 10% of non-revenue water may be greater then 5 AF. The accuracy of the data, and the nature of the goal will be further characterized as the water conservation plan is implemented and better, more accurate data is collected and analyzed.

To achieve these goals, the City will evaluate and select a group of measures and programs that address the specific areas of desired water use efficiency improvements (i.e., water loss management and summertime water use), that are cost effective, implementable within the operational constraints of the utility (e.g., staff availblity, funding availablity) and will be acceptable to the community. The evaluation and selection of water conservation and water use efficiency measures and programs is presented in the next section.

# Section 6 - Identification and Evaluation of Water Conservation and Efficiency Measures and Programs

Identifying candidate water conservation and efficiency measures and programs has its roots in two key resource areas. First is the State of Colorado Revised Statute 37-60-126 (4)(a) which addresses water conservation planning for municipal water providers (see Appendix A). Although this statute is not directly applicable to the City[11], it requires that "at a minimum, [planning entities should] consider the following," which is a list of water-saving measures and program types that may be used by a water provider for water conservation and improved water use efficiency. The second is the Southeastern District's Best Management Practices (BMP) Tool Box, which is a web-based water conservation planning tool that contains a wide variety of relevant information regarding best practices that water utilities can use to improve water use efficiency and support smart water use. The Tool Box contains categories of measures and programs that address the five different operational areas that all utilities conduct - system wide management, water production and treatment, water distribution, delivery of water to customers and customer demand management.

Table 6 presents a discussion of how each of the State's required types of water conservation measures and programs were considered and incorporated into the City's evaluation of candidate water conservation and water use efficiency programs. In general, the City has determined that customer demand management techniques are not particularly relevant to the issues that Las Animas currently faces. Water use efficiency in this geography of the State is generally integrated into the culture. Outdoor water use is limited in most locations. Automated sprinkler systems are the exception rather than the rule. Residential outdoor use tends to be focused on small food gardens and limited lawn irrigation. Indoor use is consistent with typical water uses; albeit in older housing stock. Leaks inside may be higher than the national average, however passive savings are expected to help reduce indoor water use over time as a result of naturally occurring fixture and appliance upgrades and replacements.

For these reasons, the City like many other water providers in the Lower Arkansas river valley are choosing to focus their limited resources on maintaining and upgrading the water system infrastructure – managing data collection, water loss, and revenue generation – over providing incentives and financial support for customer demand management. Note that a broader range of customer demand management programs such as those listed by the State for consideration under CRS 37-60-126 (4)(a) may become more applicable to the needs of Las Animas and its customer base in the future. However, for the current planning period, there is limited utility of some of those measures and programs contained in Table 6, as noted.

Water conservation and/or efficiency measures and programs that the City may choose to implement have been identified using the template presented in the District's Tool Box, as indicated in Table 7. In the short term (i.e., the next 1 to 2 years), the City will continue those measures and programs that it has been performing over the past few years (e.g., capital projects to repair and place meters and water lines), making selected enhancements to improve data collection and better plan for the future. The City

[11] See footnote 1.

**Table 6**
**Review of State Required Measures and Programs for Consideration Under CRS 30-67-126 (4)(a)**

| Measure or Program | Applicability to the City's Water Conservation Needs | Status for Further Evaluation |
|---|---|---|
| Water-efficient fixtures and appliances, including toilets, urinals, clothes washers, showerheads, and faucet aerators | Customer efforts to replace aging water using fixtures and appliances will create water demand reductions of 13 to 16 AF over the planning period (see Table 6). More customer education related to indoor water efficiency will be considered (see below). | No further evaluation necessary |
| Low water use landscapes, drought-resistant vegetation, removal of phreatophytes, and efficient irrigation | Customer efforts to reduce landscape irrigation have at times been substantial as a result of tiered water rates, etc. No additional low water landscapes are needed beyond those currently used in the City at this time. More customer education related to landscape management will be considered (see below). | No further evaluation necessary |
| Water-efficient industrial and commercial water-using processes | The City has only a few commercial customers including a prison and nursing home. Both customers have laundry facilities that may benefit from improved water use efficiency; however the cost for new commercial equipment is beyond the scope of this planning effort. | No further evaluation necessary |
| Water reuse systems | The City receives return flow credits for its RO brine water and wastewater return flows. No other reuse is currently allowed based on its water rights portfolio; however future water supplies may create reuse options that may benefit the City. | No further evaluation necessary |
| Distribution system leak identification and repair | The City has been reducing its water loss consistently over the past decade; however it has a number of opportunities to improve its metering and system monitoring to improve on the accuracy of its measurements and allow for more focused future programs. | Include water loss management improvements for evaluation |
| Dissemination of information regarding water use efficiency measures, including by public education, customer water use audits, and water-saving demonstrations | The City will look to be more proactive in making pamphlets and other information available to its customers and supporting youth education in combination with other local and regaional programs. | Include water education programs for further evaluation |
| Water rate structures and billing systems designed to encourage water use efficiency in a fiscally responsible manner | The City raised water rates by about 4% in 2011. New water rates may be needed to keep up with increased cost of energy, chemicals and system maintenance requirements. | Include a water rate study and revised water rates for further evaluation |
| Regulatory measures designed to encourage water conservation | The City has the authority to pass ordinances that regulate water use by time of day and number of days a week, and to limit water waste. | Include seasonal water use restrictions for further evaluation |
| Incentives to implement water conservation techniques, including rebates to customers to encourage the installation of water conservation measures | The City customer base is currently replacing older fixtures and appliances; and has implemented some xeriscaping of residential and commercial properties. Incentives are not considered to be as high a priority as water loss management and improved data collection at this time. | No further evaluation necessary |

**Table 7**
**Summary of Water Conservation and Efficiency Measures and Programs Under Consideration**

| System Wide Management | Process and Treatment | Distribution System | Customer Water Delivery | Customer Demand Management |
|---|---|---|---|---|
| **Short-Term (1-2 years)** | | | | |
| Continue data management for water loss assessment; water utility management | Install electromagnetic flow meter on storage tank discharge to track water delivery to distribution | Continue water line repair and replacement | Continue meter repair and replacement, installations of AMR devices | Initiate customer education |
| Initiate regular water audits (as part of District program) | Enter into Regional Working Group discussions with District and CDPHE on solid waste and residuals management | Develop Best Management Practice (BMP) to track storage tank levels at off peak hours | Continue service line repair and replacement | |
| Update AMR software and data collection devices (as required by manufacturer) | | | Upgrade prison meter to AMR | |
| Initiate consistent reading and recording of City park meters and other authorized, unbilled uses | | | Install meter/AMR at fire station | |
| **Mid-Term (3 – 5 years)** | | | | |
| Continue data management for water loss assessment; water utility management | Continue reading process system differential pressure meters to support water loss management | Continue water line repair and replacement | Continue meter repair and replacement | Continue customer education |
| Initiate regular water audits (as part of District program) | | Continue BMP for tracking storage tank water levels | Continue service line repair and replacement | |
| Continue consistent reading and recording of City park meters and other authorized, unbilled uses | | | Install AMR on all customer meters | |
| Evaluate changes to water rates and customer billing structure | | | | |
| **Long-Term (>5 years)** | | | | |
| Continue data management for water loss assessment; water utility management | AVC construction and operation | Continue water line repair and replacement | Continue meter repair and replacement | Continue customer education |
| Initiate regular water audits (as part of District program) | Continue reading process system differential pressure meters to support water loss management | Continue BMP for tracking storage tank water levels | Continue service line repair and replacement | Evaluate benefit of implementing water use restrictions |
| Continue consistent reading and recording of City park meters and other authorized, unbilled uses | | | | |

will also look to better characterize the implications of its treated water waste stream, which will be effectively eliminated once the AVC is operational. However, in the interim period between now and when the AVC is completed, solid waste and residual management will need to be addressed in accordance with State regulations.

In the mid-term (i.e., the next 2 to 5 years), the City will continue to implement BMPs that enhance its current water conservation and efficiency programs leveraging better and more accurate data collection, improved data assessment and evaluation programs, and local and regional funding mechanisms that may be available from other sources such as the Southeastern District and/or the State. In the long-term, the City plans to utilize project water supplied through the AVC to improve treatment-related water use efficiency in conjunction with other programs that are in keeping with improved metering and water loss management, water line replacements, and other process improvements that fit into the needs of the local customer base.

Note that water use restrictions are not considered a viable water conservation measure at this time due to the current lack of available staff to perform site visits and enforce time of day watering restrictions. Budget constraints have hampered both public safety and public utility personnel, such that the current administration is reluctant to expand staff responsibilities at this time. The need for and use of water restrictions may continue to exist in the future, such that the City will continue to consider implementation if and when staff availability changes. However, at the current time – in the short-and mid-term at the least, watering restrictions will not be considered for implementation by the City.

# Section 7 - Implementation Plan

## Implementation Tasks

Based on the needs of the City, its customers and its current level of funding, Las Animas will implement those selected water conservation and water use efficiency programs listed in Table 8, with the intention of achieving those water conservation goals listed in Section 6. Implementation will occur over a number of years as ongoing programs are continued and new programs are phased in. Funding levels are always a consideration, as operating expenses and water sales income change seasonally and from year to year. However, the programs that have been selected for implementation are those that the City's water utility believes are best for the organization in the short-term, mid-term and long-term; helping to improve processes, enhance business practices, and support customer needs.

The focus of the implementation plan is on the 1 to 2 year planning horizon, for during the short-term it is possible to identify expenditures that can be used to implement those selected measures and programs without the substantial uncertainty that occurs over a 3 to 5 year horizon. To this point, the implementation plan provides a detailed accounting of planned expenditures for those programs selected for implementation in the short-term; and less detailed accounting of those that have been selected for implementation 3-years and further out.

Implementation of new programs will begin shortly, as the City has the AMR and meter equipment to upgrade the prison meter and install the fire house meter currently in hand. The completed installation will depend on staff availability and gaining access to both locations. In addition, the City will move forward with procuring the AMR equipment upgrade and the billing software improvements to ensure that data collection related to customer billings is not interrupted in the future, and that authorized unbilled water use is appropriately tracked and accounted for in monthly billing summaries.

During this same period, the City will continue its capital improvements programs associated with water line repair and replacement, service line repair and replacement, and meter repair and replacement.

It is anticipated that all water conservation and water efficiency programs selected for short-term implementation will occur by the end of 2016; with the possible exception of the water rate assessment, which may be postponed depending on funding availability[12]. Programs related to the implementation of improved processes such as tracking water use and water loss, enhanced customer education, conducting tank level monitoring assessments, etc. will be conducted as appropriate during the normal course of business once the proper infrastructure is in place. Once initiated, it is anticipated that these practices will be conducted on a regular and consistent basis into the future.

Note that a group of selected programs incorporate collaboration with the District. The District role in the implementation of water conservation and water use efficiency with the City is important insomuch as the District can provide technical and financial resources that are vital to the efforts being conducted

[12] Funding availability will be influenced by water sales revenue, capital expenses related to changing (i.e., increasing) power and chemical costs, unexpected expenses that may occur related to leak repair, and outcomes of the work group related to regulatory compliance requirements.

**Table 8**
**Summary of Selected Water Conservation and Water Use Efficiency Measures and Programs for Short-Term (1-2 year) Implementation**

| Selected Measure/Program | BMP Category(ies) | Key Attributes | Description | Estimated Cost |
|---|---|---|---|---|
| Install AMR on prison 6-inch meter, and rehabilitate meter | Customer Water Delivery | Supports more accurate water use measurement of largest customer | Installation of this meter will allow for more accurate reading of water use at the City's largest customer, allowing the City to track more than monthly total flow readings. Includes replacement of lead service line. | City Labor Only |
| Install meter with AMR on fire station 4-inch connection | Customer Water Delivery | Supports collection and characterization of authorized unbilled water use; better water loss accounting and management | Installation of this 4-inch meter will allow for more accurate reading of water use at one of the City's only unmetered authorized unbilled facilities. | $4,000 (match for City is $1,000) |
| Purchase new AMR software and hand held equipment to support data collection | Customer Water Delivery | Supports the continued use of AMR to collect customer water use data | AMR has been in place for 10 years, and is therefore requiring upgrade to maintain warranty for software and data collection instruments. Will include creating "red flag" alerts for finance department related to zero reads, high water use, etc. | $30,000 (match for City is $7,500) |
| Retain software application provider to upgrade billing software allowing for tracking of authorized unbilled accounts and water use | System Wide Management | Supports the organization and tracking of authorized unbilled water use | Billing software provider ADG of Centennial Colorado will need to be retained to program City's software to appropriately track and report authorized unbilled uses based on data collected from City facilities that are unbilled. | $8,000 |
| Install electromagnetic flow meter on customer side of storage to measure water to distribution | System Wide Management | Supports more accurate characterization of water placed into distribution | Installation of the meter will allow for more accurate reading of water placed into distribution. Includes one 12-inch meter and related piping and appurtenances. | $16,000 (match for City $4,000) |
| Continue Best Management Practice (BMP) related to data collection and management in support of water loss management | System Wide Management | Supports more accurate characterization of water loss through distribution to customers | Coupling BMPs developed as part of past system wide water audits (see Appendix B) will be used to develop more rigorous accounting of non-revenue water, authorized unbilled water, and estimates of real and apparent water loss in accordance with AWWA standards (i.e., M-36). BMP includes improving the collection and tracking of authorized unbilled water use at City parks and other City facilities (for both metered and unmetered use (e.g., system flushing flows)). | City Labor Only |
| Develop BMP related to tracking off-peak hour storage tank water level using SCADA to characterize potential real water leaks | Distribution System/Customer Water Delivery | Supports more accurate characterization of water loss through distribution to customers | Requires creating a BMP that tracks tank levels during off peak hours to characterize water use and water loss. | City Labor Only |
| Conduct regular system wide water audits | System Wide Management | Supports more accurate characterization of water loss through both water treatment and distribution to customers | Utilize resources provided by the District on a regular basis to check and evaluate ongoing BMP implemented by the City's water utility. | City Labor Only |
| Continue water line repair and placement projects | Distribution System/Customer Water Delivery | Supports reduced water loss through installation of improved distribution piping and new valves and appurtenances | Utilizes resources which are budgeted and expensed annually to replace existing under-performing cast iron pipe. | $25-50,000/yr |

**Table 8 (continued)**
**Summary of Selected Water Conservation and Water Use Efficiency Measures and Programs for Short-Term (1-2 year) Implementation**

| Selected Measure/Program | BMP Category(ies) | Key Attributes | Description | Estimated Cost |
|---|---|---|---|---|
| Continue meter repair and replacement | Customer Water Delivery | Supports improved accuracy of tracking customer water use which improves organization water sales revenues and reduces water loss | Utilizes resources which are budgeted and expensed annually to replace existing under-performing customer meters which can under-read actual water use, thereby creating paper losses (i.e., apparent losses) coupled with upgrades from manual meter reading to AMR radio read instrumentation | $2-5,000/yr |
| Continue service line repair and replacement | Distribution System/Customer Water Delivery | Supports reduced water loss through installation of improved service line/metering couplings | Utilizes resources which are budgeted and expensed annually to replace lead service lines when water mains are replaced. | (included in water line replacement and repair) |
| Enter into discussions with Regional Working Group on Solid and Waste Residuals Management | System Wide Management/Process and Treatment | Supports improved business operations by clarifying regulatory unknowns and connecting future AVC water supplies with improved water use efficiency | Working group to be facilitated by the District to help establish means for consistent application of solid waste and residuals management regulations; while accounting for the future benefits of the AVC, the local economic conditions, and the number of locally impacted water providers (both private and municipal) | City Labor Only |
| Evaluate changes to water rates and structure (may be 3-5 year depending on water sales revenues) | System Wide Management | Supports improving revenue generation to support more aggressive leak detection and water loss management through capital projects, improved metering; and enhanced BMPs | Supports evaluations required to develop working capital and reserved needed to support future infrastructure investments and to maintain pace with increasing energy costs | $15,000 (one time cost that can be supported with reserves and/or grant) |
| Initiate Customer Education and Awareness Efforts | Customer Demand Management | Supports reducing customer demand through focused educational efforts | Utilize District materials and printing of materials to be included in occasional month mailings to customers focusing on time of day watering and leak detection and repair; Partner with the District and other local water providers to support 5$^{th}$ Grade water education | $200/yr |

locally by the City. One clear example is the Working Group proposed by the District to help support conversations between the regulated community (e.g., those with CORAD agreements or other potentially regulated water treatment systems) and the regulators (i.e., CDPHE). Without the efforts of the District, it is not clear how the State would implement consistent regulation of water treatment generated solid waste and residuals in the lower Arkansas River Valley. It is incumbent on all the stakeholders to support the dialogue and work toward credible and fiscally responsible solutions; however, the District plays a vital role in supporting the dialogue and working to facilitate solutions.

The District will also fulfill an important role in providing the City with printed educational materials that address some of local water customer's needs regarding landscape planting and irrigation management, as well as indoor leak detection and repair. Similarly, the District will provide resources to support regular system wide water audits of the City as a means to help review, and if applicable, improve the water loss tracking efforts that Las Animas water utility will be conducting in the future. Having the District support the audits helps to bring a level of consistency to the City (and all other project partners) as well as an unbiased independent check of the data collection and review processes that the CIty has developed.

In the years that follow the short-term implementation activities, the City will continue to conduct the BMPs to the extent that they make business sense, and will consider funding other mid-term and long-term BMPs listed in Table 7. Other long-term water conservation and water use efficiency measures and programs that have been identified for consideration in Table 7 will be evaluated and characterized further for implementation based on the outcome of the short-term and mid-term implementation efforts.

## Plan Monitoring and Assessment

Many of the measures and programs that have been selected for implementation have imbedded within them data collection and evaluation BMPs that constitute plan monitoring and assessment practices. For example, the goal associated with reductions in system wide water loss will be assessed through the deliberate use of the AWWA M-36 water accounting methodology described in Appendix B. Similarly, the goal associated with reduced summertime water demand will be characterized and tracked as customer water use, authorized unbilled City park use, and total distribution system demanded are measured and tracked. A summary of the data collection and assessment that will occur to monitor and assess the benefits of the various selected measures and programs is presented in Table 9.

It is once again worth noting that the District supported regular system wide audits will help to focus and refine the data collection activities presented in Table 9 for the City. The audit will be crafted to not only review those data that have been collected since the development of this plan and/or since the last audit was conducted, to assist the City in interpreting and reacting to the information collected. In addition, the audit will be used by the City to make modifications to its BMPs such that the data it collects can be better utilized for its intended purposes.

**Table 9**
**Summary of Monitoring and Assessment Data Collection**

| Type of Data | Timing | | | Uses | | |
|---|---|---|---|---|---|---|
| | **Hourly** | **Daily** | **Monthly** | **Production Water Loss** | **Distribution System Water Loss Metrics[1]** | **System Wide Water Use Metrics[2]** |
| Production Data Differential Pressure Meters (for measuring product water and reject) Totalized using SCADA | X | X | X | X | | |
| Water to Distribution | | X | X | X | X | X |
| Metered Unbilled Water Use | | | X | | X | X |
| Metered Customer Water Use | | | X | | X | X |
| Unmetered Customer Water Use (bulk water sales, construction water, etc.) | | | X | | X | |
| Estimates of Other Authorized or Known Uses (e.g., losses due to leaks, line flushing, etc.) | | | X | | X | |
| Tank Level Data (off peak hours, 3 to 4 hours once per month) | X | | | | X | |
| Number of Leaks Found/Repaired | | | X | | X | |
| | | | | | | |

[1] Includes: (all are monthly) water to distribution, water sold, non-revenue water, authorized unbilled consumption, estimated apparent losses, estimated current monthly water loss and unavoidable monthly water loss (see Appendix B)

[2] Includes: (all are monthly) water sold per connection, water sold per residential connection, water sold per commercial connection, number of connections, highest water use connections (top 5)

## Updating the Plan

The City of Las Animas Water Conservation and Efficiency Plan will be reviewed and updated informally throughout the planning period (i.e., until the end of 2020). The City may choose to formally update the plan whenever it is valuable to the organization dependant on financial needs, and/or substantial changes to its current operating conditions. At the very least, the City will update the plan in 7 years, or by the end of 2021.

## Plan Public Review and Comment

The City Water Conservation and Efficiency Plan has undergone public review in accordance with the requirements of the State regulations for a period of 60 days – from January 22 to March 23, 2015. A notice of the public review was printed in the local newspaper (see Appendix C). A copy of the draft Plan was made available to the public at City Hall and at the Las Animas Library. No public comments were received.

# Appendix A

## Colorado Revised Statute 37-60-126

*C.R.S. 37-60-126*

COLORADO REVISED STATUTES

*** This document reflects changes current through all laws passed at the First Regular Session
of the Sixty-Ninth General Assembly of the State of Colorado (2013) ***

TITLE 37. WATER AND IRRIGATION
WATER CONSERVATION BOARD AND COMPACTS
ARTICLE 60.COLORADO WATER CONSERVATION BOARD
PART 1. GENERAL PROVISIONS

C.R.S. 37-60-126 (2013)

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 revenues as are necessary from the unobligated balance of the five percent share of the severance tax operational 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 or of the declaration, bylaws, or rules and regulations of a common interest community, all as defined in section 38-33.3-103, C.R.S., that prohibits or limits xeriscape, prohibits or limits the installation or use of drought-tolerant vegetative landscapes, or requires cultivated vegetation to consist wholly or partially of turf grass is hereby declared contrary to public policy and, on that basis, is unenforceable. This paragraph (a) does not prohibit common interest communities from adopting and enforcing design or aesthetic guidelines or rules that require drought-tolerant vegetative landscapes or regulate the type, number, and placement of drought-tolerant plantings and hardscapes that may be installed on the unit owner's property or property for which the unit owner is responsible.

(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.

(II.5) "Turf" means a covering of mowed vegetation, usually turf grass, growing intimately with an upper soil stratum of intermingled roots and stems.

(III) "Turf grass" means continuous plant coverage consisting of nonnative grasses or grasses that have not been hybridized for arid conditions which, 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) precludes 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 or go dormant; except that:

(I) No enforcement action shall require that a unit owner water in violation of water use restrictions declared by the jurisdiction in which the common interest community is located, in which case the unit owner shall water his or her landscaping appropriately but not in excess of 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) In any enforcement action in which the existing turf grass is dead or dormant due to insufficient watering, 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.

(d) This subsection (11) does not supersede any subdivision regulation of a county, city and county, or other municipality.

(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 severance tax operational 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.

**HISTORY:** 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.L. 2013: (11)(a), (11)(b)(III), IP(11)(c), (11)(c)(I), and (11)(c)(III) amended and (11)(b)(II.5) and (11)(d) added, (SB 13-183), ch. 187, p. 756, § 1, effective May 10; (6) and (12)(a)(IV) amended, (SB 13-181), ch. 209, p. 873, § 24, effective May 13.

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

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 B

# AWWA M-36 Water Loss Management Template

# Appendix B
## Best Management Practice for Estimating and Tracking Water Losses
## City of Las Animas Water Utility

| | | in thousands of gallons | | | |
|---|---|---|---|---|---|
| | | 2011 | | | |
| | | April | May | June | Comment |
| | | | | | |
| **Production** | | | | | |
| Reject Water | | | | | Input from Differential Pressure Meters |
| Treated Water Produced | | 15,144 | 18,365 | 20,663 | Input from Differential Pressure Meters |
| | | | | | |
| Water to Distribution (from new meter) | | | | | from new electromagnetic meter |
| | | | | | |
| **Customer Delivery** | | | | | |
| Water Sold | | 11,857 | 14,393 | 18,213 | Sum of Water Sold from all Accounts |
| residential - inside | | 6,371 | 8,438 | 12,402 | |
| com - inside | | 1,761 | 2,172 | 2,329 | |
| Other | | - | - | - | |
| residential - outside | | 160 | 342 | 291 | |
| com - outside | | 28 | 26 | 25 | |
| Prison | | 3,382 | 3,262 | 3,006 | |
| Nursing Home | | 156 | 154 | 160 | |
| | | | | | |
| | | | | | |
| **Non Revenue Water** | | 3,287 | 3,972 | 2,450 | Calculate Non-Revenue Water (Treated Water Produced less Water Sold) |
| | | | | | |
| | | | | | |
| **Authorized Unbilled Consumption** | | 27 | 1,317 | 184 | Sum Authorized Unbilled Consumption |
| System and Hydrant Flushing | | - | - | - | Estimates by Staff |
| Construction Water/Street Cleaning | | - | 80 | 2 | Estimated by Staff |
| City Parks | | - | 1,200 | 150 | From meter reads |
| Other City Facilities | | 25 | 35 | 30 | From meter reads |
| Fire Station | | 2 | 2 | 2 | From meter reads |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| **Water Loss** | | | | | |
| Apparent Water Loss | % of Water Sold | 557 | 676 | 856 | Sum Apparent Water Losses |
| Unauthorized Consumption | 0.70% | 83 | 101 | 127 | Unauthorized Consumption (as a percentage of production = production*percentage) |
| Customer Meter Inaccuracies | 3.50% | 415 | 504 | 637 | Customer Meter Inaccuracies (as a percent of demand adjusted upward = demand/(1-percentage) - demand) |
| Systematic Data handling Errors | 0.50% | 59 | 72 | 91 | Systematic Data handling Errors (as a percentage of demand = demand*percentage) |
| Real Water Loss | | | | | |
| Current Monthly Real Water Loss (CMRL) | | 2,703 | 1,979 | 1,410 | Calculate Real Water Loss (Non-Revenue Water less Authorized Unbilled Consumption and Apparent Water Loss) |
| Unavoidable Background Leakage (UBL) | | 486 | 486 | 486 | Unavoidable Background Leakage (UBL) (1000 gallons per month) = ICF*((0.2*TL)+(0.008*NC)+(0.34*TPL))*(P/70)^1.5 (*30); for the purposes of this exercise, ICF (the Infrastructure Condition Factor is set to 1.0 - it can vary in practice from 1.0 to 1.5) |
| | | | | | |
| | | | | | |
| Characteristic Parameters of Water Supply System | | | | | |
| Total Length of mains, TL (miles) | 25.00 | | | | |
| Number service connections, NC | 1,167.00 | | | | |
| Total Length of private pipes, TPL (miles) | 11.05 | | | | |
| Average system pressure, P (psi) | 65.00 | | | | |

# Appendix C

# Public Comment Notification

LA JUNTA
TRIBUNE-DEMOCRAT
BENT COUNTY DEMOCRAT • FOWLER TRIBUNE
PO Box 500 • 422 Colorado Avenue, La Junta (719) 384-4475

INVOICE/
STATEMENT
AS OF
02/01/15

100697-11
CITY OF LAS ANIMAS
PO BOX 468
LAS ANIMAS CO 81054

DUE UPON RECEIPT
ANY BALANCE AFTER 30 DAYS WILL INCUR A SERVICE CHARGE

| DATE | DESCRIPTION | PAPER | UNITS | RATE | CHG/CR | BALANCE |
|---|---|---|---|---|---|---|
| | PREVIOUS BALANCE | | | | | .00 |
| 01/01/15 | ROP DISPLAY<br>PUBLIC HEARING | BC | 6.00 | I | 42.00 | |
| 01/22/15 | ROP DISPLAY<br>PUBLIC NOTICE | BC | 6.00 | I | 42.00 | |
| | NEW BALANCE | | | | | 84.00 |

| CURRENT | 30 DAYS | 60 DAYS | 90 DAYS | 120 DAYS | TOTAL |
|---|---|---|---|---|---|
| 84.00 | .00 | .00 | .00 | .00 | 84.00 |
| | | | | | |

**City of Las Animas Water Conservation Plan Available for Comment**

The City of Las Animas has completed a draft Water Conservation Plan. The goal of the plan is to develop programs for efficient and sustainable water use. Before finalizing the Water Conservation Plan, the City welcomes comments from the public. The 60-day public review period begins the day of this notice, January 22, 2015 through March 23, 2015. A complete draft copy will be available at the City's Offices at 532 Carson Ave., Las Animas, CO for public review, Monday through Friday, between 8:00 am and 4:30 pm. The draft regional Water Conservation Plan will also be posted on the web at www.secwcd.org.

All written comments are due prior to 4:30 pm, March 23, 2013. Comments can be dropped off or mailed to Public Works Dept., 532 Carson Ave., Las Animas, CO 81054, or emailed to lapw1@bentcounty.net.

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LA JUNTA
TRIBUNE-DEMOCRAT
BENT COUNTY DEMOCRAT • FOWLER TRIBUNE
PO Box 500 • 422 Colorado Avenue La Junta (719) 384-4475

INVOICE/
STATEMENT
AS OF
03/02/15

100697-11
CITY OF LAS ANIMAS
PO BOX 468
LAS ANIMAS CO 81054

DUE UPON RECEIPT
ANY BALANCE AFTER 30 DAYS WILL INCUR A SERVICE CHARGE

| DATE | DESCRIPTION | PAPER | UNITS | RATE | CHG/CR | BALANCE |
|---|---|---|---|---|---|---|
| | PREVIOUS BALANCE | | | | | 84.00 |
| 02/19/15 | PAYMENT AR CK 39496 | | | | 84.00CR | |
| 02/19/15 | ROP DISPLAY PUBLIC NOTICE | BC | 6.00 I | | 42.00 | |
| | NEW BALANCE | | | | | 42.00 |

| CURRENT | 30 DAYS | 60 DAYS | 90 DAYS | 120 DAYS | TOTAL |
|---|---|---|---|---|---|
| 42.00 | .00 | .00 | .00 | .00 | 42.00 |