Las Cruces Utilities
Water Conservation Plan

City of Las Cruces
PEOPLE HELPING PEOPLE

LAS CRUCES UTILITIES
City of Las Cruces

water conservation program

Las Cruces, New Mexico

March 8, 2012

TABLE OF CONTENTS

TABLE OF FIGURES

EXECUTIVE SUMMARY

The Las Cruces Utilities (LCU), a department within the City of Las Cruces, has been implementing water conservation activities for over eleven years to help ensure that future water demands, quality of life, and economic development can be supported.

The LCU conservation program is shaped by the LCU 40 Year Water Development Plan (Water Plan). The Water Plan outlines current supply and demand and the City's future water needs for the next 40 years, which includes developing a sustainable local supply of water with continued conservation.

The LCU conservation program currently provides education, and assistance to reduce water use in Las Cruces. Education includes our Lush and Lean program, which provides free landscape classes and a demonstration park. Education includes assistance with school programs and a water festival. The conservation program also includes comprehensive indoor/outdoor conservation audits, which include retrofits for aerators and low-flow showerheads.

LCU currently has 45,111 acre-feet of groundwater rights. For 2010, the Las Cruces service area used 20,250 acre-feet of water. Water usage for the area served by LCU has varied over time. While population and migration into the area has increase, on average 31 percent, in the past 10 years LCU has been able to decrease GPCD at a steady average rate of 3 percent per year. For 2010, per capita per day usage (GPCD) was 192 gallons. The City is required by water right Permit No. LRG-3275 et.al. to meet a GPCD of 180 gallons by the year 2030. Most water usage for the City service area is

the single family residential sector with an overall system usage of 58 percent, with approximately 50 percent of that usage being applied for outdoor water usage.

While some effort has been made to improve conservation efforts, many cost-effective efficiency measures remain to be considered. Moving forward, LCU plans to expand measures focused on program actions which include reducing usage by 5 percent for City owned facilities; undertaking supply side conservation, which include the implementation of automatic reading meters, and implementing evaluation tools such as the Alliance for Water Efficiency (AWE) tracking tool. LCU anticipates that the program actions, audit program, education, and enforcement the goal of 180 GPCD will be met by 2030.

The water conservation program additionally sees the level of funding, resources, and public participation changing over time. As such this Conservation Plan is intended to serve as a broad guidance document that will inform development of annual action plans; identifying staff, resources, and budget needs. Recommendations contained therein will be revisited and adapted as needed to meet LCU's needs and to ensure that its conservation goals are met.

1. Introduction

Water Conservation promotes water-use efficiency through improvements in monitoring system-wide water use, education and awareness, changes and restructuring of water rates and prices, and improvements in plumbing fixtures, water technology, and household water management, including landscape irrigation.

This document represents the City of Las Cruces Water Conservation Plan (Plan), which will serve as a blueprint for a successful water conservation program for water and wastewater systems in the City. This Plan will:

- Identify the City's conservation goals;
- Develop a water-use profile and forecast;
- Identify and evaluate potential conservation measures;
- Identify and assess potential conservation incentives;
- Select conservation measures and incentives that will become part of the conservation plan and;
- Identify enforcement mechanisms.

The Plan will also contain recommendations to monitor and evaluate plan components, and to revise the program in the future as needed. The Utilities 40 Year Water Development Plan (City's 40 Year Plan), Las Cruces Strategic Plan 2010-2014, Lower Rio Grande Regional Water Plan and the completed Phase I of the water conservation program serve as inputs to the Plan.

1.1 Background

Las Cruces is the second largest city in New Mexico with a 31 percent increase in population from 2000 to 2010 (BBER, 2011). In order to maintain quality of life, and economic growth, a sustainable water supply will be needed. To achieve this goal, the City will need to prepare a Plan to encourage necessary changes in behavior and use. The need for water conservation is clear. New Mexico is in the midst of a probable long-term drought and water may be over allocated in the Lower Rio Grande Basin (LRGB).

Currently the City of Las Cruces uses groundwater for drinking and bulk water usage. Surface water in the LRGB from Elephant Butte Irrigation District (EBID) is used for agriculture and outdoor use. There are numerous homeowners within Las Cruces city limits that are within the EBID system and are small tract users who use surface water for irrigation of lawns, which are 2 acres or less. The City has taken aggressive measures to secure additional water rights for surface water with the intent of developing a surface water treatment plant for potable water use purposes in the City.

The City has a successful water conservation program which has reduced per capita water demand since 2000 by approximately 21 percent. While service area population has grown from 75,000 to about 98,500 in ten years, diversion has been stable at 6.5 billion gallons per year (BGY). Table 1-1 is a simple calculation of diversions divided by service area population. This table shows that per capita demand decreased from 255.3 gallons in 2000 to 191.7 gallons in 2010.

Table 1-1: Per capita water usage from 2000 to 2010.				
Year	Diversion (AFY)	Population	GPCD	Wastewater Discharge (ac-ft)
2000	20,683.4	72,333	255.3	8,463
2001	20,386.6	73,976	246.0	7,696
2002	19,905.3	75,884	234.2	7,763
2003	19,735.2	78,283	225.2	8,141
2004	19,063.2	80,967	210.2	7,597
2005	19,036.0	84,066	202.2	7,622
2006	19,270.1	85,435	201.4	7,726
2007	20,296.6	89,269	203.0	7,984
2008	18,507.9	91,551	180.5	8,343
2009	19,964.3	93,585	199.8	9,776
2010	20,235.2	95,338	191.7	9,488

Las Cruces is required by Condition of Approval No. 5 in Permit No. 3275 *et.al*. to achieve per capita usage of 180 by 2030. Table 1-2 below describes the mandatory water right permit requirements set forth by the New Mexico Office of the State Engineer (OSE). Most of the LCU water right permits do have water conservation mandates which include requirements for written reports to OSE concerning water conservation efforts, overall per capita use and residential per capita use calculations. All permits require that water be used to the highest and best technology available and economically feasible. However, on March 9, 2010, the OSE approved LRG-3275-POD-1 thru POD-7[1] that requires the City to formalize and expand the water conservation program. The water conservation requirements for each permit are listed below.

[1] POD is an acronym for Point Of Diversion

Table 1-2: Mandatory water right permit requirements set by OSE for water conservation	
Permit number	**Mandatory requirements set by OSE:**
LRG – 3275-POD-1 thru POD-7	Within 2 years of the approved permit, the City shall submit a WCP acceptable to OSE outlining a plan to achieve a GPCD goal of 180 within 20 years. The WCP will additionally maintain that level of effort to achieve a more aggressive GPCD goal within 40 years. The WCP will be updated every 10 years and include provisions for reducing water usage during periods of extended drought consistent with appropriate drought management plans.
LRG – 3275-POD-1 thru POD-7	The City shall submit, on or before March 1 of each year, a written report acceptable to the Water Use and Conservation Bureau, OSE on their water conservation efforts, overall GPCD using the NMOSE GPCD methodology, and annual AWWA system audit.
LRG – 5818-S-7LRG – 5818-S-8 LRG – 5818-S-9 LRG – 5818-S-10	The City shall submit, on or before January 1 of each year, a written report acceptable to the State Engineer on its water conservation efforts, overall per capita use and residential per capita use calculations, and any changes to its original water conservation plan.
LRG – 3283 LRG – 3284 LRG – 3285 LRG – 3288 LRG – 3289 LRG – 3290 LRG – 3291 LRG – 3292 LRG – 3293 LRG – 3294 LRG – 3295 LRG – 3296	The City shall submit on January 1 of each year a written report on water conservation efforts overall per capita use and residential per capita use calculations and any changes to the water conservation plan all of which illustrate the effectiveness of the water conservation efforts of the City. Within 3 years of approval of these permits the City shall reduce residential per capita use to amount equal to southwestern states average.
LRG-430-S-29 LRG-430-S-30	The City shall submit on January 1 of each year a written report on water conservation efforts overall per capita use and residential per capita use calculations and any changes to the water conservation

	plan all of which illustrate the effectiveness of the water conservation efforts of the City. Within 7 years of approval of these permits the City shall reduce residential per capita use to amount equal to southwestern states average.
LRG – 5818-S-7 LRG – 5818-S-8 LRG – 5818-S-9 LRG – 5818-S-10 LRG – 3283 LRG – 3284 LRG – 3285 LRG – 3288 LRG – 3289 LRG – 3290 LRG – 3291 LRG – 3292 LRG – 3293 LRG – 3294 LRG – 3295 LRG – 3296 LRG – 3275-POD-1 thru POD-7	The permit shall not be exercised to the detriment of valid existing water rights, shall not be contrary to the conservation of water within the state, and shall not be detrimental to the public welfare of the State of New Mexico.
Same as above.	The City shall utilize the highest and best technology available and economically feasible for the intended use to ensure conservation of water to the maximum practical extent.

The OSE mandates are relatively consistent with the goals of the City's 40 Year Plan, which set a goal of reducing the overall total gallons per capita per day (GPCD) water use to 180 GPCD by 2045 in order to maintain the ability to serve all rate classes in Las Cruces over the next 40 years. The City's 40 Year Plan includes an extensive conservation component that the City will conserve water in its facilities, develop programs and pilot projects to model conservation, work closely with all residents, businesses, and water suppliers within the City to promote conservation and effectively manage resources. These programs can effectively increase water supply and/or water rights and could defer utility costs. Benefits to residents and businesses include

decreased energy, water, and wastewater bills and decreased landscaping maintenance costs.

1.2 Overview of existing City water system

The City of Las Cruces provides water services through its Utilities Department. Water service is provided both within the City limits and in extraterritorial areas (Figure 1-1). Currently the active key features of the existing Las Cruces water system include approximately:

- 10 pressure zones,
- 30 pressure regulating valves,
- 30 supply wells over the past ten years,
- 10 booster pump stations,
- 1 elevated and 12 ground storage reservoirs, and
- Over 500 miles of transmission and distribution system.

Three well fields (East Mesa, Valley, and West Mesa) currently provide water throughout the City's water service area. Additionally, the system includes the City's wastewater treatment plant (Jacob Hands Wastewater Treatment Plant). In 2010 a total of 47 percent of the City's water diversion was discharged as treated wastewater effluent to the Rio Grande. The City's reclamation plant, where wastewater effluent from the area is processed to tertiary levels of treatment, will distribute this treated effluent through a network of purple pipes to local area parks, golf course, future public school fields and other reclaimed potential uses as approved by the New Mexico Environmental Department.

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Interstate I-10

Interstate I-10

Legend

- Wells
- East Mesa Water Reclamation Facility (EMWRF)
- Las Cruces Service Area as of February 2010
- LRG-5818 Place of Use
- NMSU-Limits
- Town_of_Mesilla-Limits

0 0.5 1 2 3 4 Miles

1 in = 2 miles

Figure 1-1 City of Las Cruces Service Area

Furthermore, the City will continue to develop and maintain a sustainable water supply over the next 40 years by using ground water in the Mesilla Basin in conjunction with surface water from the Rio Grande[2], along with proactive conservation. The City will need to construct a surface water treatment plant to be able to use the surface water option. Las Cruces plans to only pump groundwater from storage in the Jornada del Muerto Basin in dry years when surface water is limited, or to accommodate increases in demand on a temporary basis and to preserve the water supply in the Jornada del Muerto Basin. Additionally, the City's long-range water plan calls for drilling of additional wells and implementation of projects for wastewater reuse.

Over the past fifteen years the City has purchased surface water rights from local EBID constituents. While most of these water rights have been adjudicated, the duty of water has never been established through the courts. In the Final Judgment issued August, 2011 by the State of New Mexico, Third Judicial District Court No. CV-96-888; Stream System 97-101 ruled that "[f]or future transfers to non-irrigation purposes of use, a consumptive irrigation requirement (CIR) of 2.6 acre feet per annum (afay) shall apply to all irrigated acreage in the Lower Rio Grande". This judgment adjudicates the amount of CIR and farm delivery requirements (FDR) for irrigations with surface water only (shall not exceed 3.024 afay FDR), combined surface and groundwater rights (shall not exceed 4.5 afay FDR), and groundwater only (shall not exceed 4.5 afay FDR). While

[2] City plans to obtain surface-water rights, through the leasing and purchasing of agricultural water for municipal use. The City will develop and maintain a sustainable water supply by using surface water from the Rio Grande in conjunction with the City's existing Rio Grande connected groundwater rights in the Mesilla Basin.

most of the judgment focuses on agricultural irrigation, the only generally applicable provision for municipal use is listed above. Although the settlement has been issued a Final Judgment, the City of Las Cruces has requested an addendum to the Final Decree regarding post-decree administration. The City's 40 Year Plan provides additional detailed information concerning the City's current and future water supply.

In December 2006 the City Council created the Las Cruces Utility Board (the Board) through Ordinance 2342. The Board consists of seven (7) Commissioners, two (2) of whom are seated City Councillors. The Board determines the strategic policies and many practices (including setting rates) for the water system. The Plan is a component of the 40 year requirement of OSE permit. The water conservation program is part of the strategic policy duties of the Board; therefore the Board will have authority to adopt the Plan once approved by OSE.

1.3 Overview of current water use

During the past ten years the quantity of water used in the service area has fluctuated over time but has generally remained steady, while population has increased by 31 percent (See Table 1-1). In 2010, 84 percent of diversions were accounted for by sales to customers and 16 percent by non-revenue deliveries. The non-revenue deliveries are unmetered and unbilled water and consist of fire protection and training, fire hydrant testing, potable and collection line flushing, billing irregularities and general losses to the system.

The City of Las Cruces customer classes include residential, large multi-unit, small commercial, large commercial, industrial service, bulk water, parks, golf courses,

and reclaimed water. Table 1-3 shows the number of connections to the water system as of May, 2011.

Table 1-3: City of Las Cruces connections as of May, 2011.	
Customer Class	Number of connections
Residential*	27,075
Large multi unit**	866
Small Commercial	2,626
Large Commercial	450
Industrial	18
Parks	74
Reclaimed Golf course	1
Bulk	77
*Residential includes all residents who receive water from the City whether they are outside city limits. **Multi family residents (MFR) were removed from the rates during the 2009 water rate case and moved into the small or large commercial rates. However, MFR are being flagged within the small and large commercial for auditing and reporting purposes.	

The City's 2010 OSE GPCD Calculator, attached in Appendix A, indicates that the current per capita use is 191.7 gallons. This rate represents the overall water use for all customer classes and non-revenue uses listed in Table 1-3. Since 2000, Las Cruces diversions have been relatively constant, while population has steadily increased three percent annually. Las Cruces is also using the American Water Works Association (AWWA) audit to evaluate the City water system performance. A complete AWWA Audit for 2010 is provided in Appendix B of this Plan.

1.4 Projected water demand and revenue requirements

Table 1-4. City of Las Cruces water demand projections (projected population * projected total GPCD water use). Source: City of Las Cruces 40 Year Water Development Plan, 2008.

Year	Utility-adjusted maximum growth, ac-ft/yr	High growth, ac-ft/yr.	Medium growth, ac-ft/yr	Low growth, ac-ft/yr
2010	22,994	22,994	22,043	21,348
2015	26,003	25,478	22,269	20,506
2020	30,263	28,477	23,999	20,269
2025	35,206	32,458	26,241	20,025
2030	41,157	36,441	28,521	20,600
2035	48,101	41,729	31,479	21,230
2040	56,203	46,826	34,327	21,828
2045	66,018	53,891	38,079	22,609

In 2008, Las Cruces filed its 40 Year Plan with the OSE. The 40 Year Plan projected water demand for three population growth scenarios. These projections are summarized in Table 1-4 above. Total diversion for 2010 by the City of Las Cruces was 20,235 AFY, which is well below the low growth rate on water demand. Water use in the past 10 years has become more efficient, primarily because of a moderate average annual precipitation and a pro-active water conservation program.

Historical diversions from 1995 to 2005 and projected demand from 2006 to 2045 are shown in Figure 1-2 below. The 40 Year Plan included a figure that projected demand from 2006-2045, which is included as Figure 1-2. The y-axis in Figure 1-2 shows the level of water rights by volume and the x-axis shows the project demand in years. The top blue solid line shows the sum of water right permits that the City currently possesses. The City has 45,111 acre-feet of groundwater rights. The dashed lines show projected water demand to the year 2045 in the face of demand rates of low,

medium, high, and maximum growth. For example, if the City encounters a maximum population growth rate, the Utility will have only enough groundwater to the year 2033. The City will continue to purchase groundwater rights and perfect the rights they already have based on the maximum growth rate.

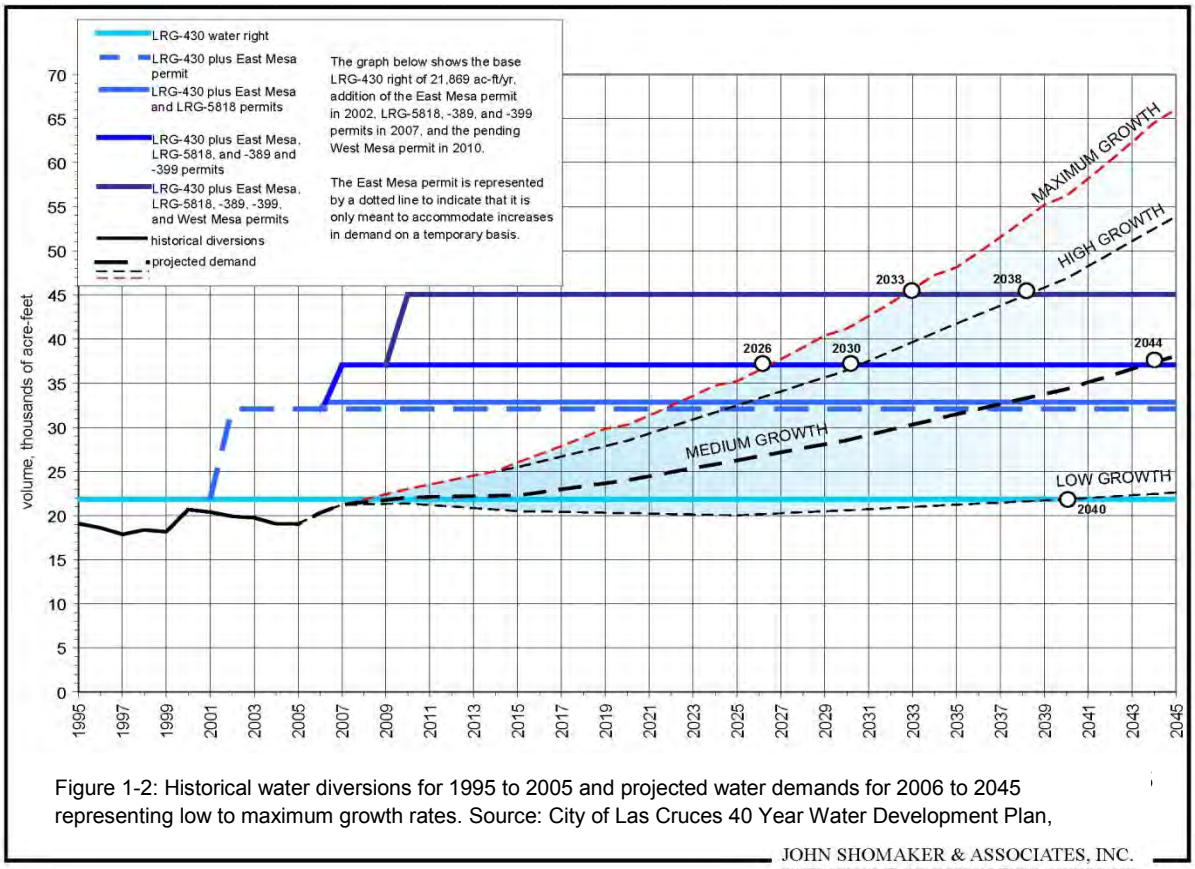

Figure 1-2: Historical water diversions for 1995 to 2005 and projected water demands for 2006 to 2045 representing low to maximum growth rates. Source: City of Las Cruces 40 Year Water Development Plan,

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Using data from the 40 Year Water Plan, Table 1-5 illustrates the forecasted medium growth population served by LCU, the predicted demand (ac.ft.) and the forecasted GPCD through year 2030. This is consistent with the permit condition associated with Permit No. LRG 3275 *et.al.* PODS 1 thru POD 7 that mandates a GPCD goal of 180 within 20 years or 2030.

Table 1-5: Predicted Demand and GPCD using medium population growth for years 2010 – 2028.			
Year	Population served	Predicted demand (ac.ft.)	GPCD
2010	94,092	20,249.87	192
2015	99,835	21,485.86	192
2020	109,796	22,891.18	186
2025	122,569	24,867.26	181
2028	130,233	26,276.27	180

As stated earlier, in order to continue a sustainable water management program, for the next 40 years, the City plans to use groundwater in the Mesilla Basin in conjunction with surface water from the Rio Grande, along with a proactive conservation program. The City will also

- continue to actively pursue water rights that are pending and unperfected,
- lease and purchase agricultural surface water for municipal use,
- pursue the option of using reclaimed water for aquifer storage and recovery[3] and,
- pursue the potential of utilizing brackish water from deep wells.

Aggregate revenue requirements for LCU in general are based on the Utilities cost to operate, rehabilitate, acquire water resources and expand and build facilities to provide safe and reliable water service to its customers. Decreases in GPCD may

[3] New Mexico has not fully utilized water reuse technology in the past; however, the state recently began allowing aquifer storage and recovery. NMSA 1978 § 72-5 A-1 *et. seq.* covers the administration and use of water for the purpose of underground storage and recovery (USR). The 1999 Act passed by the New Mexico Legislature allows governmental entities to store surplus supplies of water underground and to withdraw the recoverable amount at a later date for use by the governmental entity. The Legislature concluded that through this act, groundwater recharge, storage, and recovery have the potential to: 1) offer savings in the cost of capital investment, operation and maintenance, and flood control, improve water and environmental quality; 2) reduce the rate at which groundwater levels will decline and stress the aquifer; 3) promote conservation of water; 4) serve the public welfare of the state; and 5) lead to a more effective use of the state's water resources. However, the effort, efficiency, and process to actually acquire the permit for underground storage and recovery can take large amounts of funds and time (19.25.8.1 NMAC). While ASR is technically allowed there is currently no ASR in New Mexico. The closest direct reuse of recycled water that is being conducted is occurring in Cloudcroft, New Mexico. Due to many different governing agencies within the State of New Mexico such as the OSE, New Mexico Environmental Department and New Mexico Construction Industries Division (CID) it is very difficult to acquire permits and permission for ASR or any other indirect reuse of wastewater within the state.

reduce LCU revenue, but the reduction in revenue will be addressed through the regular rate review process. LCU has designed its tariff policy strategically to meet cost of service revenue based on a one year test period and to be consistent with the needs and goals of the community. Utility rates under a utility cost of service methodology, by default, do not embody any long-range forecasting of demand.

Since the cost of providing water has increased appreciably, the result has been substantial upward pressure on water rates. In Las Cruces, water rates must be approved by a voting majority from the Utilities Board. The City's rate case uses cost of service and revenue requirement information from an audited test year. Interveners are welcome and encouraged to join the rate case. One pre-established intervener is the Rate Advisory Committee (RAC). The RAC consist of seven members from the public that are appointed to the committee through the City Council. The responsibility of the RAC is to represent the residential and small business rate classes only. The rate case typically should be completed by nine to twelve months. The last water and wastewater rate case for City of Las Cruces was in 2009-2010 with new rates going into effect October, 2010. These rates attached in Appendix C do not include conservation, but during the rate hearing the RAC did recommend to the Utilities Board that the water rates be re-evaluated for conservation with a need for inclining block rates after two years, which would be October, 2012.

2. Conservation Program

In 1999 the City Council adopted a long range water conservation program that has evolved into our current water conservation program. Las Cruces' water conservation program basically consists of peak watering restrictions, water wasting restrictions, and fines. The program was enhanced in April, 2005 with the adoption of the 2005-2010 Phase I Water Conservation Program (Appendix D) to secure the long-range sustainability of the City's water supply and meet water permit requirements mandated by OSE (Table 1-2). The current Water Conservation Ordinance, shown in Section 2.2 restricts irrigation usage to specific time periods. The Landscape Ordinance allows landscape irrigation three days per week (using an odd-even address schedule, with no watering on Mondays), between the months of April 1 through September 30 with watering limited between the hours of 6:00 pm through 10:00 am. Any persons convicted of a violation of the Water Conservation Ordinance are considered guilty of a petty misdemeanor and shall be punished in accordance with fines listed in Table 2-1. Amendments in 2005 removed blanket waivers of the Ordinance for entities such as School Districts, although there still are variance options based on need.

Table 2-1: Water wasting fines based on type of property and number of prior convictions. (Municipal code section 28-305.

Type of property	1st conviction	2nd conviction	3rd and subsequent convictions
Residential property	$50.00	$100.00	$250.00
Nonresidential property	$100.00	$250.00	$500.00

The 40 Year Plan presents a "Water Conservation Plan" in section 4, along with an assessment of conservation-based demands in section 3. Below is a summary of tactics for meeting total GPCD water use goals listed in sections 3 and 4.

- Continue Phase I Water Conservation Plan
- National Plumbing Efficiency Standards – specifying low-flow plumbing fixtures in all new homes
- Revise landscape design standards
- Increase enforcement of the water conservation ordinance
- Develop summer month surcharge for users exceeding some multiplier
- Conduct indoor and outdoor water audits for residential accounts
- Pursue grant funds to increase outreach, rebates, conservation devices
- Increase the use of reclaimed water for irrigation
- Reduce water losses within the system

2.1 Conservation Progress and Achievements

Currently, enforcement of the Water Conservation Ordinance is operated through the City's Codes Enforcement Unit, which is directly under the City's Police Department. This unit is responsible for the enforcement of most municipal codes. Their job covers nuisances, ADA violations, zoning violations, inoperative vehicles, street and sidewalk obstruction, littering and graffiti, and weed control just to name a few. Records from Las Cruces Municipal Court shows that between, 2007 to 2009 there were a total of 15 citations issued and in 2010 a total of 213 water waste violations were reported to the City's Codes Enforcement with a total of two citations issued. The City's Codes Enforcement which is compliance driven has adopted a policy to use education awareness for code violators. Codes officers approach water wasting violators using education and reference to the Water Conservation Ordinance instead of issuing citations.

2.2 Current Water Conservation Ordinance

The current Water Conservation Ordinance requires and encourages all users of city provided water and to all users of water provided by water utility companies

franchised by the city to reduce water consumption and waste. The Ordinance applies to all users of the City who receive water from LCU. Not all water use restrictions are to all users within the city limits (subsection 28-304(b)(1).

Outdoor water restrictions for vegetation are not applied to users who use irrigation water provided by EBID, or to users of water provided by mutual domestic water companies or from domestic wells.

The outdoor water restrictions will follow a schedule for vegetation on residential and commercial properties includes the following:

1.) All outdoor vegetation on residential and commercial properties located on the even numbered side of the street shall be watered only on Tuesdays, Thursdays, and Saturdays, and on the odd numbered side of the street shall be watered only on Wednesdays, Fridays, and Sundays. For corner buildings or properties having both odd and even numbers, the number shown on the City's or the franchised water companies utility records shall control.
2.) Outdoor vegetation shall not be watered on Mondays without a written variance.
3.) From April 1 to September 1, all outdoor watering of vegetation is prohibited between the hours of 10:00 a.m. and 6:00 p.m.

The Ordinance additionally outlines miscellaneous water waste restrictions. These restrictions include the washing of vehicles and other types of mobile equipment. Washing will be done only with a handheld bucket or a handheld hose equipped with a functioning shutoff nozzle for quick rinses. The restriction does not apply to the washing

of vehicles or mobile equipment at a commercial carwash or commercial service station. Additionally the following uses of water are defined as wasting water and are prohibited:

1.) Allowing water to flow onto adjacent property or onto any street, alley or other public right-of-way.
2.) Watering outdoor vegetation excessively so that water ponds on site.
3.) Failing to repair a water leak within five working days of the discovery of the leak.
4.) Washing sidewalks, driveways, parking areas, tennis courts, patios and other impervious surfaces with a hose, except in emergencies to remove spills of hazardous materials or to eliminate dangerous conditions which threaten the public health, safety or welfare. When used in this subsection, the term "impervious surface" means any surface covered with nonporous material. (Code 1988, §29-364)

Enforcement for the ordinance states that any person who is convicted of a violation of water wasting restrictions shall be guilty of a petty misdemeanor and shall be punished. For violations that are continuous in time, each day the violation continues is a separate offense and violations that are continuous in time may be abated by injunctive or other equitable relief. The imposition of a criminal penalty does not prevent equitable relief. (Code 1988, §29-365)

The current ordinance includes several exceptions concerning outdoor watering restrictions on vegetation and miscellaneous water use restrictions. These exceptions include:

1.) Water flow as a result of natural events such as rain or snow, unless the user is watering at the same time.

2.) Water flow that is a result of temporary malfunctions of or vandalism to the municipal water supply system.

3.) Water flow that is a result of water used for firefighting purposes, including the inspection and pressure testing of fire hydrants, or the use of water for firefighting training activities.

4.) The use of water required for the control of dust or the compaction of soil as may be required by municipal codes.

5.) The water used to wash down areas where flammable or otherwise hazardous material has spilled, creating a dangerous condition.

6.) The water used to prevent or abate public health, safety or accident hazards when alternate methods are not available.

7.) The water used for routine inspection or maintenance of the municipal water supply system.

8.) The water used to facilitate construction within public right-of-way in accordance with city requirements and good construction practices.

9.) The use of water that is permitted under a variance granted by the city.

10.) The water used for street sweeping, sewer maintenance or other established utility practices.

11.) Watering contrary to the odd/even or time of day requirements is permitted for one day only where application of chemicals requires immediate watering to preserve an existing lawn.

12.) Watering contrary to the odd/even or time of day requirement is permitted for up to two weeks for newly planted landscaping vegetation. (Code 1988, §29-366) Water Conservation Plan.

2.3 Evaluation and Measures

Table 2-2 below summarizes Phase I of the water conservation program, the performance of the program and possible future changes to improve the existing program.

Table 2-2: Performance evaluation of Phase I water conservation program

Program	Description	Evaluation	Improvements
Peak water demand and miscellaneous water restrictions (Ordinance)	Odd/even watering and time restrictions	W	• For new development: • Watering variance for those that adopt water smart or rain sensor controllers. • Implement master valve in irrigation designs that will help reduce water loss in cases of leaky valves. • Prohibit use of overhead spray irrigation for watering of trees and shrubs. • Work with Codes Enforcement.
Water conserving landscape	Lush & Lean workshops	W/NA	• Conduct irrigation audits and workshops
Education and public awareness	Public schools and public	W/NA	• Continue classroom education with intent of hiring a part-time person (retired school teachers) to assist in education. • Community water festival • Conduct monthly L&L workshops, workshops include landscape irrigation, indoor water waste, rainwater harvesting, leak detection, and greywater

			applications (just to name a few). • Civic speaking engagements
Rates	New water rates in place October, 2009	NA	• Adopt inclining block rate or a water conservation rider
Enforcement	Codes through Police department enforces waste water restrictions	NA	• Work with codes to establish a database of repeat offenders. • Work with Municipal Judge to enforce ordinance fines and education opportunities
City to lead by example	Indoor and Outdoor conservation	NA	• Conduct water audits at all City parks and buildings. • Adopt proactive programs to lower water usage by 5%.
GIS	Locates specific high users	NW	• Many cities who have implemented this type of program have not seen a reduction in water usage. • Work with Customer Service/Admin Services to identify large water users through Munis system and offer water audits to those customers.
W – Working; **NA** – needs adjustment; **NW** – needs to be dropped			

The Utilities Department solicited public input to evaluate the current water conservation program and assist in sequentially producing a productive and successful water conservation program. The intent of soliciting information from the public was so that the Advisory Committee and residents would evaluate the current program and adopt and implement those conservation measures and behaviors that will lower the City's GPCD. The City's Water Conservation Coordinator performed an in depth procedure, which included collecting information from an established Advisory Committee, collecting suggestions and comments from local industry, institutional, and

commercial, and holding a public meeting. Further details on the process are outlined in Section 3.1 along with recommendations found in Appendix E.

2.4 GPCD trends and projections

Table 2-3: Gallons per capita per day by rate class for 2009 and 2010. Source: 2010 OSE GPCD Calculator

Rate Class	**Gallons per capita per day 2010**	**Gallons per capita per day 2009**
Single Family Resident	131.91	139.80
Multi Family Resident	64.66	67.05
Institutional, Commercial, & Industry	45.14	46.98
Overall	191.69	199.77

Using Table 2-3 above the LCU 2010 OSE GPCD Calculator Report showed a decrease in water usage from 2009 to 2010 of 4 percent. For Las Cruces in 2009 and 2010 precipitation has been well below the average norm and temperatures have been well above the average norm.

Precipitation and temperatures along with colder winters may be a factor that has caused the GPCD rate to fluctuate. There is obviously a trend in water usage when temperatures are high and precipitation is low in Las Cruces. For example, GPCD usage in 2009 went up from 180.5 to 199.8 gallons. During 2009, temperatures somewhat remained the same while precipitation from 2008 to 2009 went down by four inches. Typically the Lower Rio Grande area receives 9 to 14 inches of rain annually. As indicated above, seven years out of 11 years the total annual precipitation was below the typical average. In January through June, 2011 New Mexico had the driest year on record. Statewide precipitation was 30 percent below normal and the National Weather Service reported that the Southern Desert was 8 percent below normal.

Table 2-4: GPCD Trends showing population, temperature, and precipitation for 2000 to 2010.				
Year	**Population**	**GPCD**	**Max-Average Temperature (degree)**	**Annual Precipitation (inches)**
2000	72,333	255.3	95	7.44
2001	73,976	246.0	97	6.60
2002	75,884	234.2	98	5.81
2003	78,283	225.2	98	4.50
2004	80,967	210.2	94	13.56
2005	84,066	202.2	98	6.37
2006	85,435	201.4	96	16.24
2007	89,269	203.0	94	12.51
2008	91,551	180.5	97	12.51
2009	93,585	199.8	96	8.42
2010	95,338	191.7	94	7.13
Temperature and precipitation data taken from Jornada Experimental Range Coop Station (Western regional climate center).				

While most precipitation occurs during the monsoonal season months (July and August); Las Cruces received less than an inch (.72”) for the month of July. The National Weather Service is forecasting that our monsoonal season will be later or earlier than its typical norm. Temperatures for 2011 were much above the normal as shown in Table 2-4. Statewide New Mexico was ranked 107 out of 117 having the warmest temperatures on record.

2.4.1 Public water use

As industry in Las Cruces continues to grow, 12 percent from 2009 to 2010, the need for a sustainable water service will grow as well. In 2002 Las Cruces New Mexico was ranked the “Best small metro area for business and careers” by the Forbes-Milken Institute. In 2006, Forbes.com ranked Las Cruces in the top two “Best small metro area for business and careers”. The Milken Institute ranked Las Cruces as one of the “Top 3

small areas for business" in 2003 and one of the "Top 2 small areas for business" in 2004. These continued high rankings reinforce the area's virtually untapped potential for business location and expansion (MVEDA, 2010). Furthermore, the City of Las Cruces passed the Local Economic Development Act, which encourages economic growth to the city. Projects creating jobs within the City of Las Cruces in the preferred industry clusters of aerospace, maquila suppliers, high technology, advanced business and financial services, and value-added food processing and which create above-average wage and salary jobs may qualify for local financial support.

Population has increased at an annual rate of 3 percent. Population in Las Cruces of persons over 65 years of age is expected to increase from 2010-2040 due to migration into the area, while all other age classes remain stable or decrease. Net migration into the Las Cruces area for 2010 was 3 percent (Badenhausen, 2011). Net migration into the Las Cruces area from 2000 to 2007 was 5.9 percent (City of Las Cruces Chamber of Commerce, 2011).

Water reuse has become an attractive use for golf courses and local parks here in Las Cruces. The LCU Department currently operates the East Mesa Wastewater Reclamation plant. The plant was designed to produce one million gallons per day of Class 1-A reclaimed wastewater. The plant currently produces 290,000 gals per day. In 2012 a new lift station will be completed and the East Mesa plant will be able to reach full production capacity. Many residents are looking for ways to use less water or to use water more than once. This has led several residents to inquire about the use of grey water and reclaimed water.

While new development has used water conserving devices and low water use landscape, approximately 75 percent of the buildings in Las Cruces were built pre-1995. Prior to 1994, the plumbing code allowed the installation of toilets that flushed with 3.5 gallons or more. Since then the American National Standard 2006 Uniform Plumbing Code specifies a maximum 1.6 gallon per flush standard. Today, toilets are even available at as little as 1.0 gallon per flush. With 75 percent of the buildings pre-1995 we can speculate that many of the homes and businesses in the City are still using toilets that use 3.5 or higher gallons per flush. The savings of a toilet rebate would be 102 million gallons per year[4].

Industry growth, population increases, and aging infrastructure are just a few topic areas that illustrate the amount of public water demand that is placed upon the water provided by the City of Las Cruces.

2.6 Actions planned as part of the existing program

As originally developed, the water conservation program anticipated a Phase II for 2010 – 2015. In practice, Phase II will be developed as part of this Plan, and is intended to incorporate conservation measures drawn from a broad base of both established and innovative conservation programs. The intent stated in 2005 is for the program to continue to evolve in subsequent phases, and such phases are developed as part of this Plan.

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[4] Total of 17,459 buildings in Las Cruces pre-1995; using the current household multiplier 2.3 persons per building with at least 2 flushes per person for 265 days (Source: City of Las Cruces Community Development).

Separately, the 40 Year Plan identified measures that the City intended to implement to achieve a goal of 180 GPCD, although in that plan the target date was 2045. The measures include the effects of the water conservation program on outdoor water use, increased high-efficiency plumbing fixtures, the East Mesa reuse project, and a reduction in non-revenue water losses equal to or below the industry standard. The predicted effect of these measures was a reduction of nearly one (1) GPCD per year, although this quantification was only partially documented. Single family residential demand was projected to decrease to 121 GPCD, which is only four (4) GPCD less than already achieved. The 40 Year Plan noted that conservation will actually have a greater effect than the GPCD values indicate, since GPCD will tend to increase in urbanizing areas as commercial, industrial, and institutional development increase.

3 Goals of the Conservation Plan

The Lower Rio Grande Basin surface water supply and most of the groundwater supply is fully or over appropriated. If all the water right permits, licenses, and Declarations were fully exercised today, current supply would not likely meet demand. Voluntary agreements among water users such as shortage sharing, rotational use, water banking, or other forms of voluntary agreements are encouraged by the OSE (DeMouche, 2011).

The Vision 2040 survey conducted in 2008 showed that 91.3 percent of the respondents either agreed or strongly agreed that water conservation should be a high priority for the vision of the community (City of Las Cruces Vision 2040, 2011). Additionally, during a public meeting for the Sustainability Action Plan, residents

acknowledged that one of the goals of the action plan was to reduce water use in the city, private operations, ensuring that consumption will not deplete the aquifer over time. Participants stated that the City should encourage citizens and schools to use water conservation measures, the City should lead by example, continue water conservation education and outreach, and increase cost of violation for water conservation ordinance (City of Las Cruces, 2011).

The following is a list of identified goals for the Plan:

- Evaluate current water usage,
- Evaluate mandatory, voluntary, and other conservation measures for the Plan,
- Determine resource levels for the Plan,
- Determine sources of funding for the water conservation program,
- Develop priorities,
- Set measured goals and criteria for evaluation of these goals,
- Improve baseline information on City's usage and update annually,
- Develop appropriate ordinances from the Plan,
- Increase enforcement of the Water Conservation Ordinances,
- Develop summer month surcharge for users exceeding some multiplier of the average delivery amount in each rate class and,
- Establish indoor and outdoor water audits for each rate class.

3.1 Process for obtaining public input for the plan

In 2009, LCU formed an advisory committee to assist in the development of the Plan. The committee consisted of six members from diverse areas of expertise. However, there were a few rate class gaps in the committee which included representation from tourism (hotels and restaurants), institutional users (hospitals), and community development (industry, commercial and new development). This representation has been added to the Advisory Committee. Appendix E gives a brief description of conservation measures considered and currently active by the Advisory Committee.

Beyond the initial advisory committee, the Water Conservation Coordinator organized and conducted a public meeting on October 6, 2011. Residents that were not able to attend the public meeting were able to send an e-mail to the Water Conservation Coordinator with their concerns and comments. A synopsis of the information collected from the community meeting and e-mails are attached in Appendix F.

The purpose of the public meeting was to obtain community input on the initial phase of the Plan. Las Cruces Utilities seeks to reach its water conservation decisions through a public process so that they reflect the community's values. The public meetings brought significant input about community values, priorities, and objectives and how they can be reflected in water conservation activities. All information was placed on the City's website for easy access. Additionally, the Utilities public relations firm assembled a newspaper release announcing the community meeting (Appendix G).

3.2 Reasons for conserving water

An initial subject for public discussion was to determine attitudes regarding the need for water conservation. Among the specific rationales for conservation that were debated were the following:

- Conservation is required because of the permit condition (Permit No. LRG-3275 *et.al.*).
- Conservation is already an established City and Utility policy and practice.
- Conservation is important as a general principle of sustainable living.
- Conservation is important because water supplies in the Lower Rio Grande Basin are scarce.
- Conservation is important because it will reduce the City's need to acquire water rights and, in turn, reduce adverse impacts to irrigated agriculture.
- Conservation is important because it will delay costly investments in water infrastructure.

3.3 Specific conservation objectives

The main objective for the City of Las Cruces to develop and implement a Plan is a regulatory compliance. The OSE requires the City to develop and implement a Water Conservation Plan as one of the Conditions of Approval No. 5 for Permit No. LRG-3275 *et.al.* POD 1 thru 7. However, the City additionally recognizes the benefits for considering water conservation which include:

- **Customer benefit** – customers who conserve will enjoy a lower water bill and possibly lower their wastewater and energy bills.
- **Environmental benefit** – less water being removed from the Rio Grande could be used for environmental and other purposes.
- **Utility stewardship and sustainability** – City water conservation demonstrates leadership in resource management working towards the goal of sustainability.
- **Cost savings** – lower water production can save the utility and its constituent's money in reduced operations and maintenance and capital costs.
- **Improved supply reliability** – conserving water can reduce the frequency and duration of drought water use curtailments by essentially increasing supply.
- **Public perception** – the public often insists on demonstrating efficient use of water supplies.

4 Conservation measures to be enacted 2012

Measures to achieve water conservation in Las Cruces fall into three overall categories:

(1) program actions,
(2) voluntary measures, and
(3) mandatory measures.

Program actions refer to measures that the City of Las Cruces operations can take directly to implement or encourage water conservation. Voluntary measures refer to education or incentives that promote water conservation. Mandatory measures are regulatory. These measures will be combined and phased in over time. The Plan will supersede and enhance the current water conservation program. It is LCU intent to

update the Plan every five (5) years. This document will replace any past documentation towards the water conservation program and ordinance.

4.0.1 Basis for selection of measures for evaluation

The basis used for the measures selected is to acquire a clear and accurate direction of water conservation measures that will be accepted by the Las Cruces Utilities Board of Commissioners and the public. Las Cruces Utilities went through a process of evaluating the various recommendations in the Plan for the value to the water conservation program versus the difficulty of implementation. The principles used to access the success of the water conservation program are outlined below:

- Effectiveness or change in behavior, as shown in the following measures:
    - GPCD
    - Volume of water used by Utilities
    - Volume of water used in non-revenue category
- Knowledge and understanding:
    - AWWA Audit
    - Data availability
    - Level of metering
    - Level of reporting to OSE
- Broad, equitable participation
- Political will/buy-in
    - Conservation adoption of ordinances
    - Public support
- Rates
    - Conservation rates – inclining block
    - Water efficiency surcharge

4.1 Program Actions

City program actions are important to encourage residents and business to practice water conservation by exhibiting good water conservation practices. The City will continue to take a proactive approach to water conservation by identifying water conservation opportunities, continuously monitoring water consumption in City buildings,

parks and other operations, and reduce water consumption in City operations by 5 percent. All of the City buildings will undertake a water efficiency or leak detection audit every 5 years. Recommendations from the audits will be used to reduce water consumption.

The City will use the AWWA Audit guidelines to reduce system water loss, specifically non-revenue water, which includes system loss, unbilled metered and unbilled unmetered use. Additionally, the Water Conservation Coordinator will use the OSE Calculator monthly to evaluate sector water usage to allow programs to focus on high water usage by sector.

The City will furthermore implement an Automatic Meter Reading (AMR) program. The program, Phase I will be implemented on commercial meters and will be phased in over time in Las Cruces.

4.2 Voluntary Measures

The Water Conservation Coordinator will organize and oversee a program to inform and obtain comments from the public. At least one public meeting will be organized annually to inform and receive comments from the public concerning the water conservation program. Other methods for information distribution, such as water bill inserts, news articles, and website will also be utilized. The City will use the information from the public meetings to update the Plan every 5 years.

4.2.1 Water Efficiency or Leak Detection Audits

The Water Conservation Coordinator will organize and oversee a program to conduct water audits. Water audits will be conducted on all city buildings by December, 2013. Audits will be conducted every five years on city buildings to reevaluate

recommendations. The City has a very aggressive goal to lower water consumption 5 percent by 2015.

Indoor and landscape audits are offered to the public starting October, 2011. Audits include retrofitting faucets with 1 gallon aerators and distribution of 1.5 gallon showerheads. The Water Conservation Coordinator will conduct landscape audits upon certification of landscape auditor test from Irrigation Association. Since 75 percent of the buildings in Las Cruces were built pre-1994, indoor audits for pre-1994 building structures will be initially targeted. LCU anticipates the audit program to show a consumptive savings of at least 1 to 5 percent for the next ten years.

4.2.2 Education

Children will be informed and taught about water conservation. The Water Conservation Coordinator will work with the Las Cruces Public Schools to determine when and how the conservation program can be integrated into school programs.

Public education programs shall be instituted to promote water efficiency. The Water Conservation Coordinator will work with City staff, other affected public agencies and the private sector to develop promotional information, seminars and workshops to promote the use of low water use landscaping and water use efficiency. Promotional materials will be available by early 2014 and seminars and workshops will be scheduled by the middle of 2012. While classroom educational programs have shown behavioral changes at home, it is difficult to quantify the percentage change in water consumed. However, LCU does anticipate a savings in consumption of outdoor water usage from the seminars and workshops to promote the use of low water use landscape. LCU anticipates a savings of at least 2 percent over the next 5 years.

4.2.3 Promotions and Incentives

The Water Conservation Coordinator will organize and oversee programs to encourage and promote "green build certification" for fixtures, graywater systems[5], and homes remodeled to "EPA WaterSense" standards. Programs will be developed in coordination with local building and real estate organizations to promote and encourage new development to install indoor fixtures beyond the current Uniform Plumbing Codes and graywater systems for outdoor landscape water usage.

4.2.4 Rainwater Harvesting

The Water Conservation Coordinator will organize and oversee a program to encourage rainwater harvesting. Rainwater harvesting strategies encouraged will include earthworks and cisterns (barrels). Programs will be developed with the City Landscape Architect to educate persons as to how to select, place, and construct chosen water harvesting earthworks. Programs will also include construction of rainwater harvesting barrels, roof catchment, and low impact development.

4.2.5 Reuse and reclaimed water

The Water Conservation Coordinator will organize and oversee a program to encourage the use of reuse water. Near future plans are to install a purple hydrant at the East Mesa Reclamation Plant to allow temporary uses. Currently the City East Mesa Discharge Permit allows the discharge from to:

- Las Cruces City Veterans Park,

[5] Graywater is wastewater from laundry, bathtubs, showers, and bath sinks (lavatories). Persons wishing to use a graywater system must follow the New Mexico Gray Water Reuse Rules (§20.7.3.810 NMAC – Rp, §20.7.3.310 NMAC, 2005).

- Las Cruces City Sagecrest Park,
- Facilities that have been separately permitted by NMED to receive reclaimed water from the permitted, and;
- Temporary use for construction purposes, dust control, and irrigation of street medians.

4.2.6 Retrofit Program

Currently the City has a retrofit program through water audits. Water audits retrofit sink aerators and showerheads. If funding is available, the City will implement a high efficiency toilet (HET) retrofit program. The HET rebate program will allow homeowners who receive a water bill from LCU to submit an application for a WaterSense EPA HET. Currently the City has applied for Bureau of Reclamation Water SMART funding. If awarded the City will have a HET and SMART irrigation controller retrofit program starting Fall 2012. Additional funding will be sought for water conservation retrofit/rebate programs.

4.2.7 Rates

Las Cruces Utilities set water rates based on the Utilities cost of service rate setting methodology to reflect the true cost of producing, distributing and maintaining a water utility system, such as construction of water supply facilities, heavy equipment, management, training, operation and maintenance, water quality laboratory tests, depreciation, interest on debt or capital, and taxes; along with establishment of a reserve fund for future improvements, extensions, and expansions and the replacement of system components that reach end of operating life.

As stated earlier, the City of Las Cruces went through a water and wastewater rate case in 2008-2009. The structure of the increasing block rates are two tiers with a summer peak and non-summer peak rates (Appendix C). During the rate hearing the

RAC did recommend to the Utilities Board that the water rates be re-evaluated for conservation with a need for inclining block rates, which would be October, 2012. Las Cruces Utilities will investigate the possibility of adding a third tier rate that will address water conservation issues. The Water Conservation Coordinator will develop a white paper that will identify different studies that have addressed the use of rates for water conservation. This white paper will be presented to the Board with the intent of the Board taking or not taking action to initiate a water efficiency surcharge. The Las Cruces Utilities Board is the governing mechanism to approve or disapprove utilities rates.

4.2.8 Landscape and irrigation design standards

City of Las Cruces design standards, which include landscape and irrigation, are currently being evaluated. The following landscape design and irrigation requirements have been presented to the committee and may become part of the design standards to be presented to City Council. If the landscape and irrigation standards listed below are not approved by City Council then the following are strictly recommendations for reducing landscape water usage on both public and private properties and will be encouraged by the water conservation program as voluntary measures. However, if these standards are accepted by City Council, they will be enforced through the Design Standards and the Water Conservation Plan.

4.2.8.1 Landscape design

Low water use landscaping for private properties shall be promoted. The following specifications will be encouraged for all new development.

1.) It is recommended that high water use turf not be planted on slopes greater than 4:1.

2.) It is recommended that all publicly owned properties other than parks and golf courses use medium and low water use plants on 100% of the landscape area.

3.) It is recommended that all privately owned properties other than golf courses use medium and low water use turf in no more than 80% of the landscape area.

4.) It is recommended that all privately owned properties other than golf courses use high water use turf in no more than 20% visible in public or private right-of-way.

5.) It is recommended that any existing features should be evaluated for incorporation in design to include natural drainages, rock outcroppings, and strong stands of native vegetation which can be protected, detention area where vegetation has grown and is being supported by nuisance flows or harvested water.

6.) It is recommended that fountains using over 500 gallons of make-up water (water that is consumed and must be replaced by additional water) per day are not promoted. Multiple fountains on the same property will be considered one fountain to determine usage. Water used in fountains shall be recycled to minimize water usage.

7.) Decorative ponds proposed for aesthetic or ornamental purposes and containing no more than 10 percent of the properties landscape area are highly discouraged. This does not apply to government owned detention basins, which may contain more than one-half acre of surface area.

4.2.8.2 Irrigation System

The following standards apply to all new development. The standards serve only as guidelines unless adopted by City Council through the design standards.

1.) Irrigation systems are encouraged to be designed in conformance with all provisions in the Water Conservation Plan and Design Standards.
2.) Irrigation systems are encouraged to be designed to minimize water waste, overwatering, over spraying, and susceptibility to vandalism.
3.) Irrigation systems are encouraged to be designed to be site-specific, reflecting plant type, soil type, infiltration rates, slopes, and prevailing wind direction. Subsurface and drip irrigation are highly recommended.
4.) Irrigation systems are encouraged to be controlled by an automatic controller having multiple programming capabilities. Irrigation systems shall be reprogrammed as needed to reflect the age of plants and the season. Irrigation systems that use smart technology are highly recommended to minimize water waste and overwatering.
5.) Temporary irrigation systems will be allowed for erosion control and revegetation plants.
6.) Valves should be utilized to regulate water pressure, prevent water hammer and possible damage to piping and fittings, and prevent line drainage and cross contamination.
7.) Sprinkler heads are encouraged to be installed at least 18 inches away from any imperious surface and shall not spray toward the imperious surface.
8.) Spray heads should not be used in street medians.

9.) All new turf landscape areas cumulative to over a quarter of an acre are encouraged to have a Landscape Irrigation Audit performed by an authorized Landscape Irrigation Auditor, certified by the Irrigation Association. The audits will be conducted in accordance with the current edition of the Landscape Irrigation Auditors Handbook. The audit shall be performed prior to the installation of turf or seed. The minimum efficiency requirements recommended in the audit are a 55% distribution uniformity for all spray systems and 65% distribution uniformity for all rotary systems.

10.) Landscape planting and irrigation system design plans are recommended for all development and should be reviewed.

11.) All landscape areas on privately owned properties with a landscape meter are recommended to follow the recommended water budget requirements:

a. Water budget means maximum annual water allowance in gallons per year;
b. For Las Cruces, NM 53” is the average annual requirement in inches per year for warm season turf and 34” is the average annual requirements in inches for cool season turf based on historic water use in Las Cruces (Leinauer, 2011);
c. 0.62 is the conversion factor from ET inches to gallons;
d. LA is the landscape area in square feet;
e. Properties are encouraged to install an irrigation flow meter immediately downstream from the City landscape water meter.

12.) All existing public parks and golf courses are recommended to use medium and low water use plants as much as possible. High water use turf is recommended in those areas with heavy usage or foot traffic, such as athletic fields, playgrounds, and golf course tees, greens and fairways.

13.) All existing golf courses are encouraged to only use up to only 44 inches of water per landscaped acre per year. All new golf courses or existing golf course expansion permitted by the City after the effective date of the water conservation plan are encouraged to use up to only 37 inches per landscaped acre per year.

14.) All existing public parks are encouraged to use up to only 36 inches of water per landscaped acre per year.

15.) All new public parks permitted after the effective date of the water conservation plan are encouraged to use up to only 36 inches per landscaped acre per year. Any usage over the allowable amount will be subject to the excess use surcharge(s) described above.

4.3 Mandatory Measures (Demand Side)

4.3.1 General

The outdoor vegetation watering restrictions contained in this section shall apply to all users of city- provided water and to all users of water provided by water utility companies franchised by the city. As new development continues in the area with smaller lot sizes, with desert landscaping, with applicable plumbing code restrictions adopted by City of Las Cruces, and with the mandatory measures set forth in the Plan; LCU anticipates a steady decrease in consumption.

Outdoor watering restrictions do not apply to users of irrigation water provided by EBID or to users of water provided by mutual domestic water companies.

4.3.2 Schedule for Outdoor Vegetation Watering

The outdoor vegetation watering restrictions will follow a schedule for residential and commercial properties:

1.) All outdoor vegetation on residential and commercial properties located on the even numbered side of the street shall be watered only on Tuesday, Thursday, and Saturday and on the odd numbered side of the street shall be watered on Wednesday, Friday, and Sunday. No watering is allowed on Monday. For corner buildings or properties having both odd and even numbers, the number shown on the City's or the franchised water company's utilities records shall control.
2.) From April 1 to October 1, all outdoor vegetation watering is prohibited between the hours of 10:00 a.m. and 6:00 p.m.
3.) The schedule does not apply to the following:
4.) Drip irrigation, subsurface irrigation, low precipitation bubblers, hand watering, or watering containerized plants and plant stock.
5.) Outdoor irrigation necessary to establish newly sodded lawns and landscaping within the first 45 days of planting upon the issuance of a water restriction waiver by the Water Conservation Coordinator.
6.) Outdoor irrigation necessary to establish newly seeded lawns with the first 120 days of planting upon the issuance of a water restriction waiver by the Water Conservation Coordinator.

7.) Outdoor irrigation necessary to establish inter-seeded lawns within the first 90 days of planting upon the issuance of a water restriction waiver by the Water Conservation Coordinator.

8.) Irrigation necessary for one day only where treatment with an application of chemicals requires immediate watering to preserve an existing landscape or to establish new landscaping.

9.) Water used to control dust or to compost soil

10.) An attended watering system that has one or more repair or maintenance personnel present at the irrigated zone being serviced for purposes of inspecting system condition and function and/or repairing or maintaining the water system.

11.) A water restriction waiver granted by the Water Conservation Coordinator for good cause shown.

12.) Below is a table outlining the annual schedule for outdoor water restrictions:

Table 4-1: Residential and Commercial Properties Water Restriction Schedule

Month	Time Restriction	Day Restriction
October – March	None	Even address water Tuesday, Thursday, & Saturday
		Odd address water Wednesday, Friday, & Sunday
April- September	Outdoor watering prohibited between the hours of 10:00 a.m. and 6:00 p.m.	Even address water Tuesday, Thursday, & Saturday
		Odd address water Wednesday, Friday, & Sunday

4.3.3 Water Wasting Restrictions

The following water wasting restrictions apply to all water users within the City limits:

1.) Landscape water applied in such a manner, rate, and/or quantity that it overflows the landscape area being watered and runs into adjacent property or public right-of-way.

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 right-of-way.

3.) Washing of vehicles, equipment, or hand surfaces such as parking lots, aprons, pads, driveways, or other surfaced areas when water is applied in sufficient quantity to flow from that surface onto adjacent property or the public right-of-way.

4.) Water applied in sufficient quantity to cause ponding on impervious surfaces.

5.) Water applied in sufficient quantity to cause ice formation on adjacent property or public right-of-ways.

6.) Shutoff nozzles are required on any hoses used for hand watering, car washing, or other outdoor uses.

4.3.4 Exceptions to Water Wasting

The following are exceptions to water wasting:

a. Stormwater runoff allowed under the provisions of the City of Las Cruces design standards as currently adopted or subsequently amended.

b. Flow resulting from temporary water supply system failures or malfunctions. These failures or malfunctions shall be repaired within 48 hours of notification or the system shut off until repair can be completed.

c. Flow resulting from fire protection or routine inspections of fire hydrants or from fire protection training.

d. Flow resulting from water breaks and routine inspection, operation, or maintenance of a utility water supply system.

e. Water used for construction or maintenance activities where the application of water is the appropriate methodology and where no other practical alternative exists.

f. Use of water that is permitted under a variance granted by the Water Conservation Coordinator. Variances will need to be requested annually to the Water Conservation Coordinator.

4.3.5 Penalty:

Any person who is convicted of a violation of any section of the mandatory regulations stated in this water conservation plan shall be guilty of a petty misdemeanor and shall be fined as follows based on the type of property upon which the violation occurred and on the number of prior convictions.

Conviction	Residential Property	Non-residential Property
First	$50	$100
Second	$100	$250
Third and subsequent conviction	$250	$500

For purposes of this section a “person” who can be cited may be one of the property owners; the water utility customer of record for the property; a tenant or any person over the age of 18 years residing at or occupying the property; or an officer,

manager or general agent of the property owner or of the business located on the property.

Persons cited pursuant to this section may still be held liable regardless of the conduct or lack of conduct of an individual or business performing or responsible for performing landscaping or yard maintenance services on the property, or regardless of the effect of an automated water sprinkler or delivery system on the property.

4.4 Supply Side Water Conservation (including but not limited to)

Las Cruces Utilities has 30 supply wells, of which 28 are currently active. All wells are metered; thus, 100 percent of the City's water supply sources are metered. A portable meter is used to test the accuracy of each well at least twice a year. Las Cruces Utilities has a SCADA system which automatically logs meter data on a continuous basis and these data are reviewed at least once a month.

The vast bulk of water mains are associated with new subdivisions and development. The commissioning of new mains is governed by the subdivision regulation which sets forth requirements for permitting and commissioning mains. When mains are installed, there are very accurate paper records and over time they are converted into electronic records. The City does not have a third party auditor for leak detection. Water pipes are replaced every 30 years. Additionally LCU works in collaboration with the City Public Works to replace water and sewer pipes when work is being done on streets.

4.4.2. Meter Program

Las Cruces Utilities uses "Munis[6]" to track accounts with high or low usage. The meter shop can run a query that will flag those accounts that have high or low usage, using a threshold of 200 percent. Once the accounts are flagged, an investigation is completed to identify why there has been a sudden change in usage. Typically, the investigation focuses on the meter and possible leakage. Currently, the LCU has contracted a private third party auditor to conduct a meter testing program for commercial meters. This audit will begin in 2012.

Las Cruces Utilities has a meter program that replaces residential meters every seven years. However, LCU is in the progress of developing Phase I Automatic Remote Metering System (ARM) that will target high/low usage commercial accounts with more than 200 meters. Additionally, LCU will work to extend the program to cover all accounts throughout the City. LCU anticipates the ARM program will contribute to a savings in consumption.

5 Program Evaluation

As an input to the Water Conservation Plan, Utilities went through a process of evaluating the various recommendations listed in Chapter 4 for the value to the water conservation program versus the difficulty of implementing these programs as listed in the works cited.

[6] Munis is the City's computer customer service system.

5.1 Analysis methods and evaluation criteria

The OSE Calculator and AWWA Audit will be used to assess the water conservation program over the next 10 years. The Calculator will show the monthly effectiveness or change in behavior for single family residential, multi-family residential, and small and large commercial accounts. The AWWA Audit will show the effectiveness or change in usage by Utilities for revenue and non-revenue water. Additionally, the adoption of this water conservation plan by the LCU Board will confirm political buy-in and public support.

The Water Conservation Program will continue to examine or develop tracking tools that will assist the program in evaluating water savings, costs, and benefits of the conservation program for LCU. LCU is a member of the Alliance for Water Efficiency (AWE) and will use the tracking tools and materials associated with this program to assist the conservation program, especially the AWE tracking tool. The tracking tool, which provides a standardized methodology for water savings and benefit-cost accounting, track the implementation of water savings, which includes the cost and benefits of the conservation activities over time, evaluate utilities changing revenue requirements with conservation, and estimate the changes from the plumbing codes and conservation program activities through rebates and audits.

Additionally, LCU will conduct surveys and periodic public meetings to assess changes in public perception and practices as the water conservation program is implemented. In order to assist residents, businesses, and institutions in assessing changes to conserve water, the City will create on the water conservation website a water usage calculator that will calculate actual water usage and potential water

savings. The calculator will be developed by the City IT and Water Conservation Coordinator in 2012 and will be used as an educational tool for the program.

6 Implementation plan

As noted earlier, Utilities has examined a combination of program actions, including voluntary and mandatory measures. The mandatory measures will be regarded as regulatory, being enforced and monitored by the Las Cruces Police Department's Codes Enforcement Unit and the Water Conservation Coordinator. The voluntary measures, which are ways to encourage residents and businesses to conserve voluntarily and as a way to introduce water conservation education, will be combined with the mandatory measures over time. The mandatory measures will begin immediately with the adoption of this water conservation plan. Some of the mandatory measures language will mirror the City Design Standards concerning landscaping of new development.

Implementation of the Plan requires the continuation of developing the water conservation program and funding. Steps toward implementing the Plan will include but not limited to:

1. City of Las Cruces as a role model – The City has already taken steps through the City Strategic Plan to lower water consumption by five percent. Additionally, education programs will be implemented for all staff. These actions will assist in educating staff on how to implement water conservation measures. The ease of implementation will depend on the attitudes toward and understanding of conservation within the City. Additionally, with

assistance through the Parks department the Water Conservation Coordinator will measure a baseline of current water use for each park within the City. From this baseline a new irrigation schedule for minimizing ET will be developed along with replacing sprinkler heads, and mowing education.

2. Education – Education will be a valuable factor in affecting the behavioral changes required for water conservation. Through the program, Utilities will implement a Communication Plan that will be used as a tool to educate City residents and businesses. The Water Conservation Coordinator will work with a Public Relations firm to establish the elements of the Communication Plan and a Water Conservation Campaign. The campaign will include publicizing incentive programs, voluntary measures, mandatory measures, and educational programs.

3. County involvement – The water conservation program will engage County leadership on the Water Conservation Plan and its message and implementation.

4. New Mexico State University (NMSU) involvement - The water conservation program will engage NMSU leadership on the Water Conservation Plan and its message and implementation. NMSU is not within the boundaries of the City of Las Cruces; however since both NMSU and the City use the same aquifers, they will be encouraged to team up with the City and conserve water. Additionally, the water conservation program will work with NMSU faculty and

Water Resource Research Institute (WRRI) to develop and implement conservation educational workshops and grant funding projects.

6.1 Implementation of measures

The Design Standards Committee has reviewed the landscape and irrigation standards. The Committee did specify that several of the measures will only be supported for new development in the City. However, since 75 percent of the buildings in Las Cruces are pre-1995 the Committee did see the need to possibly implement additional measures in later years of the program.

6.2 Implementation of single family and multi-family residential measures

While historically the City has been already engaged in conserving water, there are certain areas where the public may not be actively engaged; such as graywater, xeriscaping, and drip irrigation. These measures are an important part of the conservation program, engaging the public and providing education in the tools needed to conserve water. The incentive programs for SFR will require new sources of funding, staff time, and political support.

6.3 Implementation of industry, commercial, and institutional (ICI) measures

The measures to conserve water in existing and new businesses and institutions will require Utilities to work closely with stakeholders. One of the programs to assist in the implementation for ICI is to create a recognition program for measures that save water under ICI. Recognition could range from a published thank you on the City website; a thank you for the measures taken published in the local newspaper; decals

that the business or institution could place in their window; collaboration with the Chamber of Commerce for recognition; or a formal recognition dinner.

6.4 Enforcement

Much of the implementation for the mandatory measures will be enforcement. As stated earlier, enforcement falls under the Las Cruces Police Codes Enforcement Unit. Although the mandatory measures can be adopted using existing Codes staff, it is likely that enforcement may incur a cost, whether for new equipment, training, overtime, or other items.

7 Methodology for water conservation program

Methodology used to evaluate the water conservation plan included the following approaches:

- Research significant water conservation programs within and outside New Mexico.
- Collect and review policies, programs, issues, and reports from other cities water conservation programs within Las Cruces population base.
- Develop an advisory committee with key individuals to discuss possible water conservation programs and projects.
- Discuss with various key individuals from the Water Conservation Alliance on their City's water conservation program and policies, how they measured effectiveness, target programs, and other information.

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Glossary

Acre-foot - a volume of water that would cover one acre to a depth of one foot, or 325,850 gallons of water.

Adaptive plants - non-indigenous plants that easily adapt to the climate and thus require little or no supplemental irrigation once established.

Adjusted water budget - an amount of water used to maintain a landscape that is based on area and ET rate.

Aquifer - Underground water-bearing geologic formation or structure.

Arable - Having soil or topographic features suitable for cultivation.

Arid - a climate characterized by less than 10 inches of annual rainfall.

Audit (end-use) - a systematic accounting of water uses conducted to identify opportunities for improved efficiency.

Automatic irrigation - delivery of water to a landscape using a timer, a system of valves, and sprinklers.

Automatic irrigation controller - an irrigation timer capable of operating valve stations to set the days and length of time of water applications.

Automatic Valve - an irrigation valve which can be remotely operated. The remote operation method may be either electrical (the most common) or hydraulic. Automatic valves are commonly used as "control valves" for irrigation systems.

Backflow prevention device - a safety device used to prevent reverse flow of water back into a potable water supply line; typically used in conjunction with automatic irrigation systems.

Ball valve - a type of valve that controls the water by means of a rotating ball with a hole through the center of it. When the hole is aligned with the water flow the water flows freely through the valve with almost no friction loss. When the ball is rotated so that the hole is not aligned the flow is completely shut off.

Baseline - an established value or trend used for comparison when conditions are altered.

Block-rate pricing - a method of charging for water based on the volume used. As more water is used, the price increases (or decreases) through a series of blocks. These pricing structures are designed to encourage efficient use of a resource.

Bubbler - a type of sprinkler head that delivers water a level area where the water slowly infiltrates to the soil. Typically used to irrigate shrubs and trees.

Budget (water budget) - an accounting of water use for a given activity or location over a fixed period of time.

Central irrigation control - a computerized system that programs sprinkler clocks from a centralized location using a computer.

Check valve - a device that prevents drainage of water from the low points of an irrigation circuit after irrigation stops.

Cistern - a tank (often underground) use to store water (often rainwater or graywater).

Conservation - increasing the efficiency of energy use, water use, production, or distribution; the act of conserving or preserving from injury or loss; the protection of rivers, forests and other natural resources.

Conservation pricing - water rate structures that increase the price of water as more water is used with the goal of encouraging more efficient use.

Consumptive use (evapotranspiration) - combined amounts of water needed for transpiration by vegetation and for evaporation from adjacent soil, snow, or intercepted precipitation. Also known as crop requirement, crop irrigation requirement, and consumptive use requirement.

Cool-season grass - turf grass varieties that are typically not damaged by sub-freezing temperatures. Includes such grasses as bluegrass, Kentucky bluegrass, perennial rye grass, red fescue, and tall fescue.

Cost-effectiveness - a comparison of total benefits against total costs.

Decreasing block rate - Pricing that reflects per-unit costs of production and delivery that go down as customers consume more water.

Deep percolation - the movement of water by gravity downward through the soil profile beyond the root zone; plants do not use this water.

Demand forecast - a projection of future water use.

Demand management - the practice of systematically reducing water use for a broad spectrum of utility customers through efficiency measures and conservation, often as an alternative to purchasing new water or expanding water treatment facilities.

Demand scheduling - method of irrigation scheduling whereby water is delivered to users as needed and which may vary in flow rate, frequency and duration. Considered a flexible form of scheduling.

Design Pressure - the total pressure available to operate an irrigation system.

Distribution efficiency - measure of the uniformity of irrigation water distribution over a field.

Distribution system - a system of pipes and valves that conveys water from a treatment plant to end users.

Diversion (water) - removal of water from its natural channels for human use.

Drainage - the process of removing surface or subsurface water from a soil or area.

Drip irrigation - a type of micro-irrigation systems that delivers water is slow drips to plants through a network of plastic pipes and emitters.

Drought - climatic condition in which there is insufficient soil moisture available for normal vegetative growth for an extended period of time.

Drought condition - the hydrologic conditions during a defined drought period in which rainfall and runoff are much less than average.

Dual-flush toilet - a toilet designed to use a lower volume of water to flush liquid wastes and a higher volume of water to flush solid wastes.

Effective precipitation - the total depth of rainfall minus the volume lost to evaporation and leaching during a specific time period.

Efficiency - the use of a resource that maximizes the benefit and minimizes consumption of the resource.

Effluent - wastewater, treated or untreated, that flows out of a treatment plant, sewer, or industrial outfall.

Emitter - a drip irrigation system fitting that delivers water to plants at a slow and predictable rate.

End use - fixtures, appliances, plumbing devices, equipment, and activities that use water.

End user - a consumer of water; a utility water customer.

Environment - the sum of all external influences and conditions affecting the life and development of an organism or ecological community.

Erosion - a gradual wearing away of soil or rock by running water, waves, or wind.

Established landscape - a landscape that has been in place for an extended period of time where the roots of the plants are well developed.

Evaporation - the process by which water changes from liquid to vapor.

Evapotranspiration (ET) - water lost from the surface of soils and plants through the processes of evaporation and transpiration combined.

Evapotranspiration (ET) rate - a measure of the amount of water required to maximize plant growth. This measure is calculated from climatic conditions and factors such as temperature, solar radiation, humidity, wind, time of year, precipitation, etc.

Faucet aerator - a device that can be installed in a sink to reduce water flow rate by adding air to the water.

Fixed charge - the portion of a water bill that does not vary with water use.

Fixed costs - costs for a utility that do not vary with the amount of water produced, delivered, and sold to customers.

Flood irrigation - a method of irrigating where water is applied from field ditches onto land that has no guide preparation such as furrows, borders or corrugations.

GPCD - gallons per capita per day

gpd - gallons per day

gpf - gallons per flush

gph - gallons per hour

gphd - gallons per household per day

gpl - gallons per load (of laundry or dishes)

gpm - gallons per minute

gpy - gallons per year

Graywater - domestic wastewater composed of wash water from kitchen sinks, bathroom sinks and tubs, clothes washers, and laundry tubs that can be used for non-potable purposes such as irrigation.

Green industry - the industry that includes design, maintenance, installation, and management of landscapes.

Groundwater - water beneath the earth's surface.

Groundwater recharge - the flow to groundwater storage from precipitation, infiltration from streams, and other sources of water; the use of reclaimed wastewater, by surface spreading or direct injection, to prevent saltwater intrusion into freshwater aquifers, to store the reclaimed water for future use, to control or prevent ground subsidence, and to augment non-potable or potable ground water aquifers.

Groundwater table - the upper boundary of groundwater where water pressure is equal to atmospheric pressure, i.e., water level in a bore hole after equilibrium when groundwater can freely enter the hole from the sides and bottom.

Hardscape - landscaped areas covered by non-living materials such as concrete, bricks, rocks, wood, pavement, etc.

High-water-use landscape - a landscape made up of plants, turf and features that requires 50 to 80% of the reference evapotranspiration to maintain optimal appearance.

Horticultural practices - activities to maintain plants and landscapes such a s fertilization, mowing, and thatch control.

Hydrology - science dealing with the properties, distribution, and flow of water on or in the earth.

Hydrozone - a portion of a landscaped area comprising plants with similar water requirements.

Increasing block rate - pricing that reduces water use by structuring water rates to increase per-unit charges as the amount used increases.

Invasive plant - a non-indigenous plant that invades and takes over substantial areas of an ecosystem.

Irrigation audit - an on-site evaluation of an irrigation system to assess its water-use efficiency as measured by distribution uniformity, irrigation schedule, and other factors.

Irrigation controller - a sprinkler clock or timer.

Irrigation cycle - a scheduled application of water by an irrigation system with a defined start time and duration. A cycle may include multiple watering zones.

Irrigation efficiency - the ratio of the average depth of irrigation water that is beneficially used to the average depth of irrigation water applied, expressed as a percent. Beneficial uses include satisfying the soil water deficit and any leaching requirement to remove salts from the root zone.

Irrigation requirement - quantity of water, exclusive of effective precipitation, that is required for maintaining a landscape.

Irrigation scheduling – carefully chosen irrigation application rates and timing to help irrigators maintain yields with less water.

Irrigation timer - a device that can be programmed to regulate the time and duration of irrigation; a sprinkler clock.

Irrigation water requirement - a measure of the water required in addition to precipitation to obtain desired crop yield.

Landscape area - the total area on a property that contains landscaping elements. Usually equivalent to the total area minus the building footprint and paved driveways and paths.

Landscape water requirement - a measure of the supplemental water required to maintain the optimum health and appearance of landscape plants and features.

Leak detection - Systematic methods for identifying water leakage from pipes, plumbing fixtures, and fittings.

Low-flow faucet - a faucet that uses no more than 2.5 gallons per minute at 80 pounds of pressure per square inch.

Low-flow plumbing - plumbing equipment that uses less water than was considered standard prior to January 1, 1994.

Low-flow showerhead - A showerhead that requires 2.5 gallons of water per minute or less.

Low-flush toilet - a toilet that requires 1.6 gallons of water per flush or less.

Low-volume urinal - a urinal that uses no more than 1.0 gallons per flush.

Low-water-use landscape - use of plants that are appropriate to an area's climate and growing conditions.

Low-water-use plants - plants that require less than 30% of reference ET to maintain optimum health and appearance.

Medium-water-use plants - plants that require 30 to 50 percent of reference ET to maintain optimum health and appearance.

Meter - an instrument that measures the volume of water use.

Metering - use of metering equipment that can provide essential data for charging fees based on actual customer use.

mgd - million gallons per day.

mgy - million gallons per year.

Multiple start times - an irrigation schedule where the system is programmed to start and run several times during the day.

Native landscape - a landscape that features plants and grasses indigenous to the region.

Native plants - plants that are indigenous to a region and require litter or no supplemental irrigation after establishment.

Natural landscape - a landscape created to reflect the character and spirit of nature and the native surroundings.

Nonconsumptive water use - water withdrawn for use but not consumed and thus returned to the source.

Non-residential water use - water use by industrial, commercial, institutional, public, and agricultural users.

Peak demand - the highest total water use experienced by a water system.

Peak/off-peak rates - rates charged in accordance with the most and least popular hours of water use during the day.

Per capita use - the amount of water used by one person during one 24 hour period. Typically expressed as gallons per capita per day (GPCD).

Percolation - downward movement of water through the soil profile or other porous media.

Percolation rate - (1) the rate at which water moves through porous media, such as soil; and (2) intake rate used for designing wastewater absorption systems.

Plant water requirement - the amount of irrigation water needed to replace moisture depleted from the soil around plant roots as a result of evapotranspiration.

Pop-up sprinkler head - a sprinkler head that retracts below ground level when it is not operating.

Potable water - water that is safe for drinking.

Precipitation rate - the amount of water applied by a sprinkler system in a specific unit of time.

Rain sensor - a device that automatically shuts off an irrigation system after a set amount of precipitation falls.

Rain switch - a simple on/off switch on an irrigation system that makes it easy to shut the system down during a rainstorm.

Rainwater harvesting - the capture and use of runoff from rainfall.

Rationing - mandatory water use restrictions typically imposed during a drought.

Recharge - the addition of water to the groundwater supply by natural or artificial means.

Recirculating cooling water - recycling cooling water to greatly reduce water use by using the same water to perform several cooling operations.

Reclaimed water - wastewater that is treated and reused to supplement water supplies.

Recycled water - a type of reuse water usually run repeatedly through a closed system; sometimes used to describe reclaimed water.

Reference evapotranspiration (ET_o) - the evapotranspiration of a broad expanse of adequately watered cool-season grass 4 to 6 inches in height. A standard measurement for determining maximum water allowances for plants so that regional differences in climate can be accommodated.

Reservoir - a body of water, such as a natural or constructed lake, in which water is collected and stored for use.

Residential water use - water use in homes and apartments.

Retrofit - replacement of existing equipment with equipment that uses less water.

Return flow - that portion of the water diverted from a stream that finds its way back to the stream channel, either as surface or underground flow.

Riparian - of, on, or pertaining to the bank of a river, pond, or lake.

Riser - the connection between a sprinkler or other irrigation device and the pipe that supplies the water to it.

Root zone - that depth of soil which plant roots readily penetrate and in which the predominant root activity occurs.

Runoff - the portion of precipitation, snow melt, or irrigation that flows over the soil, eventually making its way to surface water supplies.

Secondary treatment - the second step in most publicly owned waste treatment systems, which removes floating and settleable solids and about 90 percent of the oxygen-demanding substances and suspended solids. Disinfection is the final stage of secondary treatment.

Secondary wastewater treatment plant - a facility that reduces pollutants and suspended solids to a greater level than that achieved by a primary treatment plant; the water goes through additional treatment processes, producing "cleaner" wastewater.

Seepage - the movement of water into and through the soil from unlined canals, ditches, and water storage facilities.

Self-closing faucet - a faucet that automatically shuts off the water flow after a designated amount of time, usually a few seconds.

Semi-arid climate - a climate characterized by 10 to 20 inches of annual precipitation.

Service area - the geographic area served by a water utility.

Simple water budget - a water budget that is the product of reference evapotranspiration, irrigated area, and a conversion factor.

Soil classification - the systematic arrangement of soils into classes of one or more categories or levels to meet a specific objective. Broad groupings are made on the basis of general characteristics, and subdivisions are made on the basis of more detailed differences in specific properties.

Soil conservation - protection of soil against physical loss by erosion and chemical deterioration by the application of management and land-use methods that safeguard the soil against all natural and human-induced factors.

Soil moisture - water stored in soils.

Soil moisture sensor - a device placed in the ground at the plant root zone depth to measure the amount of water in the soil. Soil moisture sensors are also used to control irrigation and signal whether watering is required or not.

Source protection - protection of a water source, ranging from simple sanitary surveys of a watershed to the development and implementation of complex land use controls, in an effort to avoid water contamination.

Spray head - a sprinkler nozzle that delivers water in a fixed spray pattern.

Sprinkler heads - devices that distribute water over a given area for irrigation.

Sprinkler irrigation - a method of irrigation in which the water is sprayed, or sprinkled, through the air to the ground surface.

Static water pressure - water pressure as measured when the water is not moving. The "not moving" part is critical, if the water is moving it isn't "static".. When measuring static water pressure all the water outlets on the pipe must be closed. So if you're measuring the static pressure at a house you connect the pressure gauge, then take the reading while all the faucets, the ice maker, etc., are turned off.

Stream rotors - sprinkler heads that deliver rotating streams of water in arcs or full circles at relative low precipitation rates.

Subirrigation - applying irrigation water below the ground surface either by raising the water table within or near the root zone, or by use of a buried perforated or porous pipe system that discharges directly into the root zone.

Subsurface irrigation - applying irrigation water below the ground surface either by raising the water table within or near the root zone, or by use of a buried perforated or porous pipe system that discharges directly into the root zone.

Surface soil - upper part of the soil ordinarily moved in tillage, or its equivalent in uncultivated soils, about 10 to 20 cm in thickness.

Surface water - an open body of water such as a river, stream, or lake.

Supplemental irrigation - the application of water to a landscape to supplement natural phenomena.

Surcharge - a special charge included on a water bill to recover costs associated with a particular activity, facility, use, or to convey a message about water prices to customers.

Surface irrigation - the application of water to land by surface flow.

Surface water supply - water supplied from a stream, lake, or reservoir.

Tailwater - applied irrigation water that runs off the lower end of a field. Tailwater is measured as the average depth of runoff water, expressed in inches or feet.

Tall fescue - a hybridized cool-season turf grass characterized by deeper root systems and greater drought tolerance than bluegrass.

Tiered pricing - increasing block-rate pricing.

Toilet displacement device - a toilet retrofit device (such as a dam, bag, bottle, or rock) used to displace water in the toilet tank in order to reduce the volume required for flushing.

Toilet flapper - the valve that controls flushing in a gravity-tank toilet.

Transpiration - the transfer of water vapor from plants to air.

Turf - hybridized grass that forms a dense growth of blades and roots when regularly mowed.

Utility - public water service provider.

Valve - a device used to control the flow of water. Isolation valves are used to shut-off water for repairs. Control valves turn on and off the water to the individual circuits of sprinklers or drip emitters. Check valves allow the water to flow in only one direction. Master valves are located at the water source and turn on and off the water for the entire irrigation system when not in use.

Valve zone - an area where irrigation is all controlled by a single control valve. Each valve zone must be within only one hydrozone.

Warm-season turf grass - turf grass that grows vigorously during warm summer months but goes dormant or dies at temperatures below 50ºF. Includes such grasses as bermuda grass, buffalo grass, St. Augustine grass, and zoysia grass.

Wastewater - spent or used water from individual homes, a community, a farm, or an industry that contains dissolved or suspended matter.

Wastewater treatment plant - a facility with an engineered system designed to remove pollutants, such as phosphorus and nitrogen, from municipal and industrial wastewater for discharge into surface waters.

Water audit - an on-site survey and assessment of water-using hardware, fixtures, equipment, landscaping, irrigation systems, and management practices to determine the efficiency of water use and to develop recommendations for improving water use efficiency.

Water budget - the amount of water required to maintain plants in a landscape; a method of establishing water efficiency standards by prescribing limits on water applications to landscapes.

Water conservation - activities designed to reduce the demand for water, improve efficiency in use, and reduce losses and waste of water.

Water conservation incentive - an effort designed to promote customer awareness about reducing water use and motivate customers to adopt specific conservation measures.

Water conservation measure - an action, behavioral change, device, technology, or improved design or process implemented to reduce water loss, waste or use.

Water delivery system - Reservoirs, canals, ditches, pumps, and other facilities to move water.

Water demand - water requirements for a particular purpose, as for irrigation, drinking, toilet flushing, bathing, clothes washing, etc.

Water efficiency - accomplishment of a function, task, process, or result with the minimal amount of water feasible; an indicator of the relationship between the amount of water required for a particular purpose and the quantity of water used or delivered.

Water efficiency measure - a specific tool or practice that results in more efficient water use and thus reduces water demand.

Water efficiency standard - criterion creating maximum or acceptable levels of water use.

Water efficient landscape - a landscape that minimizes water demand through design, installation, and management.

Water feature - a pool, fountain, water sculpture, waterfall, or other decorative element that includes water. Many water features recycle water thus reducing consumption.

Water harvesting - the capture and use of runoff from rainfall.

Water holding capacity - amount of soil water available to plants. See available soil water.

Water quality - the chemical, physical, and biological characteristics of water.

Water reclamation - the treatment of wastewater to make it reusable, usually for non-potable purposes.

Water recycling - the treatment of urban wastewater to make it reusable for a specific beneficial purpose.

Water reuse - using wastewater or reclaimed water from one application for another application. The deliberate use of reclaimed water or wastewater must be in compliance with applicable rules for a beneficial purpose (landscape irrigation, agricultural irrigation, aesthetic uses, ground water recharge, industrial uses, and fire protection).

Water right - under the riparian system, a legally protected claim to take possession of water occurring in a natural waterway and to divert that water for beneficial use; under the prior appropriation system, a property or legal claim to withdraw a specified amount of water in a specified time frame for beneficial use.

Watershed - the area of land from which all precipitation and runoff drain into a single water source.

Water surcharge - imposition of a higher rate on excessive water use .

Water system - a series of interconnected treatment and conveyance facilities owned and operated by a water supplier.

Water table - in an unconfined aquifer, the top of the saturated zone; the level at which a well penetrates the top of an unconfined aquifer.

Water transfers - selling or exchanging water or water rights among individuals or agencies.

Water use efficiency - employing water-saving practices to reduce costs and to slow the depletion of the water supply to ensure future water availability.

Weather station - a facility where meteorological data are gathered.

Wetlands - lands including swamps, marshes, bogs, and similar areas such as wet meadows, river overflows, mud flats, and natural ponds. An area characterized by periodic inundation or saturation, hydric soils, and vegetation adapted for life in saturated soil conditions.

Xeriscape™ - a trademarked term denoting landscaping that involves the selection, placement, and care of low-water-use and native ground cover, turf, plants, shrubs, and trees. Xeriscape is based on seven principles: proper planning and design, soil analysis and improvement, practical turf areas, appropriate plant selection, efficient irrigation, mulching, and appropriate maintenance.

AWWA Water Loss Control Committee (WLCC) Free Water Audit Software v4.2

WAS v4.2

PURPOSE: This spreadsheet-based water audit tool is designed to help quantify and track water losses associated with water distribution systems and identify areas for improved efficiency and cost recovery. It provides a "top-down" summary water audit format, and is not meant to take the place of a full-scale, comprehensive water audit format.

USE: The spreadsheet contains several separate worksheets. Sheets can be accessed using the tabs towards the bottom of the screen, or by clicking the buttons on the left below. Descriptions of each sheet are also given below.

THE FOLLOWING KEY APPLIES THROUGHOUT:

	Value can be entered by user
	Value calculated based on input data
	These cells contain recommended default values

Please begin by providing the following information, then proceed through each sheet in the workbook:

NAME OF CITY OR UTILITY: Las Cruces Utilities COUNTRY: USA

REPORTING YEAR: 2010 START DATE(MM/YYYY): 01/2010 END DATE(MM/YYYY): 01/2011

NAME OF CONTACT PERSON: E-MAIL: TELEPHONE: Ext.

PLEASE SELECT PREFERRED REPORTING UNITS FOR WATER VOLUME: Acre-feet

Click to advance to sheet… Click here: ? for help about units and conversions

Instructions	The current sheet
Reporting Worksheet	Enter the required data on this worksheet to calculate the water balance
Water Balance	The values entered in the Reporting Worksheet are used to populate the water balance
Grading Matrix	Depending on the confidence of audit inputs, a grading is assigned to the audit score
Service Connections	Diagrams depicting possible customer service connection configurations
Definitions	Use this sheet to understand terms used in the audit process
Loss Control Planning	Use this sheet to interpret the results of the audit validity score and performance indicators

Comments:

Add comments here to track additional supporting information, sources or names of participants

If you have questions or comments regarding the software please contact us at: wlc@awwa.org

AWWA WLCC Free Water Audit Software: Reporting Worksheet

WAS v4.2

Back to Instructions

? Click to access definition

Water Audit Report for: Las Cruces Utilities
Reporting Year: 2010 (1/2010 - 1/2011)

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: ACRE-FEET PER YEAR

WATER SUPPLIED

<< Enter grading in column 'E'

Volume from own sources:	8	20,235.168	acre-ft/yr	
Master meter error adjustment (enter positive value):	7	0.000		acre-ft/yr
Water imported:	8	0.000	acre-ft/yr	
Water exported:	4	0.015	acre-ft/yr	
WATER SUPPLIED:		20,235.153	acre-ft/yr	

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

				Pcnt:	Value:
Billed metered:	7	17,027.196	acre-ft/yr		
Billed unmetered:	10		acre-ft/yr		
Unbilled metered:	9	43.117	acre-ft/yr		
Unbilled unmetered:	6	124.100	acre-ft/yr		124.100
AUTHORIZED CONSUMPTION:		17,194.413	acre-ft/yr		

Use buttons to select percentage of water supplied **OR** value

WATER LOSSES (Water Supplied - Authorized Consumption)

3,040.740 acre-ft/yr

Apparent Losses

				Pcnt:	Value:
Unauthorized consumption:		50.588	acre-ft/yr	0.25%	
Customer metering inaccuracies:	7	172.427	acre-ft/yr	1.00%	
Systematic data handling errors:	6	172.000	acre-ft/yr		
Apparent Losses:		395.015			

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Choose this option to enter a percentage of billed metered consumption. This is NOT a default value

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: 2,645.725 acre-ft/yr

WATER LOSSES: 3,040.740 acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER: 3,207.957 acre-ft/yr

= Total Water Loss + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	7	390.0	miles
Number of active AND inactive service connections:	6	30,327	
Connection density:		78	conn./mile main
Average length of customer service line:	7	30.0	ft (pipe length between curbstop and customer meter or property boundary)
Average operating pressure:	9	70.0	psi

COST DATA

Total annual cost of operating water system:	10	$12,881,237	$/Year
Customer retail unit cost (applied to Apparent Losses):	10	$1.95	$/1000 gallons (US)
Variable production cost (applied to Real Losses):	8	$2.08	$/acre-ft

PERFORMANCE INDICATORS

Financial Indicators

Non-revenue water as percent by volume of Water Supplied:	15.9%
Non-revenue water as percent by cost of operating system:	2.0%
Annual cost of Apparent Losses:	$250,997
Annual cost of Real Losses:	$5,503

Operational Efficiency Indicators

Apparent Losses per service connection per day:	11.63	gallons/connection/day
Real Losses per service connection per day*:	77.88	gallons/connection/day
Real Losses per length of main per day*:	N/A	
Real Losses per service connection per day per psi pressure:	1.11	gallons/connection/day/psi
Unavoidable Annual Real Losses (UARL):	623.46	acre-feet/year
From Above, Real Losses = Current Annual Real Losses (CARL):	2,645.72	acre-feet/year
Infrastructure Leakage Index (ILI) [CARL/UARL]:	4.24	

* only the most applicable of these two indicators will be calculated

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 75 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Water exported
2: Volume from own sources
3: Billed metered

For more information, click here to see the Grading Matrix worksheet

AWWA WLCC Free Water Audit Software: Water Balance

WAS v4.2

Water Audit Report For:	Report Yr:
Las Cruces Utilities	2010

<table>
<tr><td rowspan="8">Own Sources
(Adjusted for known errors)
20,235.168</td><td rowspan="8">Water Supplied
20,235.153</td><td>Water Exported
0.015</td><td colspan="3">Billed Water Exported</td></tr>
<tr><td rowspan="3">Authorized Consumption
17,194.413</td><td rowspan="2">Billed Authorized Consumption
17,027.196</td><td>Billed Metered Consumption (inc. water exported)
17,027.196</td><td rowspan="2">Revenue Water
17,027.196</td></tr>
<tr><td>Billed Unmetered Consumption
0.000</td></tr>
<tr><td rowspan="2">Unbilled Authorized Consumption
167.217</td><td>Unbilled Metered Consumption
43.117</td><td rowspan="6">Non-Revenue Water (NRW)
3,207.957</td></tr>
<tr><td>Unbilled Unmetered Consumption
124.100</td></tr>
<tr><td rowspan="4">Water Losses
3,040.740</td><td rowspan="3">Apparent Losses
395.015</td><td>Unauthorized Consumption
50.588</td></tr>
<tr><td>Customer Metering Inaccuracies
172.427</td></tr>
<tr><td>Systematic Data Handling Errors
172.000</td></tr>
<tr><td rowspan="3">Real Losses
2,645.725</td><td>Leakage on Transmission and/or Distribution Mains
Not broken down</td></tr>
<tr><td>Water Imported
0.000</td><td>Leakage and Overflows at Utility's Storage Tanks
Not broken down</td></tr>
<tr><td>Leakage on Service Connections
Not broken down</td></tr>
</table>

AWWA WLCC Free Water Audit Software: Grading Matrix

WASv 4.2

Back to Instructions

In the Reporting Worksheet, grades were assigned to each component of the audit to describe the confidence and accuracy of the input data. The grading assigned to each audit component and the corresponding recommended improvements and actions are highlighted in yellow. Audit accuracy is likely to be improved by prioritizing those items shown in red

Grading

	n/a	1	2	3	4	5	6	7	8	9	10
Volume from own sources:	Select this grading only if the water utility purchases/imports all of its water resources (i.e. has no sources of its own)	Less than 25% of water production sources are metered, remaining sources are estimated. No regular meter accuracy testing.	25% - 50% of treated water production sources are metered; other sources estimated. No regular meter accuracy testing.	Conditions between 2 and 4	50% - 75% of treated water production sources are metered, other sources estimated. Occasional meter accuracy testing	Conditions between 4 and 6	At least 75% of treated water production sources are metered, or at least 90% of the source flow is derived from metered sources. Meter accuracy testing and/or electronic calibration conducted annually. Less than 25% of tested meters are found outside of +/- 6% accuracy.	Conditions between 6 and 8	100% of treated water production sources are metered, meter accuracy testing and electronic calibration conducted annually, less than 10% of meters are found outside of +/- 6% accuracy	Conditions between 8 and 10	100% of treated water production sources are metered, meter accuracy testing and electronic calibration conducted semi-annually, with less than 10% found outside of +/- 3% accuracy.
Improvements to attain higher data grading for "Volume from own Sources" component:		<u>to qualify for 2:</u> Organize efforts to begin to collect data for determining volume from own sources	<u>to qualify for 4:</u> Locate all water production sources on maps and in field, launch meter accuracy testing for existing meters, begin to install meters on unmetered water production sources and replace any obsolete/defective meters		<u>to qualify for 6:</u> Formalize annual meter accuracy testing for all source meters. Complete installation of meters on unmetered water production sources and complete replacement of all obsolete/defective meters.		<u>to qualify for 8:</u> Conduct annual meter accuracy testing on all meters. Complete project to install new, or replace defective existing, meters so that entire production meter population is metered. Repair or replace meters outside of +/- 6% accuracy.		<u>to qualify for 10:</u> Maintain annual meter accuracy testing for all meters. Repair or replace meters outside of +/- 6% accuracy. Investigate new meter technology; pilot one or more replacements with innovative meters in attempt to improve meter accuracy.		<u>to maintain 10:</u> Standardize meter accuracy test frequency to semi-annual, or more frequent, for all meters. Repair or replace meters outside of +/- 3% accuracy. Continually investigate/pilot improving metering technology.
Master meter error adjustment:	Select n/a only if the water utility fails to have meters on its sources of supply, either its own source, and/or imported (purchased) water sources	Inventory information on meters and paper records of measured volumes in crude condition; data error cannot be determined	No automatic datalogging of production volumes; daily readings are scribed on paper records. Tank/storage elevation changes are not employed in calculating "Volume from own sources" component. Data is adjusted only when grossly evident data error occurs.	Conditions between 2 and 4	Production meter data is logged automatically in electronic format and reviewed at least on a monthly basis. "Volume from own sources" tabulations include estimate of daily changes in tanks/storage facilities. Meter data is adjusted when gross data errors occur, or occasional meter testing deems this necessary.	Conditions between 4 and 6	Hourly production meter data logged automatically & reviewed on at least a weekly basis. Data adjusted to correct gross error from equipment malfunction and error confirmed by meter accuracy testing. Tank/storage facility elevation changes are automatically used in calculating a balanced "Volume from own sources" component.	Conditions between 6 and 8	Continuous production meter data logged automatically & reviewed daily. Data adjusted to correct gross error from equipment malfunction & results of meter accuracy testing. Tank/storage facility elevation changes are automatically used in "Volume from own sources" tabulations.	Conditions between 8 and 10	Computerized system (SCADA or similar) automatically balances flows from all sources and storages; results reviewed daily. Mass balance technique compares production meter data to raw (untreated) water and treatment volumes to detect anomalies. Regular calibrations between SCADA and sources meters ensures minimal data transfer error.
Improvements to attain higher data grading for "Master meter error adjustment" component:		<u>to qualify for 2:</u> Develop plan to restructure recordkeeping system to capture all flow data; set procedure to review data daily to detect input errors	<u>to qualify for 4:</u> Install automatic datalogging equipment on production meters. Identify tanks/storage facilities and include estimated daily volume of water added to, or subtracted from, "Water Supplied" volume based upon changes in storage		<u>to qualify for 6:</u> Review hourly production meter data for gross error on, at least, a weekly basis. Begin to install instrumentation on tanks/storage facilities to record elevation changes. Use daily net storage change to balance flows in calculating "Water Supplied" volume.		<u>to qualify for 8:</u> Complete installation of elevation instrumentation on all tanks/storage facilities. Continue to use daily net storage change in calculating balanced "Volume from own sources" component. Adjust production meter data for gross error and inaccuracy confirmed by testing.		<u>to qualify for 10:</u> Link all production and tank/storage facility elevation change data to a Supervisory Control & Data Acquisition (SCADA) System, or similar computerized monitoring/control system, and establish automatic flow balancing algorithm and regularly calibrate between SCADA and source meters.		<u>to maintain 10:</u> Monitor meter innovations for development of more accurate and less expensive flowmeters. Continue to replace or repair meters as they perform outside of desired accuracy limits.
Water Imported:	Select n/a if the water utility's supply is exclusively from its own water resources (no bulk purchased/ imported water)	Less than 25% of imported water sources are metered, remaining sources are estimated. No regular meter accuracy testing.	25% - 50% of imported water sources are metered; other sources estimated. No regular meter accuracy testing.	Conditions between 2 and 4	50% - 75% of imported water sources are metered, other sources estimated. Occasional meter accuracy testing	Conditions between 4 and 6	At least 75% of imported water sources are metered, meter accuracy testing and/or electronic calibration conducted annually. Less than 25% of tested meters are found outside of +/- 6% accuracy.	Conditions between 6 and 8	100% of imported water sources are metered, meter accuracy testing and/or electronic calibration conducted annually, less than 10% of meters are found outside of +/- 6% accuracy	Conditions between 8 and 10	100% of imported water sources are metered, meter accuracy testing and/or electronic calibration conducted semi-annually, with less than 10% found outside of +/- 3% accuracy.
Improvements to attain higher data grading for "Water Imported Volume" component:		<u>to qualify for 2:</u> Review bulk water purchase agreements with partner suppliers; confirm requirements for use and maintenance of accurate metering. Identify needs for new or replacement meters with goal to meter all imported water sources.	<u>To qualify for 4:</u> Locate all imported water sources on maps and in field, launch meter accuracy testing for existing meters, begin to install meters on unmetered imported water interconnections and replace obsolete/defective meters		<u>to qualify for 6:</u> Formalize annual meter accuracy testing for all imported water meters. Continue installation of meters on unmetered exported water interconnections and replacement of obsolete/defective meters.		<u>to qualify for 8:</u> Complete project to install new, or replace defective, meters on all imported water interconnections. Maintain annual meter accuracy testing for all imported water meters. Repair or replace meters outside of +/- 6% accuracy.		<u>to qualify for 10:</u> Maintain annual meter accuracy testing for all meters. Repair or replace meters outside of +/- 6% accuracy. Investigate new meter technology; pilot one or more replacements with innovative meters in attempt to improve meter accuracy.		<u>to maintain 10:</u> Standardize meter accuracy test frequency to semi-annual, or more frequent, for all meters. Repair or replace meters outside of +/- 3% accuracy. Continually investigate/pilot improving metering technology.

Grading											
	n/a	1	2	3	4	5	6	7	8	9	10
Water Exported:	Select n/a if the water utility sells no bulk water to neighboring water utilities (no exported water sales)	Less than 25% of exported water sources are metered, remaining sources are estimated. No regular meter accuracy testing.	25% - 50% of exported water sources are metered; other sources estimated. No regular meter accuracy testing.	Conditions between 2 and 4	50% - 75% of exported water sources are metered, other sources estimated. Occasional meter accuracy testing	Conditions between 4 and 6	At least 75% of exported water sources are metered, meter accuracy testing and/or electronic calibration conducted annually. Less than 25% of tested meters are found outside of +/- 6% accuracy.	Conditions between 6 and 8	100% of exported water sources are metered, meter accuracy testing and/or electronic calibration conducted annually, less than 10% of meters are found outside of +/- 6% accuracy	Conditions between 8 and 10	100% of exported water sources are metered, meter accuracy testing and/or electronic calibration conducted semi-annually, with less than 10% found outside of +/- 3% accuracy.
Improvements to attain higher data grading for "Water Exported Volume" component:		<u>to qualify for 2:</u> Review bulk water sales agreements with partner suppliers; confirm requirements for use & upkeep of accurate metering. Identify needs to install new, or replace defective meters as needed.	<u>To qualify for 4</u>: Locate all exported water sources on maps and in field, launch meter accuracy testing for existing meters, begin to install meters on unmetered exported water interconnections and replace obsolete/defective meters		<u>to qualify for 6</u>: Formalize annual meter accuracy testing for all exported water meters. Continue installation of meters on unmetered exported water interconnections and replacement of obsolete/defective meters.		<u>to qualify for 8</u>: Complete project to install new, or replace defective, meters on all exported water interconnections. Maintain annual meter accuracy testing for all imported water meters. Repair or replace meters outside of +/- 6% accuracy.		<u>to qualify for 10:</u> Maintain annual meter accuracy testing for all meters. Repair or replace meters outside of +/- 6% accuracy. Investigate new meter technology; pilot one or more replacements with innovative meters in attempt to improve meter accuracy.		<u>to maintain 10</u>: Standardize meter accuracy test frequency to semi-annual, or more frequent, for all meters. Repair or replace meters outside of +/- 3% accuracy. Continually investigate/pilot improving metering technology.
AUTHORIZED CONSUMPTION											
Billed metered:	n/a (not applicable). Select n/a only if the entire customer population is not metered and is billed for water service on a flat or fixed rate basis. In such a case the volume entered must be zero.	Less than 50% of customers with volume-based billings from meter readings; flat or fixed rate billed for the majority of the customer population	At least 50% of customers with volume-based billing from meter reads; flat rate billed for others. Manual meter reading, under 50% read success rate, remainder estimated. Limited meter records, no regular meter testing or replacement. Billing data maintained on paper records, with no auditing.	Conditions between 2 and 4	At least 75% of customers with volume-based billing from meter reads; flat or fixed rate billed for remainder. Manual meter reading used, at least 50% meter read success rate, failed reads are estimated. Purchase records verify age of customer meters; only very limited meter accuracy testing is conducted. Customer meters replaced only upon complete failure. Computerized billing records, but only periodic internal auditing conducted.	Conditions between 4 and 6	At least 90% of customers with volume-based billing from meter reads; remaining accounts are estimated. Manual customer meter reading gives at least 80% customer meter reading success rate, failed reads are estimated. Good customer meter records, limited meter accuracy testing, regular replacement of oldest meters. Computerized billing records with routine auditing of global statistics.	Conditions between 6 and 8	At least 97% of customers with volume-based billing from meter reads. At least 90% customer meter read success rate; or minimum 80% read success rate with planning and budgeting for trials of Automatic Metering Reading (AMR) in one or more pilot areas. Good customer meter records. Regular meter accuracy testing guides replacement of statistically significant number of meters each year. Routine auditing of computerized billing records for global and detailed statistics; verified periodically by third party.	Conditions between 8 and 10	At least 99% of customers with volume-based billing from meter reads. At least 95% customer meter reading success rate; or minimum 80% meter reading success rate, with Automatic Meter Reading (AMR) trials underway. Statistically significant customer meter testing and replacement program in place. Computerized billing with routine, detailed auditing, including field investigation of representative sample of accounts. Annual audit verification by third party.
Improvements to attain higher data grading for "Billed Metered Consumption" component:	If n/a is selected because the customer meter population is unmetered, consider establishing a new policy to meter the customer population and employ water rates based upon metered volumes.	<u>to qualify for 2</u>: Conduct investigations or trials of customer meters to select appropriate meter models. Budget funding for meter installations. Investigate volume based water rate structures.	<u>to qualify for 4</u>: Purchase and install meters on unmetered accounts. Implement policies to improve meter reading success. Catalog meter information during meter read visits to identify age/model of existing meters. Test a minimal number of meters for accuracy. Install computerized billing system.		<u>to qualify for 6</u>: Purchase and install meters on unmetered accounts. Eliminate flat fee billing and establish appropriate water rate structure based upon measured consumption. Continue to achieve verifiable success in removing manual meter reading barriers. Expand meter accuracy testing. Launch regular meter replacement program. Conduct routine audit of global statistics.		<u>to qualify for 8</u>: Purchase and install meters on unmetered accounts. Assess cost-effectiveness of Automatic Meter Reading (AMR) system for portion or entire system; or achieve ongoing improvements in manual meter reading success rate. Refine meter accuracy testing program. Set meter replacement goals based upon accuracy test results. Refine routine auditing procedures based upon third party guidance.		<u>to qualify for 10</u>: Purchase and install meters on unmetered accounts. Launch Automatic Meter Reading (AMR) system trials if manual meter reading success rate of at least 95% is not achieved within a five-year program. Continue meter accuracy testing program. Conduct planning and budgeting for large scale meter replacement based upon meter life cycle analysis using cumulative flow target. Continue routine auditing and require annual third party review.		<u>to maintain 10</u>: Regular internal and third party auditing, and meter accuracy testing ensures that accurate customer meter readings are obtained and entered as the basis for volume based billing. Stay abreast of improvements in Advanced Metering Infrastructure (AMI) and information management. Plan and budget for justified upgrades in metering, meter reading and billing data management.
Billed unmetered:	Select n/a if it is the policy of the water utility to meter all customer connections and it has been confirmed by detailed auditing that all customers do indeed have a water meter; i.e. no unmetered accounts exist	Water utility policy does not require customer metering; flat or fixed fee billed. No data collected on customer consumption. Only estimates available are derived from data estimation methods using average fixture count multiplied by number of connections, or similar approach.	Water utility policy does not require customer metering; flat or fixed fee billed. Some metered accounts exist in parts of the system (pilot areas or District Metered Areas) with consumption recorded on portable dataloggers. Data from these sample meters are used to infer consumption for the total customer population. Site specific estimation methods are used for unusual buildings/water uses.	Conditions between 2 and 4	Water utility policy does require metering and volume based billing but lacks written procedures and employs casual oversight, resulting in up to 20% of billed accounts believed to be unmetered. A rough estimate of the annual consumption for all unmetered accounts is included in the annual water audit, with no inspection of individual unmetered accounts.	Conditions between 4 and 6	Water utility policy does require metering and volume based billing but exemption exist for a portion of accounts such as municipal buildings. As many as 15% of billed accounts are unmetered due to this exemption or meter installation difficulties. Only a group estimate of annual consumption for all unmetered accounts is included in the annual water audit, with no inspection of individual unmetered accounts.	Conditions between 6 and 8	Water utility policy requires metering and volume based billing for all customer accounts. However, less than 5% of billed accounts remain unmetered because because installation is hindered by unusual circumstances. The goal is to minimize the number of unmetered accounts. Reliable estimates of consumption are obtained for unmetered accounts via site specific estimation methods.	Conditions between 8 and 10	Water utility policy requires metering and volume based billing for all customer accounts. Less than 2% of billed accounts are unmetered and exist because meter installation is hindered by unusual circumstances. The goal exists to minimize the number of unmetered accounts to the extent that is economical. Reliable estimates of consumption are obtained at these accounts via site specific estimation methods.

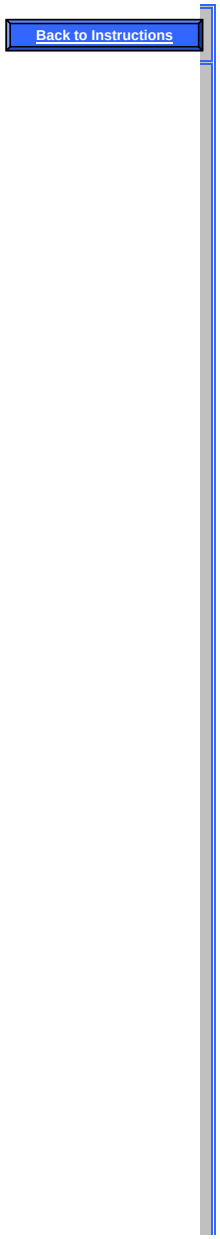
Grading										
	n/a	1	2	3	4	5	6	7	8	9	10
Improvements to attain higher data grading for "Billed Unmetered Consumption" component:		to qualify for 2: Investigate a new water utility policy to require metering of the customer population, and a reduction of unmetered accounts. Conduct pilot metering project by installing water meters in small sample of customer accounts and datalogging the water consumption.	to qualify for 4: Implement a new water utility policy requiring customer metering. Expand pilot metering study to include several different meter types, which will provide data for economic assessment of full scale metering options. Assess sites with access difficulties to devise means to obtain water consumption volumes.		to qualify for 6: Budget for staff resources to review billing records to identify unmetered properties. Specify metering needs and funding requirements to install sufficient meters to significant reduce the number of unmetered accounts		to qualify for 8: Install customer meters on a full scale basis. Refine metering policy and procedures to ensure that all accounts, including municipal properties, are designated for meters. Implement procedures to obtain reliable consumption estimate for unmetered accounts awaiting meter installation.		to qualify for 10: Continue customer meter installation throughout the service area, with a goal to minimize unmetered accounts. Sustain the effort to investigate accounts with access difficulties to devise means to install water meters or otherwise measure water consumption.		to maintain 10: Continue to refine estimation methods for unmetered consumption and explore means to establish metering, for as many billed unmetered accounts as is economically feasible.
Unbilled metered:	select n/a if all billing-exempt consumption is unmetered.	Billing practices exempt certain accounts, such as municipal buildings, but written policies do not exist; and a reliable count of unbilled metered accounts is unavailable. Meter upkeep and meter reading on these accounts is rare and not considered a priority. Due to poor recordkeeping and lack of auditing, water consumption for all such accounts is purely guesstimated.	Billing practices exempt certain accounts, such as municipal buildings, but only scattered, dated written directives exist to justify this practice. A reliable count of unbilled metered accounts is unavailable. Sporadic meter replacement and meter reading occurs on an as-needed basis. The total annual water consumption for all unbilled, metered accounts is estimated based upon approximating the number of accounts and assigning consumption from actively billed accounts of same meter size.	Conditions between 2 and 4	Dated written procedures permit billing exemption for specific accounts, such as municipal properties, but are unclear regarding certain other types of accounts. Meter reading is given low priority and is sporadic. Consumption is quantified from meter readings where available. The total number of unbilled, unmetered accounts must be estimated along with consumption volumes.	Conditions between 4 and 6	Written policies regarding billing exemptions exist but adherence in practice is questionable. Metering and meter reading for municipal buildings is reliable but sporadic for other unbilled metered accounts. Periodic auditing of such accounts is conducted. Water consumption is quantified directly from meter readings where available, but the majority of the consumption is estimated.	Conditions between 6 and 8	Written policy identifies the types of accounts granted a billing exemption. Customer meter management and meter reading are considered secondary priorities, but meter reading is conducted at least annually to obtain consumption volumes for the annual water audit. High level auditing of billing records ensures that a reliable census of such accounts exists.	Conditions between 8 and 10	Clearly written policy identifies the types of accounts given a billing exemption, with emphasis on keeping such accounts to a minimum. Customer meter management and meter reading for these accounts is given proper priority and is reliably conducted. Regular auditing confirms this. Total water consumption for these accounts is taken from reliable readings from accurate meters.
Improvements to attain higher data grading for "Unbilled metered Consumption" component:		to qualify for 2: Reassess the water utility's policy allowing certain accounts to be granted a billing exemption. Draft an outline of a new written policy for billing exemptions, with clear justification as to why any accounts should be exempt from billing, and with the intention to keep the number of such accounts to a minimum.	to qualify for 4: Review historic written directives and policy documents allowing certain accounts to be billing-exempt. Draft an outline of a written policy for billing exemptions, identify criteria that grants an exemption, with a goal of keeping this number of accounts to a minimum.		to qualify for 6: Draft a new written policy regarding billing exemptions based upon consensus criteria allowing this occurrence. Assign resources to audit meter records and billing records to obtain census of unbilled metered accounts.		to qualify for 8: Communicate billing exemption policy throughout the organization and implement procedures that ensure proper account management. Conduct inspections of accounts confirmed in unbilled metered status and verify that accurate meters exist and are scheduled for routine meter readings.		to qualify for 10: Ensure that meter management (meter accuracy testing, meter replacement) and meter reading activities are accorded the same priority as billed accounts. Establish ongoing annual auditing process to ensure that water consumption is reliably collected and provided to the annual water audit process.		to maintain 10: Reassess philosophy in allowing any water uses to go "unbilled". It is possible to meter and bill all accounts, even if the fee charged for water consumption is discounted or waived. Metering and billing all accounts ensures that water consumption is tracked and water waste from plumbing leaks is detected and minimized.
Unbilled unmetered:		Extent of unbilled, unmetered consumption is unknown due to unclear policies and poor recordkeeping. Total consumption is quantified based upon a purely subjective estimate.	Clear extent of unbilled, unmetered consumption is unknown, but a number of events are randomly documented each year, confirming existence of such consumption, but without sufficient documentation to quantify an accurate estimate of the annual volume consumed.	Conditions between 2 and 4	Extent of unbilled, unmetered consumption is partially known, and procedures exist to document certain events such as miscellaneous fire hydrant uses. Formulae is used to quantify the consumption from such events (time running x typical flowrate x number of events).	Default value of 1.25% of system input volume is employed	Coherent policies exist for some forms of unbilled, unmetered consumption but others await closer evaluation. Reasonable recordkeeping for the managed uses exists and allows for annual volumes to be quantified by inference, but unsupervised uses are guesstimated.	Conditions between 6 and 8	Clear policies and good recordkeeping exist for some uses (ex: unmetered fire connections registering consumption), but other uses (ex: miscellaneous uses of fire hydrants) have limited oversight. Total consumption is a mix of well quantified use such as from formulae (time x typical flow) or temporary meters, and relatively subjective estimates of less regulated use.	Conditions between 8 and 10	Clear policies exist to identify permitted use of water in unbilled, unmetered fashion, with the intention of minimizing this type of consumption. Good records document each occurrence and consumption is quantified via formulae (time x typical flow) or use of temporary meters.

Grading											
	n/a	1	2	3	4	5	6	7	8	9	10
Improvements to attain higher data grading for "Unbilled Unmetered Consumption" component:		to qualify for 5: Utilize accepted default value of 1.25% of system input volume as an expedient means to gain a reasonable quantification of this use. to qualify for 2: Establish a policy regarding what water uses should be allowed as unbilled and unmetered. Consider tracking a small sample of one such use (ex: fire hydrant flushings).	to qualify for 5: Utilize accepted default value of 1.25% of system input volume as an expedient means to gain a reasonable quantification of this use. to qualify for 4: Evaluate the documentation of events that have been observed. Meet with user groups (ex: for fire hydrants - fire departments, contractors to ascertain their need for water from fire hydrants).		to qualify for 5: Utilize accepted default value of 1.25% of system input volume as expedient means to gain a reasonable quantification of all such use. This is particularly appropriate for water utilities who are in the early stages of the water auditing process.	to qualify for 6 or greater: Finalize policy and do field checks. Proceed if top-down audit exists and/or a great volume of such use is suspected.	to qualify for 8: Assess water utility policy and procedures to ensure that fire hydrant permits are issued for use by persons outside of the utility. Create written procedures for use and documentation of fire hydrants by water utility personnel.		to qualify for 10: Refine written procedures to ensure that all uses of unbilled, unmetered water are overseen by a structured permitting process managed by water utility personnel. Reassess policy to determine if some of these uses have value in being converted to billed and/or metered status.		to maintain 10: Continue to refine policy and procedures with intention of reducing the number of allowable uses of water in unbilled and unmetered fashion. Any uses that can feasibly become billed and metered should be converted eventually.
APPARENT LOSSES											
Unauthorized consumption:		Extent of unauthorized consumption is unknown due to unclear policies and poor recordkeeping. Total unauthorized consumption is guesstimated.	Unauthorized consumption is a known occurrence, but its extent is a mystery. There are no requirements to document observed events, but periodic field reports capture some of these occurrences. Total unauthorized consumption is approximated from this limited data.	conditions between 2 and 4	Procedures exist to document some unauthorized consumption such as observed unauthorized fire hydrant openings. Use formulae to quantify this consumption (time running x typical flowrate x number of events).	Default value of 0.25% of system input volume is employed	Coherent policies exist for some forms of unauthorized consumption but others await closer evaluation. Reasonable surveillance and recordkeeping exist for occurrences that fall under the policy. Volumes quantified by inference from these records. Unsupervised uses are guesstimated.	Conditions between 6 and 8	Clear policies and good recordkeeping exist for certain events (ex: tampering with water meters); other occurrences have limited oversight. Total consumption is a combination of volumes from formulae (time x typical flow) and subjective estimates of unconfirmed consumption.	Conditions between 8 and 10	Clear policies exist to identify all known unauthorized uses of water. Staff and procedures exist to provide enforcement of policies and detect violations. Each occurrence is quantified via formulae (time x typical flow) or similar methods.
Improvements to attain higher data grading for "Unauthorized Consumption" component:		to qualify for 5: Use accepted default of 0.25% of system input volume. to qualify for 2: Review utility policy regarding what water uses are considered unauthorized, and consider tracking a small sample of one such occurrence (ex: unauthorized fire hydrant openings)	to qualify for 5: Use accepted default of 0.25% of system input volume to qualify for 4: Review utility policy regarding what water uses are considered unauthorized, and consider tracking a small sample of one such occurrence (ex: unauthorized fire hydrant openings)		to qualify for 5: Utilize accepted default value of 0.25% of system input volume as expedient means to gain a reasonable quantification of all such use. This is particularly appropriate for water utilities who are in the early stages of the water auditing process.	to qualify for 6 or greater: Finalize policy and do field checks. Proceed if top-down audit exists and/or a great volume of such use is suspected.	to quality for 8: Assess water utility policies to ensure that all known occurrences of unauthorized consumption are outlawed, and that appropriate penalties are prescribed. Create written procedures for use and documentation of various occurrences of unauthorized consumption as they are uncovered.		to qualify for 10: Refine written procedures and assign staff to seek out likely occurrences of unauthorized consumption. Explore new locking devices, monitors and other technologies designed to detect and thwart unauthorized consumption.		to maintain 10: Continue to refine policy and procedures to eliminate any loopholes that allow or tacitly encourage unauthorized consumption. Continue to be vigilant in documentation and enforcement efforts.
Customer metering inaccuracies:	select n/a only if the entire customer population is unmetered. In such a case the volume entered must be zero.	Customer meters exist, but with unorganized paper records on meters; no meter accuracy testing or meter replacement program. Workflow is driven chaotically by customer complaints with no proactive management. Loss volume due to aggregate meter inaccuracy is guesstimated.	Poor recordkeeping and meter oversight is recognized by water utility management who has allotted staff and funding resources to organize improved recordkeeping and start meter accuracy testing. Existing paper records gathered and organized to provide cursory disposition of meter population.	Conditions between 2 and 4	Reliable recordkeeping exists; meter information is improving as meters are replaced. Meter accuracy testing is conducted annually for a small number of meters. Limited number of oldest meters replaced each year. Inaccuracy volume is largely an estimate, but refined based upon limited testing data.	Conditions between 4 and 6	A reliable electronic recordkeeping system for meters exists. Population includes a mix of new high performing meters and dated meters with suspect accuracy. Routine, but limited, meter accuracy testing and meter replacement occur. Inaccuracy volume is quantified using a mix of reliable and less certain data.	Conditions between 6 and 8	Ongoing meter replacement and accuracy testing result in highly accurate customer meter population. Testing is conducted on samples of meters at varying lifespans to determine optimum replacement time for various types of meters.	Conditions between 8 and 10	Good records of number, type and size of customer meters; ongoing meter replacement occurs. Regular meter accuracy testing gives reliable measure of composite inaccuracy volume for the system. New metering technology is embraced to keep overall accuracy improving.
Improvements to attain higher data grading for "Customer meter inaccuracy volume" component:	If n/a is selected because the customer meter population is unmetered, consider establishing a new policy to meter the customer population and employ water rates based upon metered volumes.	to qualify for 2: Gather available meter purchase records. Conduct testing on a small number of meters believed to be the most inaccurate. Review staffing needs of metering group and budget for necessary resources to better organize meter management.	to qualify for 4: Implement a reliable record keeping system for customer meter histories, preferably using electronic methods typically linked to, or part of, the Customer Billing System or Customer Information System. Expand meter accuracy testing to a larger group of meters.		to qualify for 6: Standardize procedures for meter recordkeeping with the electronic information system. Accelerate meter accuracy testing and meter replacements guided by testing results.		to qualify for 8: Expand annual meter accuracy testing to evaluate a statistically significant number of meter makes/models. Expand meter replacement program to replace statistically significant number of poor performing meters each year.		to qualify for 10: Continue efforts to manage meter population with reliable recordkeeping, meter testing and replacement. Evaluate new meter types and install one or more types in 5-10 customer accounts each year in order to pilot improving metering technology.		to maintain 10: Increase the number of meters tested and replaced as justified by meter accuracy test data. Continually monitor development of new technology in Advanced Metering Infrastructure (AMI) to grasp opportunities for greater accuracy in metering and customer consumption data.

Grading											
	n/a	1	2	3	4	5	6	7	8	9	10
Systematic Data Handling Error:	Note: all water utilities incur some amount of this error. Even in water utilities with unmetered customer populations and fixed rate billing, errors occur in annual billing tabulations. Enter a positive value for the volume and select a grading.	Vague policy for permitting (creating new customer accounts) and billing. Billing data maintained on paper records which are in disarray. No audits conducted to confirm billing data handling efficiency. Unknown number of customers escape routine billing due to lack of billing process oversight.	Policy for permitting and billing exists but needs refinement. Billing data maintained on paper records or insufficiently capable electronic database. Only periodic unstructured auditing work conducted to confirm billing data handling efficiency. Volume of unbilled water due to billing lapses is a guess.	Conditions between 2 and 4	Policy and procedures for permitting and billing exist but needs refinement. Computerized billing system exists, but is dated or lacks needed functionality. Periodic, limited internal audits conducted and confirm with approximate accuracy the consumption volumes lost to billing lapses.	Conditions between 4 and 6	Policy for permitting and billing is adequate and reviewed periodically. Computerized billing system in use with basic reporting available. Any effect of billing adjustments on measured consumption volumes is well understood. Internal checks of billing data error conducted annually. Reasonably accurate quantification of consumption volume lost to billing lapses is obtained.	Conditions between 6 and 8	Permitting and billing policy reviewed at least biannually. Computerized billing system includes an array of reports to confirm billing data and system functionality. Annual internal checks conducted with periodic third party audit. Accountability checks flag billing lapses. Consumption lost to billing lapses is well quantified and reducing year-by-year.	Conditions between 8 and 10	Sound policy exists for permitting of all customer billing accounts. Robust computerized billing system gives high functionality and reporting capabilities. Assessment of policy and data handling errors conducted internally and audited by third party annually, ensuring consumption lost to billing lapses is minimized and detected as it occurs.
Improvements to attain higher data grading for "Systematic Data Handling Error volume" component:		to qualify for 2: Draft written policy for permitting and billing. Investigate and budget for computerized customer billing system. Conduct initial audit of billing records by flow-charting the basic business processes of the customer account/billing function.	to qualify for 4: Finalize written policy for permitting and billing. Implement a computerized customer billing system. Conduct initial audit of billing records as part of this process.		to qualify for 6: Refine permitting and billing procedures and ensure consistency with the utility policy regarding billing, and minimize opportunity for missed billings. Upgrade or replace customer billing system for needed functionality - ensure that billing adjustments don't corrupt the value of consumption volumes. Procedurize internal annual audit process.		to qualify for 8: Formalize regular review of permitting and billing practices. Enhance reporting capability of computerized billing system. Formalize regular auditing process to reveal scope of data handling error.		to qualify for 10: Close policy/procedure loopholes that allow some customer accounts to go unbilled, or data handling errors to exist. Ensure that internal and third party audits are conducted annually.		to maintain 10: Stay abreast of customer information management developments and innovations. Monitor developments of Advanced Metering Infrastructure (AMI) and integrate technology to ensure that customer endpoint information is well-monitored and errors/lapses are at an economic minimum.
SYSTEM DATA											
Length of mains:		Poorly assembled and maintained paper as-built records of existing water main installations makes accurate determination of system pipe length impossible. Length of mains is guesstimated.	Paper records in poor condition (no annual tracking of installations & abandonments). Poor procedures to ensure that new water mains installed by developers are accurately documented.	Conditions between 2 and 4	Sound policy and procedures for permitting and documenting new water main installations, but gaps in management result in a uncertain degree of error in tabulation of mains length.	Conditions between 4 and 6	Sound policy and procedures exist for permitting and commissioning new water mains. Highly accurate paper records with regular field validation; or electronic records and asset management system in good condition. Includes system backup.	Conditions between 6 and 8	Sound policy and procedures exist for permitting and commissioning new water mains. Electronic recordkeeping and asset management system are used to store and manage data.	Conditions between 8 and 10	Sound policy exists for managing water mains extensions and replacements. Geographic Information System (GIS) data and asset management database agree and random field validation proves truth of databases.
Improvements to attain higher data grading for "Length of Water Mains" component:		to qualify for 2: Assign personnel to inventory current as-built records and compare with customer billing system records and highway plans. Assemble policy documents regarding permitting and documentation of water main installations by the utility and building developers; identify gaps in procedure that result in poor documentation.	to qualify for 4: Complete inventory of paper records of water main installations & abandonments for a number of years prior to audit year. Review policy and procedures for commissioning and documenting new water main installation and abandonments.		to qualify for 6: Finalize updates/improvements to policy and procedures for permitting/commissioning new main installations. Confirm inventory of records for five years prior to audit year; correct any errors or omissions.		to qualify for 8: Launch random field checks of limited number of locations. Convert to electronic databases with backup as justified.		to qualify for 10: Link Geographic Information System (GIS) and asset management databases, conduct field verification of data.		to maintain 10: Continue with standardization and random field validation to improve knowledge of system.
Number of active AND inactive service connections:		Vague permitting (of new service connections) policy and poor paper recordkeeping of customer connections/billings result in suspect determination of the number of service connections, which may be 10-15% in error from actual count.	General permitting policy exists but paper records, procedural gaps, and weak oversight result in questionable total for number of connections, which may vary 5-10% of actual count.	Conditions between 2 and 4	Permitting policy and procedures exist, but with some gaps in performance and oversight. Computerized information management system is being brought online to replace dated paper recordkeeping system. Reasonably accurate tracking of service connection installations & abandonments; but count can be up to 5% in error from actual total.	Conditions between 4 and 6	Permitting policy and procedures are adequate and reviewed periodically. Computerized information management system is in use with annual installations & abandonments totaled. Very limited field verifications and audits. Error in count of number of service connections is believed to be no more that 3%.	Conditions between 6 and 8	Permitting policy and procedures reviewed at least biannually. Well-managed computerized information management system and routine, periodic field checks and internal system audits allows counts of connections that is no more than 2% in error.	Conditions between 8 and 10	Sound permitting policy and well managed and audited procedures ensure reliable management of service connection population. Computerized information management system and Geographic Information System (GIS) information agree; field validation proves truth of databases. Count of connections believed to be in error by less than 1%.
Improvements to attain higher data grading for "Number of Active and Inactive customer service connections" component:		to qualify for 2: Draft new policy and procedures for permitting and billing. Research and collect paper records of installations & abandonments for several years prior to audit year.	to qualify for 4: Refine policy and procedures for permitting and billing. Research computerized recordkeeping system (Customer Information System or Customer Billing System) to improve documentation format for service connections.		to qualify for 6: Refine procedures to ensure consistency with permitting policy to establish new service connections or decommission existing connections. Improve process to include all totals for at least five years prior to audit year.		to qualify for 8: Formalize regular review of permitting policy and procedures. Launch random field checks of limited number of locations. Develop reports and auditing mechanisms for computerized information management system.		to qualify for 10: Close any procedural loopholes that allow installations to go undocumented. Link computerized information management system with Geographic Information System (GIS) and formalize field inspection and information system auditing processes. Documentation of new or decommissioned service connections encounters several levels of checks and balances.		to maintain 10: Continue with standardization and random field validation to improve knowledge of system.

Grading											
	n/a	1	2	3	4	5	6	7	8	9	10
Average length of customer service line:	Note: if customer water meters are located outside of the customer building next to the curbstop or boundary separating utility/customer responsibility, follow the grading description for 10(a). Also see the Service Connection Diagram worksheet.	Gradings 1-9 apply if customer properties are **unmetered**, if customer meters exist and are located **inside the customer building premises, or if the water utility owns and is responsible for the entire service connection piping from the water main to the customer building**. In any of these cases the average distance between the curbstop or boundary separating utility/customer responsibility for service connection piping, and the typical first point of use (ex: faucet) or the customer meter must be quantified. Gradings of 1-9 are used to grade the validity of the means to quantify this value. (See the "Service Connection Diagram" worksheet)									Either of two conditions can be met to obtain a grading of 10: a) The customer water meter is located outside of the customer building adjacent to the curbstop or boundary separating utility/customer responsibility for the service connection piping. In this case enter a value of zero in the Reporting Worksheet with a grading of 10. b). Customer water meters are located inside customer buildings, or the properties are unmetered. In either case the distance is highly reliable since data is drawn from a Geographic Information System (GIS) and confirmed by routine field checks.
		Vague policy exists to define the delineation of water utility ownership and customer ownership of the service connection piping. Curbstops are perceived as the breakpoint but these have not been well-maintained or documented. Most are buried or obscured. Their location varies widely from site-to-site, and estimating this distance is arbitrary due to the unknown location of many curbstops.	Policy requires that the curbstop serves as the delineation point between water utility ownership and customer ownership of the service connection piping. The piping from the water main to the curbstop is the property of the water utility; and the piping from the curbstop to the customer building is owned by the customer. Curbstop locations are not well documented and the average distance is based upon a limited number of locations measured in the field.	Conditions between 2 and 4	Good policy requires that the curbstop serves as the delineation point between water utility ownership and customer ownership of the service connection piping. Curbstops are generally installed as needed and are reasonably documented. Their location varies widely from site-to-site, and an estimate of this distance is hindered by the availability of paper records.	Conditions between 4 and 6	Clear policy exists to define utility/customer responsibility for service connection piping. Accurate, well-maintained paper or basic electronic recordkeeping system exists. Periodic field checks confirm piping lengths for a sample of customer properties.	Conditions between 6 and 8	Clearly worded policy standardizes the location of curbstops and meters, which are inspected upon installation. Accurate and well maintained electronic records exist with periodic field checks to confirm locations of service lines, curbstops and customer meter pits. An accurate number of customer properties from the customer billing system allows for reliable averaging of this length.	Conditions between 8 and 10	
Improvements to attain higher data grading for "Average Length of Customer Service Line" component:		to qualify for 2: Research and collect paper records of service line installations. Inspect several sites in the field using pipe locators to locate curbstops. Obtain the length of this small sample of connections in this manner.	to qualify for 4: Formalize and communicate policy delineating utility/customer responsibilities for service connection piping. Assess accuracy of paper records by field inspection of a small sample of service connections using pipe locators as needed. Research the potential migration to a computerized information management system to store service connection data.		to qualify for 6: Establish coherent procedures to ensure that policy for curbstop, meter installation and documentation is followed. Gain consensus within the water utility for the establishment of a computerized information management system.		to qualify for 8: Implement an electronic means of recordkeeping, typically via a customer information system or customer billing system. Standardize the process to conduct field checks of limited number of locations.		to qualify for 10: Link customer information management system and Geographic Information System (GIS), standardize process for field verification of data.		to maintain 10: Continue with standardization and random field validation to improve knowledge of system.
Average operating pressure:		Available records are poorly assembled and maintained paper records of supply pump characteristics and water distribution system operating conditions. Average pressure is guesstimated based upon this information and ground elevations from crude topographical maps. Widely varying distribution system pressures due to undulating terrain, high system head loss and weak/erratic pressure controls further compromise the validity of the average pressure calculation.	Limited telemetry monitoring of scattered sites provides some static pressure data, which is recorded in handwritten logbooks. Pressure data is gathered at individual sites only when low pressure complaints arise. Average pressure is determined by averaging relatively crude data, and is affected by significant variation in ground elevations, system head loss and gaps in pressure controls in the distribution system.	Conditions between 2 and 4	Effective pressure controls separate different pressure zones; moderate pressure variation across the system, occasional open boundary valves are discovered that breech pressure zones. Basic telemetry monitoring of the distribution system logs pressure data electronically. Pressure data gathered by gauges or dataloggers at fire hydrants or buildings when low pressure complaints arise, and during fire flow tests and system flushing. Reliable topographical data exists. Average pressure is calculated using this mix of data.	Conditions between 4 and 6	Reliable pressure controls separate distinct pressure zones; only very occasional open boundary valves are encountered that breech pressure zones. Well-covered telemetry monitoring of the distribution system logs extensive pressure data electronically. Pressure gathered by gauges/dataloggers at fire hydrants and buildings when low pressure complaints arise, and during fire flow tests and system flushing. Average pressure is determined by using this mix of reliable data.	Conditions between 6 and 8	Well-managed, discrete pressure zones exist with generally predictable pressure fluctuations. A current full-scale SCADA System exists to monitor the water distribution system and collect data, including real time pressure readings at representative sites across the system. The average system pressure is determined from reliable SCADA System data.	Conditions between 8 and 10	Well-managed pressure districts/zones, SCADA System and hydraulic model exist to give very precise pressure data across the water distribution system. Average system pressure is reliably calculated from extensive, reliable, and cross-checked data.
Improvements to attain higher data grading for "Average Operating Pressure" component:		to qualify for 2: Employ pressure gauging and/or datalogging equipment to obtain pressure measurements from fire hydrants. Locate accurate topographical maps of service area in order to confirm ground elevations. Research pump data sheets to find pump pressure/flow characteristics	to qualify for 4: Formalize a procedure to use pressure gauging/datalogging equipment to gather pressure data during various system events such as low pressure complaints, or operational testing. Gather pump pressure and flow data at different flow regimes. Identify faulty pressure controls (pressure reducing valves, altitude valves, partially open boundary valves) and plan to properly configure pressure zones. Make all pressure data from these efforts available to generate system-wide average pressure.		to qualify for 6: Expand the use of pressure gauging/datalogging equipment to gather scattered pressure data at a representative set of sites, based upon pressure zones or areas. Utilize pump pressure and flow data to determine supply head entering each pressure zone or district. Correct any faulty pressure controls (pressure reducing valves, altitude valves, partially open boundary valves) to ensure properly configured pressure zones. Use expanded pressure dataset from these activities to generate system-wide average pressure.		to qualify for 8: Install a Supervisory Control and Data Acquisition (SCADA) System to monitor system parameters and control operations. Set regular calibration schedule for instrumentation to insure data accuracy. Obtain accurate topographical data and utilize pressure data gathered from field surveys to provide extensive, reliable data for pressure averaging.		to qualify for 10: Obtain average pressure data from hydraulic model of the distribution system that has been calibrated via field measurements in the water distribution system and confirmed in comparisons with SCADA System data.		to maintain 10: Continue to refine the hydraulic model of the distribution system and consider linking it with SCADA System for real-time pressure data calibration, and averaging.

Grading											
	n/a	1	2	3	4	5	6	7	8	9	10
COST DATA											
Total annual cost of operating water system:		Incomplete paper records and lack of documentation on many operating functions making calculation of water system operating costs a pure guesstimate	Reasonably maintained, but incomplete, paper or electronic accounting provides data to estimate the major portion of water system operating costs.	Conditions between 2 and 4	Electronic, industry-standard cost accounting system in place. Gaps in data known to exist, periodic internal reviews conducted but not a structured audit.	Conditions between 4 and 6	Reliable electronic, industry-standard cost accounting system in place, with all pertinent water system operating costs tracked. Data audited periodically by utility personnel, not a Certified Public Accountant (CPA).	Conditions between 6 and 8	Reliable electronic, industry-standard cost accounting system in place, with all pertinent water system operating costs tracked. Data audited at least annually by utility personnel, and periodically by third-party CPA.	Conditions between 8 and 10	Reliable electronic, industry-standard cost accounting system in place, with all pertinent water system operating costs tracked. Data audited annually by utility personnel and by third-party CPA.
Improvements to attain higher data grading for "Total Annual Cost of Operating the Water System" component:		<u>to qualify for 2</u>: Gather available records, institute new procedures to regularly collect and audit basic cost data of most important operations functions.	<u>to qualify for 4</u>: Implement an electronic cost accounting system, structured according to accounting standards for water utilities		<u>to qualify for 6</u>: Establish process for periodic internal audit of water system operating costs; identify cost data gaps and institute procedures for tracking these outstanding costs.		<u>to qualify for 8</u>: Standardize the process to conduct routine financial audit on an annual basis.		<u>to qualify for 10</u>: Standardize the process to conduct a third-party financial audit by a CPA on an annual basis.		<u>to maintain 10</u>: Maintain program, stay abreast of expenses subject to erratic cost changes and budget/track costs proactively
Customer retail unit cost (applied to Apparent Losses):		Antiquated, cumbersome water rate structure is use, with periodic historic amendments that were poorly documented and implemented; resulting in classes of customers being billed inconsistent charges. The actual composite billing rate likely differs significantly from the published water rate structure, but a lack of auditing leaves the degree of error indeterminate.	Dated, cumbersome water rate structure, not always employed consistently in actual billing operations. The actual composite billing rate is known to differ from the published water rate structure, and a reasonably accurate estimate of the degree of error is determined, allowing a composite billing rate to be quantified.	Conditions between 2 and 4	Straight-forward water rate structure in use, but not updated in several years. Billing operations reliably employ the rate structure. The composite billing rate is derived from a single customer class such as residential customer accounts, neglecting the effect of different rates from varying customer classes.	Customer population unmetered. Fixed fee charged; single composite number derived from multiple customer classes.	Clearly written, up-to-date water rate structure is in force and is applied reliably in billing operations. Composite customer rate is determined using a weighted average residential rate using volumes of water in each rate block.	Conditions between 6 and 8	Effective water rate structure is in force and is applied reliably in billing operations. Composite customer rate is determined using a weighted average composite consumption rate, including residential, commercial, industrial and any other customer classes within the water rate structure.	Conditions between 8 and 10	Third party reviewed weighted average composite consumption rate (includes residential, commercial, industrial, etc.)
Improvements to attain higher data grading for "Customer Retail Unit Cost" component:		<u>to qualify for 2</u>: Formalize the process to implement water rates, including a secure documentation procedure. Create a current, formal water rate document and gain approval from all stakeholders.	<u>to qualify for 4</u>: Review the water rate structure and update/formalize as needed. Assess billing operations to ensure that actual billing operations incorporate the established water rate structure.		<u>to qualify for 6</u>: Evaluate volume of water used in each usage block by residential users. Multiply volumes by full rate structure.	<u>Meter customers and charge rates based upon water volumes</u>	<u>to qualify for 8</u>: Evaluate volume of water used in each usage block by all classifications of users. Multiply volumes by full rate structure.		<u>to qualify for 10</u>: Conduct a periodic third-party audit of water used in each usage block by all classifications of users. Multiply volumes by full rate structure.		<u>to maintain 10</u>: Keep water rate structure current in addressing the water utility's revenue needs. Update the calculation of the customer unit rate as new rate components, customer classes, or other components are modified.
Variable production cost (applied to Real Losses):	Note: if the water utility purchases/imports its entire water supply, then enter the unit purchase cost of the bulk water supply in the Reporting Worksheet with a grading of 10	Incomplete paper records and lack of documentation on primary operating functions (electric power and treatment costs most importantly) makes calculation of variable production costs a pure guesstimate	Reasonably maintained, but incomplete, paper or electronic accounting provides data to roughly estimate the basic operations costs (pumping power costs and treatment costs) and calculate a unit variable production cost.	Conditions between 2 and 4	Electronic, industry-standard cost accounting system in place. Electric power and treatment costs are reliably tracked and allow accurate calculation of unit variable production costs based on these two inputs only. All costs are audited internally on a periodic basis.	Conditions between 4 and 6	Reliable electronic, industry-standard cost accounting system in place, with all pertinent water system operating costs tracked. Pertinent additional costs beyond power and treatment (ex: liability, residuals management, etc.) are included in the unit variable production cost. Data audited at least annually by utility personnel.	Conditions between 6 and 8	Reliable electronic, industry-standard cost accounting system in place, with all pertinent variable production costs tracked. Data audited at least annually by utility personnel, and periodically by third-party.	Conditions between 8 and 10	Either of two conditions can be met to obtain a grading of 10: 1) Third party CPA audit of all primary and secondary cost components on an annual basis. <u>or</u>: 2) Water supply is entirely purchased as bulk imported water, and unit purchase cost serves as the variable production cost.
Improvements to attain higher data grading for "Variable Production Cost" component:		<u>to qualify for 2</u>: Gather available records, institute new procedures to regularly collect and audit basic cost data and most important operations functions.	<u>to qualify for 4</u>: Implement an electronic cost accounting system, structured according to accounting standards for water utilities		<u>to qualify for 6</u>: Formalize process for regular internal audits of production costs. Assess whether additional costs (liability, residuals management, etc.) should be included to calculate a more accurate variable production cost.		<u>to qualify for 8</u>: Formalize the accounting process to include primary cost components (power, treatment) as well as secondary components (liability, residuals management, etc.) Conduct periodic third-party audits.		<u>to qualify for 10</u>: Standardize the process to conduct a third-party financial audit by a CPA on an annual basis.		<u>to maintain 10</u>: Maintain program, stay abreast of expenses subject to erratic cost changes and budget/track costs proactively


Back to Instructions

AWWA WLCC Free Water Audit Software: Customer Service Line Diagrams

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Return to Reporting Worksheet

Average Length of Customer Service Line

The three figures shown on this worksheet display the assignment of the Average Length of Customer Service Line, Lp, for the three most common piping configurations.

Figure 1 shows the configuration of the water meter outside of the customer building next to the curbstop valve. In this configuration Lp = 0 since the distance between the curbstop and the customer metering point is essentially zero.

Figure 2 shows the configuration of the customer water meter located inside the customer building, where Lp is the distance from the curbstop to the water meter.

Figure 3 shows the configuration of an unmetered customer building , where Lp is the distance from the curbstop to the first point of customer water consumption, or, more simply, the building line.

In any water system the Lp will vary notably in a community of different structures, therefore the average Lp value is used and this should be approximated or calculated if a sample of service line measurements has been gathered.

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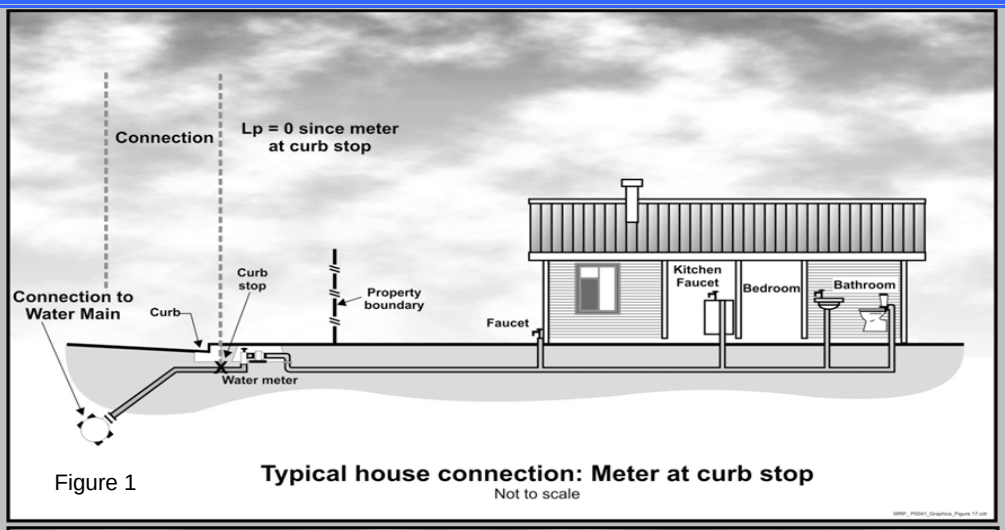

Figure 1 **Typical house connection: Meter at curb stop**
Not to scale

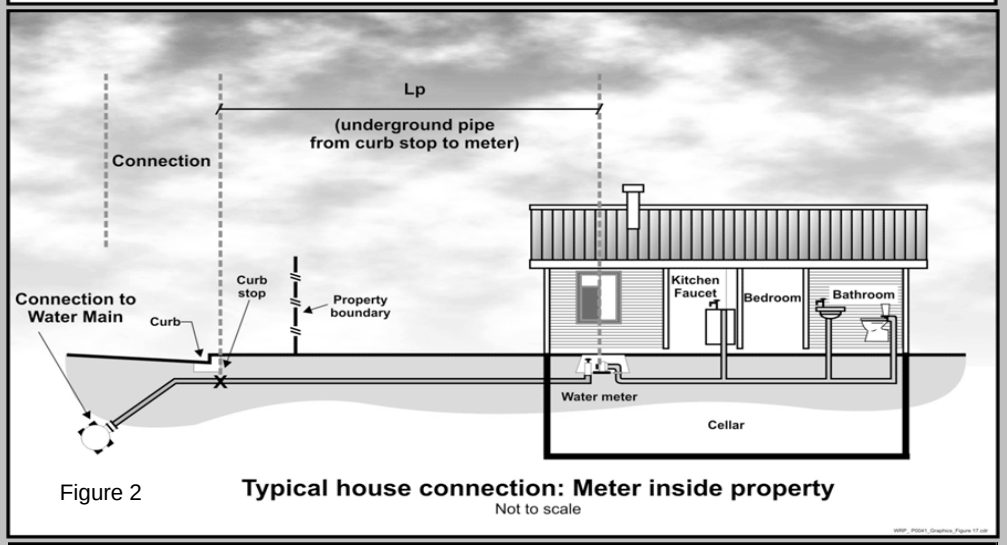

Figure 2 **Typical house connection: Meter inside property**
Not to scale

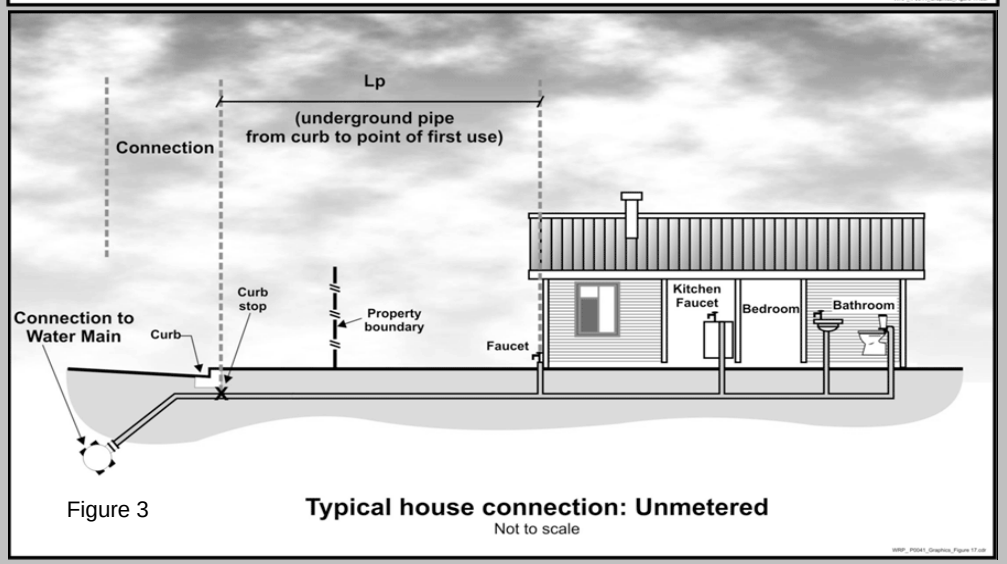

Figure 3 **Typical house connection: Unmetered**
Not to scale

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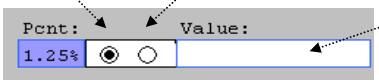
Back to Instructions

Item Name		Description
Apparent Losses	Find	= unauthorized consumption + meter under-registration + data handling errors Includes all types of inaccuracies associated with customer metering as well as data handling errors (meter reading and billing), plus unauthorized consumption (theft or illegal use). NOTE: Over-registration of customer meters, leads to under-estimation of Real Losses. Under-registration of customer meters, leads to over-estimation of Real Losses.
AUTHORIZED CONSUMPTION	Find	= billed metered + billed unmetered + unbilled metered + unbilled unmetered The volume of metered and/or unmetered water taken by registered customers, the water supplier and others who are implicitly or explicitly authorized to do so by the water supplier, for residential, commercial and industrial purposes. This does NOT include water sold to neighboring utilities (water exported). Authorized consumption may include items such as fire fighting and training, flushing of mains and sewers, street cleaning, watering of municipal gardens, public fountains, frost protection, building water, etc. These may be billed or unbilled, metered or unmetered.
Average length of customer service line	Find	This is entered for unmetered services and in cold or other areas where meters are installed inside homes and buildings. It is the length of customer service line either between the utility's service connection (often at the curbstop) and the meter, or to the building line (first point of customer consumption) if customers are unmetered. Note that the length of service connection between the main and customer service line is owned by the utility and its length and potential leakage is accounted for in the UARL formula by the number of service connections. **What role does the "Average Length of Customer Service Line" parameter serve in the Water Audit?** In many water distribution systems the water utility has maintenance responsibility for a portion of the customer service piping from its connection point at the water main to the curbstop valve located midway to the customer building. The customer is responsible to maintain the customer service piping from the curbstop to the building premises. When leaks arise on customer service piping, water utilities respond faster to repair leaks than customers when the leak is on piping under their responsibility. Leak durations are longer on the customer-maintained piping than the utility-maintained piping. The total length of pipe maintained by customers is one of the components of the Unavoidable Annual Real Loss (UARL) equation and is determined by multiplying the average length of customer maintained pipe, Lp by the number of customer service connections. Therefore this parameter is important to the calculation of the UARL and the Infrastructure leakage Index (ILI). Click to see Service Connection Diagram
Average operating pressure	Find	The average pressure may be approximated when compiling the preliminary water audit. Once routine water auditing has been established, a more accurate assessment of average pressure should be pursued. If the water utility infrastructure is recorded in a Geographical Information System (GIS) the average pressure at many locations in the distribution system can be readily obtained. If a GIS does not exist, a weighted average of pressure data can be calculated from water pressure measured at various fire hydrants scattered across the water distribution system.
Billed Authorized Consumption		All consumption that is billed and authorized by the utility. This may include both metered and unmetered consumption. See "Authorized Consumption" for more information.
Billed metered consumption	Find	All metered consumption which is billed. This includes all groups of customers such as domestic, commercial, industrial or institutional. It does NOT include water sold to neighboring utilities (water exported) which is metered and billed. The metered consumption data can be taken directly from billing records for the water audit period. The accuracy of yearly metered consumption data can be refined by including an adjustment to account for customer meter reading lagtime, however additional analysis is necessary to determine the adjustment value, which may or may not be significant.
Billed unmetered consumption	Find	All billed consumption which is calculated based on estimates or norms but is not metered. This might be a very small component in fully metered systems (for example billing based on estimates for the period a customer meter is out of order) but can be the key consumption component in systems without universal metering. It does NOT include water sold to neighboring utilities (water exported) which is unmetered but billed.
Connection density		=number of connections / length of mains

Item Name		Description
Customer metering inaccuracies	Find	Apparent water losses caused by the collective under-registration of customer water meters. Many customer water meters will wear as large cumulative volumes of water are passed through them over time. This causes the meters to under-register. The auditor has two options for entering data for this component of the audit. The auditor can enter a percentage under-registration (typically an estimated value), this will apply the selected percentage to the two categories of metered consumption to determine the volume of water not recorded due to customer meter inaccuracy. Alternatively, if the auditor has substantial data from meter testing to arrive at their own volumes of such losses, this volume may be entered directly. Note that a value of zero will be accepted but an alert will appear asking if the customer population is unmetered. Since all metered systems have some degree of inaccuracy, then a positive value should be entered. A value of zero in this component is valid only if the water utility does not meter its customer population.
Customer retail unit cost	Find	The Customer Retail Unit Cost represents the charge that customers pay for water service. This unit cost is applied to the components of apparent loss, since these losses represent water reaching customers but not (fully) paid for. It is important to compile these costs per the same unit cost basis as the volume measure included in the water audit. For example, if all water volumes are measured in million gallons, then the unit cost should be dollars per million gallon ($/mil gal). The software allows the user to select the units that are charged to customers (either $/1,000 gallons, $/hundred cubic feet or $/1,000 litres) and automatically converts these units to the units that appear in the "WATER SUPPLIED" box. Since most water utilities have a rate structure that includes a variety of different costs based upon class of customer, a weighted average of individual costs and number of customer accounts in each class can be calculated to determine a single composite cost that should be entered into this cell. Finally, the weighted average cost should also include additional charges for sewer, stormwater or bio charges are based upon the volume of potable water consumed.
Infrastructure Leakage Index (ILI)	Find	The ratio of the Current Annual Real Losses (Real Losses) to the Unavoidable Annual Real Losses (UARL). The ILI is a highly effective performance indicator for comparing (benchmarking) the performance of utilities in operational management of real losses.
Length of mains	Find	Length of all pipelines (except service connections) in the system starting from the point of system input metering (for example at the outlet of the treatment plant). It is also recommended to include in this measure the total length of fire hydrant lead pipe. Hydrant lead pipe is the pipe branching from the water main to the fire hydrant. Fire hydrant leads are typically of a sufficiently large size that is more representative of a pipeline than a service connection. The average length of hydrant leads across the entire system can be assumed if not known, and multiplied by the number of fire hydrants in the system, which can also be assumed if not known. This value can then be added to the total pipeline length. Total length of mains can therefore be calculated as: Length of Mains, miles = (total pipeline length, miles) + [{(average fire hydrant lead length, ft) x (number of fire hydrants)} / 5,280 ft/mile] or Length of Mains, kilometres = (total pipeline length, kilometres) + [{(average fire hydrant lead length, metres) x (number of fire hydrants)} / 1,000 metres/kilometre]
Master meter error adjustment	Find	An estimate or measure of the degree of any inaccuracy that exists in the master meters measuring the Volume from own sources. Please also indicate if this adjustment is because the master meters under-registered (did not capture all the flow) or over-registered (overstated the actual flow). All systems encounter some degree of error in their Master Meter data. Please enter a positive value.
NON-REVENUE WATER	Find	= Apparent Losses + Real Losses + Unbilled Metered + Unbilled Unmetered Water which does not provide any revenue to the utility
Number of active AND inactive service connections	Find	Number of service connections, main to curb stop. Please note that this includes the actual number of distinct piping connections including fire connections whether active or inactive. This may differ substantially from the number of Customers (or number of accounts)
Real Losses	Find	Physical water losses from the pressurized system and the utility's storage tanks, up to the point of customer consumption. In metered systems this is the customer meter, in unmetered situations this is the first point of consumption (stop tap/tap) within the property. The annual volume lost through all types of leaks, breaks and overflows depends on frequencies, flow rates, and average duration of individual leaks, breaks and overflows.
Revenue Water		Water which is charged to customers to provide revenue to the utility.
Systematic data handling errors	Find	Apparent water losses caused by systematic data handling errors in the meter reading and billing system.
Total annual cost of operating the water system	Find	These costs include those for operations, maintenance and any annually incurred costs for long-term upkeep of the system, such as repayment of capital bonds for infrastructure expansion or improvement. Typical costs include employee salaries and benefits, materials, equipment, insurance, fees, administrative costs and all other costs that exist to sustain the drinking water supply. These costs should not include any costs to operate wastewater, biosolids or other systems outside of drinking water.

Item Name		Description
Unauthorized consumption	Find	Includes water illegally withdrawn from hydrants, illegal connections, bypasses to consumption meter or meter reading equipment tampering. While this component has a direct impact on revenue, in most water utilities the volume is low and it is recommended that the auditor apply a default value of 0.25% of the volume from own sources. If the auditor has well validated data that indicates the volume from unauthorized consumption is substantially higher or lower than that generated by the default value then this value can be entered. However, for most water utilities it is recommended to apply the default value. Note that a value of zero will not be accepted since all water utilities have some volume of unauthorized consumption occurring in their system.
Unavoidable Annual Real Losses (UARL)	Find	UARL (gallons/day)=(5.41Lm + 0.15Nc + 7.5Lc) xP, or UARL (litres/day)=(18.0Lm + 0.8Nc + 25.0Lc) xP where: Lm = length of mains (miles or kilometres) Nc = number of service connections Lc = total length of customer service lines (miles or km) = Nc multiplied by the average distance of customer service line, Lp (miles or km) P = Pressure (psi or metres) Click to see Service Connection Diagram The UARL is a theoretical reference value representing the technical low limit of leakage that could be achieved if all of today's best technology could be successfully applied. It is a key variable in the calculation of the Infrastructure Leakage Index (ILI). It is not necessary that water utilities set this level as the target level of leakage, unless water is unusually expensive, scarce or both. NOTE: The UARL calculation has not yet been fully proven as effective for very small, or low pressure water distribution systems. If, in gallons per day: (Lm x 32) + Nc < 3000 or P <35psi in litres per day: (Lm x 20) + Nc < 3000 or P < 25m then the calculated UARL value may not be valid. The software does not display a value of UARL or ILI if either of these conditions is true.
Unbilled Authorized Consumption		All consumption that is unbilled, but still authorized by the utility. See "Authorized Consumption" for more information.
Unbilled metered consumption	Find	Metered Consumption which is for any reason unbilled. This might for example include metered consumption of the utility itself or water provided to institutions free of charge. It does NOT include water sold to neighboring utilities (water exported) which is metered but unbilled.
Unbilled unmetered consumption	Find	Any kind of Authorized Consumption which is neither billed nor metered. This component typically includes items such as fire fighting, flushing of mains and sewers, street cleaning, frost protection, etc. In most water utilities it is a small component which is very often substantially overestimated. It does NOT include water sold to neighboring utilities (water exported) which is unmetered and unbilled – an unlikely case. This component has many sub-components of water use which are often tedious to identify and quantify. Because of this, and the fact that it is usually a small portion of the water supplied, it is recommended that the auditor apply the default value of 1.25% of the volume from own sources. Select the default percentage to enter this value. If the water utility already has well validated data that gives a value substantially higher or lower than the default volume, then the auditor should enter their own volume. However the default approach is recommended for most water utilities. Note that a value of zero is not permitted, since all water utilities have some volume of water in this component occurring in their system.
Units and Conversions	Find	The user may develop an audit based on one of three unit selections: 1) Million Gallons (US) 2) Megalitres (Thousand Cubic Metres) 3) Acre-feet Once this selection has been made in the instructions sheet, all calculations are made on the basis of the chosen units. Should the user wish to make additional conversions, a unit converter is provided below (use drop down menus to select units from the yellow unit boxes): Enter Units: Convert From… **Converts to…..** **1** **Million Gallons (US)** = **3.068883** **Acre-feet** (conversion factor = 3.06888328973723)

Item Name		Description
Use of Option Buttons	Find	To use the percent value choose this button To enter a value choose this button and enter the value in the cell to the right  **NOTE:** For unbilled unmetered consumption and unauthorized consumption, a recommended default value can be applied by selecting the Percent option. The default values are based on fixed percentages of water supplied and are recommended for use in this audit unless the auditor has well validated data for their system. Default values are shown by purple cells, as shown in the example above. If a default value is selected, the user does not need to grade the item; a grading value of 3 is automatically applied (however, this grade will not be displayed).
Variable production cost (applied to Real Losses)	Find	The cost to produce and supply the next unit of water. (E.g., $/million gallons) This cost is determined by calculating the summed unit costs for ground and surface water treatment and all power used for pumping from the source to the customer. It should also include the unit cost of bulk water purchased as an import if applicable.
Volume from own sources	Find	The volume of treated water input to system from own production facilities
Water exported	Find	Bulk water sold and conveyed out of the water distribution system. Typically this is water sold to a neighboring water utility. Be sure to account for any export meter inaccuracy in reporting this volume
Water imported	Find	Bulk water purchased to become part of the water supplied. Typically this is water purchased from a neighboring water utility or regional water authority. Be sure to account for any import meter inaccuracy in reporting this volume
WATER LOSSES	Find	= apparent losses + real losses The difference between System Input and Authorized Consumption. Water losses can be considered as a total volume for the whole system, or for partial systems such as transmission or distribution systems, or individual zones. Water Losses consist of Real Losses and Apparent Losses.

AWWA WLCC Free Water Audit Software: Determining Water Loss Standing

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Back to Instructions

Water Loss Control Planning Guide

	Water Audit Data Validity Level / Score				
Functional Focus Area	**Level I** (0-25)	**Level II** (26-50)	**Level III** (51-70)	**Level IV** (71-90)	**Level V** (91-100)
Audit Data Collection	Launch auditing and loss control team; address production metering deficiencies	Analyze business process for customer metering and billing functions and water supply operations. Identify data gaps.	Establish/revise policies and procedures for data collection	Refine data collection practices and establish as routine business process	Annual water audit is a reliable gauge of year-to-year water efficiency standing
Short-term loss control	Research information on leak detection programs. Begin flowcharting analysis of customer billing system	Conduct loss assessment investigations on a sample portion of the system: customer meter testing, leak survey, unauthorized consumption, etc.	Establish ongoing mechanisms for customer meter accuracy testing, active leakage control and infrastructure monitoring	Refine, enhance or expand ongoing programs based upon economic justification	Stay abreast of improvements in metering, meter reading, billing, leakage management and infrastructure rehabilitation
Long-term loss control		Begin to assess long-term needs requiring large expenditure: customer meter replacement, water main replacement program, new customer billing system or Automatic Meter Reading (AMR) system.	Begin to assemble economic business case for long-term needs based upon improved data becoming available through the water audit process.	Conduct detailed planning, budgeting and launch of comprehensive improvements for metering, billing or infrastructure management	Continue incremental improvements in short-term and long-term loss control interventions
Target-setting			Establish long-term apparent and real loss reduction goals (+10 year horizon)	Establish mid-range (5 year horizon) apparent and real loss reduction goals	Evaluate and refine loss control goals on a yearly basis
Benchmarking			Preliminary Comparisons - can begin to rely upon the Infrastructure Leakage Index (ILI) for performance comparisons for real losses (see below table)	Performance Benchmarking - ILI is meaningful in comparing real loss standing	Identify Best Practices/ Best in class - the ILI is very reliable as a real loss performance indicator for best in class service

For validity scores of 50 or below, the shaded blocks should not be focus areas until better data validity is achieved.

Once data has been entered into the Reporting Worksheet, the performance indicators are automatically calculated. How does a water utility operator know how well his or her system is performing? The AWWA Water Loss Control Committee provided the following table to assist water utilities is gauging an approximate Infrastructure Leakage Index (ILI) that is appropriate for their water system and local conditions. The lower the amount of leakage and real losses that exist in the system, then the lower the ILI value will be.
Note: this table offers an approximate guideline for leakage reduction target-setting. The best means of setting such targets include performing an economic assessment of various loss control methods. However, this table is useful if such an assessment is not possible.

General Guidelines for Setting a Target ILI
(without doing a full economic analysis of leakage control options)

Target ILI Range	Financial Considerations	Operational Considerations	Water Resources Considerations
1.0 - 3.0	Water resources are costly to develop or purchase; ability to increase revenues via water rates is greatly limited because of regulation or low ratepayer affordability.	Operating with system leakage above this level would require expansion of existing infrastructure and/or additional water resources to meet the demand.	Available resources are greatly limited and are very difficult and/or environmentally unsound to develop.
>3.0 -5.0	Water resources can be developed or purchased at reasonable expense; periodic water rate increases can be feasibly imposed and are tolerated by the customer population.	Existing water supply infrastructure capability is sufficient to meet long-term demand as long as reasonable leakage management controls are in place.	Water resources are believed to be sufficient to meet long-term needs, but demand management interventions (leakage management, water conservation) are included in the long-term planning.
>5.0 - 8.0	Cost to purchase or obtain/treat water is low, as are rates charged to customers.	Superior reliability, capacity and integrity of the water supply infrastructure make it relatively immune to supply shortages.	Water resources are plentiful, reliable, and easily extracted.
Greater than 8.0	Although operational and financial considerations may allow a long-term ILI greater than 8.0, such a level of leakage is not an effective utilization of water as a resource. Setting a target level greater than 8.0 - other than as an incremental goal to a smaller long-term target - is discouraged.		
Less than 1.0	If the calculated Infrastructure Leakage Index (ILI) value for your system is 1.0 or less, two possibilities exist. a) you are maintaining your leakage at low levels in a class with the top worldwide performers in leakage control. b) A portion of your data may be flawed, causing your losses to be greatly understated. This is likely if you calculate a low ILI value but do not employ extensive leakage control practices in your operations. In such cases it is beneficial to validate the data by performing field measurements to confirm the accuracy of production and customer meters, or to identify any other potential sources of error in the data.		

AWWA WLCC Free Water Audit Software: Reporting Worksheet

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Back to Instructions

? Click to access definition

Water Audit Report for: Philadelphia Water Department
Reporting Year: 2008 7/2007 - 6/2008

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

WATER SUPPLIED

<< Enter grading in column 'E'

Volume from own sources:	7	94,536.900	Million gallons (US)/yr (MG/Yr)	
Master meter error adjustment (enter positive value):	10	2,779.300	over-registered	MG/Yr
Water imported:	n/a		MG/Yr	
Water exported:	10	7,100.400	MG/Yr	
WATER SUPPLIED:		84,657.200	MG/Yr	

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

				Pcnt:	Value:
Billed metered:	7	57,242.400	MG/Yr		
Billed unmetered:	n/a		MG/Yr		
Unbilled metered:	n/a		MG/Yr		
Unbilled unmetered:	8	764.200	MG/Yr	○ ◉	764.200
AUTHORIZED CONSUMPTION:		58,006.600	MG/Yr		

Use buttons to select percentage of water supplied **OR** value

WATER LOSSES (Water Supplied - Authorized Consumption)

26,650.600 MG/Yr

Apparent Losses

				Pcnt:	Value:
Unauthorized consumption:	8	2,086.300	MG/Yr	○ ◉	2,086.300
Customer metering inaccuracies:	8	190.300	MG/Yr	○ ◉	190.300
Systematic data handling errors:	5	4,676.400	MG/Yr		
Apparent Losses:		6,953.000			

Choose this option to enter a percentage of billed metered consumption. This is NOT a default value

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses:		19,697.600	MG/Yr
WATER LOSSES:		26,650.600	MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER: 27,414.800 MG/Yr

= Total Water Loss + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	9	3,137.0	miles	
Number of active AND inactive service connections:	7	547,932		
Connection density:		175	conn./mile main	
Average length of customer service line:	7	12.0	ft	(pipe length between curbstop and customer meter or property boundary)
Average operating pressure:	10	55.0	psi	

COST DATA

Total annual cost of operating water system:	10	$219,182,339	$/Year
Customer retail unit cost (applied to Apparent Losses):	9	$4.97	$/1000 gallons (US)
Variable production cost (applied to Real Losses):	9	$215.50	$/Million gallons

PERFORMANCE INDICATORS

Financial Indicators

Non-revenue water as percent by volume of Water Supplied:	32.4%
Non-revenue water as percent by cost of operating system:	17.8%
Annual cost of Apparent Losses:	$34,556,410
Annual cost of Real Losses:	$4,244,833

Operational Efficiency Indicators

Apparent Losses per service connection per day:	34.77	gallons/connection/day
Real Losses per service connection per day*:	98.49	gallons/connection/day
Real Losses per length of main per day*:	N/A	
Real Losses per service connection per day per psi pressure:	1.79	gallons/connection/day/psi
Unavoidable Annual Real Losses (UARL):	2,178.15	million gallons/year
From Above, Real Losses = Current Annual Real Losses (CARL):	19,697.60	million gallons/year
Infrastructure Leakage Index (ILI) [CARL/UARL]:	9.04	

* only the most applicable of these two indicators will be calculated

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 82 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Billed metered
3: Systematic data handling errors

For more information, click here to see the Grading Matrix worksheet

AWWA WLCC Free Water Audit Software: Reporting Worksheet

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Back to Instructions

? Click to access definition

Water Audit Report for: Regional Municipality of Peel

Reporting Year: 2008 (1/2008 - 12/2008)

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: MEGALITRES (THOUSAND CUBIC METRES) PER YEAR

WATER SUPPLIED

<< Enter grading in column 'E'

Volume from own sources:	7	213,977.000	Megalitres/yr (or ML/Yr)	
Master meter error adjustment (enter positive value):	4	0.000		ML/Yr
Water imported:	n/a	0.000	ML/Yr	
Water exported:	7	26,457.500	ML/Yr	
WATER SUPPLIED:		187,519.500	ML/Yr	

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

				Pcnt:	Value:
Billed metered:	7	163,665.000	ML/Yr		
Billed unmetered:	2	433.900	ML/Yr		
Unbilled metered:	8	1,768.400	ML/Yr		
Unbilled unmetered:	5	230.100	ML/Yr		230.100
AUTHORIZED CONSUMPTION:		166,097.400	ML/Yr		

Use buttons to select percentage of water supplied **OR** value

WATER LOSSES (Water Supplied - Authorized Consumption)

21,422.100 ML/Yr

Apparent Losses

				Pcnt:	Value:
Unauthorized consumption:	5	886.800	ML/Yr		886.800
Customer metering inaccuracies:	7	2,851.000	ML/Yr		2,851.000
Systematic data handling errors:		0.000	ML/Yr		

Systematic data handling errors are likely, please enter a non-zero value; otherwise grade = 5

Apparent Losses: 3,737.800

Choose this option to enter a percentage of billed metered consumption. This is NOT a default value

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: 17,684.300 ML/Yr

WATER LOSSES: 21,422.100 ML/Yr

NON-REVENUE WATER

NON-REVENUE WATER: 23,420.600 ML/Yr

= Total Water Loss + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	8	4,161.0	kilometers	
Number of active AND inactive service connections:	9	287,905		
Connection density:		69	conn./km main	
Average length of customer service line:	5	16.0	metres	(pipe length between curbstop and customer meter or property boundary)
Average operating pressure:	6	58.4	metres (head)	

COST DATA

Total annual cost of operating water system:	3	$100,000,000	$/Year
Customer retail unit cost (applied to Apparent Losses):	10	$0.64	$/1000 litres
Variable production cost (applied to Real Losses):	10	$642.00	$/Megalitre

Retail costs are less than (or equal to) production costs; please review and correct if necessary

PERFORMANCE INDICATORS

Financial Indicators

Non-revenue water as percent by volume of Water Supplied:	12.5%
Non-revenue water as percent by cost of operating system:	15.0%
Annual cost of Apparent Losses:	$2,399,668
Annual cost of Real Losses:	$11,353,321

Operational Efficiency Indicators

Apparent Losses per service connection per day:	35.57	litres/connection/day
Real Losses per service connection per day*:	168.29	litres/connection/day
Real Losses per length of main per day*:	N/A	
Real Losses per service connection per day per meter (head) pressure:	2.88	litres/connection/day/m
Unavoidable Annual Real Losses (UARL):	8,960.91	ML/yr
From Above, Real Losses = Current Annual Real Losses (CARL):	17,684.30	ML/yr
Infrastructure Leakage Index (ILI) [CARL/UARL]:	1.97	

* only the most applicable of these two indicators will be calculated

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 66 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources

2: Billed unmetered

3: Total annual cost of operating water system

For more information, click here to see the Grading Matrix worksheet

AWWA WLCC Free Water Audit Software: Acknowledgements

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Back to Instructions

AWWA Water Audit Software Version 4.2 Developed by the Water Loss Control Committee of the American Water Works Association May 2010

This software is intended to serve as a basic tool to compile a preliminary, or "top-down", water audit. It is recommended that users also refer to the 3rd Edition AWWA M36 Publication, Water Audits and Loss Control Programs, for detailed guidance on compiling a comprehensive, or "bottom-up", water audit using the same water audit methodology.

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- Kunkel, G. et al, 2003. Water Loss Control Committee Report: Applying Worldwide Best Management Practices in Water Loss Control. Journal AWWA, 95:8:65

- AWWA Water Audits and Loss Control Programs, M36 Publication, 3rd Edition, 2009

- Service Connection Diagrams courtesy of Ronnie McKenzie, WRP Pty Ltd.

NMOSE GPCD CALCULATOR

Gallons per Capita - v2.04 Beta

Release Date: Mar, 16, 2009

This spreadsheet-based GPCD calculator is designed to help quantify and track water uses associated with water distribution systems. The spreadsheet contains several separate worksheets. Sheets can be accessed using the tabs towards the bottom of the screen, or by clicking the buttons on the left below. Descriptions of each sheet are also given below.

It should be noted that all the recorded data should be from actual metered results and should not include any estimates.

THE FOLLOWING KEY APPLIES THROUGHOUT:

- Value to be entered by user
- Dropdown box, pick from list
- Value calculated based on input data
- No longer available for input

Look for the following boxes that provide additiona Instructions Info

Please begin by providing the following information, then proceed through each sheet:

NAME OF CITY OR UTILITY: City of Las Cruces Utilities — New Mexico

REPORTING YEARS: Enter the most recent reporting year: 2010 — Data can be entered back to: 2004

NAME OF CONTACT PERSON: Leeann DeMouche — **E-MAIL:** ldemouche@las-cruces.org — **TELEPHONE:** 575-528-3549 **Ext.**

SELECT THE REPORTING UNITS FOR VOLUME DATA: Gallons (US) — Gallons per Capita - v2.04 Beta

Instructions & Utility	This sheet
Census Data	Census data and the portal to get the data from the Census website
Single-Family	Single-Family residential gallons and population
Multi-Family	Multi-Family residential gallons and population
ICI & Other Metered	Other data including Commercial, Industrial and Institutional [1.3] and Other metered [1.4] categories
Reuse	Data related to water reuse projects
Total Diverted	Total Production and Diverted Water
Reported Data	The calculated data graphical review of most common performance indicators
Annual Performance	The calculated data graphical review of **annual** performance indicators
Monthly Performance	The calculated data graphical review of **monthly** performance indicators
Definitions	Use this sheet to understand terms used in the audit process

All parties reserve the right to validate the data recorded in this document. This does not bind the OSE or the Utility to the results. It is a tool used for planning purposes.

If you have questions or comments regarding the software please contact us at: waternm@state.nm.us

Census Information Data Table 2.1

Info

Click here to access the Census Web site

OR

Click here for instructions on how to find the data on the Census website

2010 TO 2004

Use the most recent census data

Return to Instructions

DATA

US Census Table	Description		INPUT
		CENSUS YEAR	**2000**
P37	Group Quarters Population	Total	**1,671**
H3	Occupancy Status	Total	**31,682**
from H3		Occupied	**29,184**
from H3		Vacant	**2,498**
H12	Ave. Household Size of Occupied Housing Units	Total	**2.31**

Formula: Household Size = Total Population / Total Number of Housing Units

Vacancy Rate %	7.9%

COMMENTS:

DATA INPUT SHEET

City of Las Cruces Utilities

Instructions

3. SINGLE-FAMILY RESIDENTIAL (SFR)

Return to Instructions

MONTHLY DATA

TABLE 3.1 Info — 2010 TO 2004

SFR BILLED WATER CONSUMPTION (Gallons (US))

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2010	173,522,000	145,393,000	176,364,000	256,596,000	292,970,000	383,372,000	393,247,000	323,871,000	317,424,000	275,386,000	261,691,000	166,923,000
2009	178,196,000	162,846,000	214,006,000	242,157,000	337,338,000	320,328,000	423,449,000	390,811,000	340,889,000	282,756,000	215,277,000	166,338,000
2008												
2007												
2006												
2005												
2004												

TABLE 3.2 Info — Active Connections Only — **You have chosen to enter Active Connections Only, enter the monthly values below, or enter annual values in table 3.8 Check message above Table 3.3 to see if additional data is required**

NUMBER OF SFR CONNECTIONS (Monthly)

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2010	28,356	28,370	28,378	28,528	28,399	28,515	28,571	28,578	28,429	28,500	28,408	28,639
2009	27,465	27,435	27,576	27,628	27,651	27,590	27,635	27,737	28,220	27,984	28,116	28,312
2008												
2007												
2006												
2005												
2004												

TABLE 3.3 Info — **You have entered Active Connections Only in Table 3.2; leave the cells below blank**

INACTIVE (ZERO USE) SFR CONNECTIONS (Monthly)

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2010												
2009												
2008												
2007												
2006												
2005												
2004												

TABLE 3.4 — **Formula = (No. of Connections - No. of Zero Use Accounts) * Ave. Household Size**

SFR POPULATION (Monthly)

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2010	65,501	65,535	65,553	65,899	65,601	65,870	65,998	66,015	65,672	65,835	65,622	66,157
2009	63,444	63,375	63,700	63,820	63,875	63,733	63,837	64,071	65,189	64,642	64,947	65,400
2008	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
2007	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
2006	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
2005	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
2004	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data

TABLE 3.5 — **Formula = Billed Water Consumption (SFR only) / Calculated Population (SFR only)**

SFR GPCD CALCULATION (Monthly)

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2010	85.46	79.23	86.79	129.79	144.06	194.00	192.21	158.26	161.12	134.93	132.93	81.39
2009	90.60	91.77	108.37	126.48	170.36	167.54	213.98	196.76	174.31	141.10	110.49	82.05
2008	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
2007	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
2006	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
2005	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
2004	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data

COMMENTS:

SFR Connections adjusted with multiplier for SFR meters that serve duplexes. See narrative for calculation of duplex multiplier.

ANNUAL DATA

TABLE 3.6 ANNUAL CONSUMPTION

TABLE 3.7 ANNUAL CALCULATION

	3,166,759,000
	3,274,391,000
	N/A
	N/A
	N/A
	N/A
	N/A

TABLE 3.8 AVG. ANNUAL CONNECTIONS

TABLE 3.9 AVG CONN. CALCULATION

	28,472
	27,779
	N/A
	N/A
	N/A
	N/A
	N/A

TABLE 3.10 Info — CALCULATED GROWTH RATE

TABLE 3.11 No. VACANT SFR CONNECTIONS

2.50%	
N/A	
N/A	
N/A	
N/A	
N/A	

TABLE 3.12 Info — SIZE OF HOUSEHOLD

TABLE 3.13 Info — **SFR POPULATION**

2.31	**65,771**
2.31	**64,169**
2.31	**N/A**
2.31	**N/A**
2.31	**N/A**
2.31	**N/A**
2.31	**N/A**

TABLE 3.14 Info

ANNUAL SFR GPCD
131.91
139.80
N/A
N/A
N/A
N/A
N/A

DATA INPUT SHEET

City of Las Cruces Utilities

4. MULTI-FAMILY RESIDENTIAL (MFR)

Return to Instructions

Instructions

MONTHLY DATA

2010 TO 2004

TABLE 4.1 Info

MFR BILLED WATER CONSUMPTION (Monthly) (Gallons (US))

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2010	43,117,000	39,380,000	52,170,000	51,844,000	52,578,000	71,177,000	65,340,000	60,977,000	62,299,000	50,696,000	45,942,000	36,910,000
2009	43,292,000	37,618,000	47,383,000	50,745,000	61,438,000	56,850,000	69,852,000	64,320,000	65,230,000	59,180,000	43,309,000	43,681,000
2008												
2007												
2006												
2005												
2004												

TABLE 4.2

NUMBER OF MFR UNITS (Monthly)

If only Current Number of Units is Known, put this number in Table 4.7

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2010	12,714	12,531	12,607	12,638	12,592	12,577	12,623	12,623	12,577	12,546	12,546	12,546
2009	12,500	12,291	12,322	12,352	12,337	12,307	12,322	12,322	12,337	12,382	12,352	12,322
2008												
2007												
2006												
2005												
2004												

TABLE 4.3

MFR POPULATION (Monthly)

Formula = (Number of Units - Vacant MFR Connections) * Ave. Household Size

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2010	27,076	26,652	26,829	26,900	26,794	26,758	26,864	26,864	26,758	26,688	26,688	26,688
2009	26,627	26,145	26,214	26,284	26,249	26,180	26,214	26,214	26,249	26,354	26,284	26,214
2008	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
2007	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
2006	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
2005	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
2004	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data

TABLE 4.4

MFR GPCD CALCULATION (Monthly)

Formula = MFR Billed Water Consumption (Monthly) / MFR Population (Monthly)

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2010	51.37	52.77	62.73	64.24	63.30	88.67	78.46	73.22	77.61	61.28	57.38	44.61
2009	52.45	51.39	58.31	64.35	75.50	72.38	85.96	79.15	82.83	72.44	54.92	53.75
2008	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
2007	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
2006	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
2005	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
2004	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data

ANNUAL DATA

TABLE 4.5

ANNUAL CONSUMPTION

TABLE 4.6

ANNUAL CALCULATION
632,430,000
642,898,000
N/A
N/A
N/A
N/A
N/A

TABLE 4.7

No. CURRENT UNITS

TABLE 4.8

ANNUAL UNIT CALCULATION
12,593
12,345
N/A
N/A
N/A
N/A
N/A

TABLE 4.9 Info

MFR POPULATION
26,797
26,269
N/A
N/A
N/A
N/A
N/A

TABLE 4.10

VACANT MFR CONNECTIONS
993
973
N/A
N/A
N/A
N/A
N/A

TABLE 4.11 Info

ANNUAL MFR GPCD
64.66
67.05
N/A
N/A
N/A
N/A
N/A

DATA INPUT SHEET

5. INDUSTRIAL, COMMERCIAL & INSTITUTIONAL (ICI) AND OTHER METERED

Return to Instructions

Info City of Las Cruces Utilities

Instructions

MONTHLY DATA

2010 TO 2004

TABLE 5.1

ICI WATER CONSUMPTION (Gallons (US))

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2010	75,445,000	67,296,000	112,274,000	139,308,000	142,085,000	190,515,000	168,052,000	153,992,000	160,209,000	136,184,000	130,244,000	77,231,000
2009	83,072,000	79,145,000	100,230,000	122,576,000	154,487,000	161,007,000	190,286,000	189,977,000	159,850,000	140,267,000	115,895,000	82,556,000
2008												
2007												
2006												
2005												
2004												

TABLE 5.2

OTHER METERED (Gallons (US))

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2010	12,944,000	9,892,000	15,121,000	25,369,000	28,603,000	36,136,000	33,271,000	22,113,000	21,850,000	17,661,000	10,964,000	5,498,000
2009	18,265,000	22,699,000	26,300,000	37,224,000	41,865,000	38,848,000	34,386,000	35,702,000	27,176,000	27,668,000	25,681,000	12,460,000
2008												
2007												
2006												
2005												
2004												

COMMENTS:

ICI =Commercial + Industrial + Golf Courses + Paz Park + Parks; Other =Well 27 & 18 + Bulk

ANNUAL DATA

TABLE 5.3

ICI ANNUAL CONSUMPTION

TABLE 5.4

ICI GPCD
45.14
46.98
N/A
N/A
N/A
N/A
N/A

TABLE 5.5

ICI ANNUAL CALCULATED
1,552,835,000
1,579,348,000
N/A
N/A
N/A
N/A
N/A

TABLE 5.6

OTHER ANNUAL CONSUMPTION

TABLE 5.7

OTHER METERED GPCD
6.96
10.36
N/A
N/A
N/A
N/A
N/A

TABLE 5.8

OTHER ANNUAL CALCULATED
239,422,000
348,274,000
N/A
N/A
N/A
N/A
N/A

DATA INPUT SHEET | Info

City of Las Cruces Utilities

6. REUSE

Return to Instructions

Instructions

MONTHLY DATA

2010 TO 2004

TABLE 6.1

REUSE DIVERSIONS (Monthly) (Gallons (US))

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2010	0	0	0	0	0	0	0	3,266,600	9,426,000	7,872,000	9,018,000	4,182,000
2009												
2008												
2007												
2006												
2005												
2004												

COMMENTS:
Sonoma Ranch Golf course

ANNUAL DATA

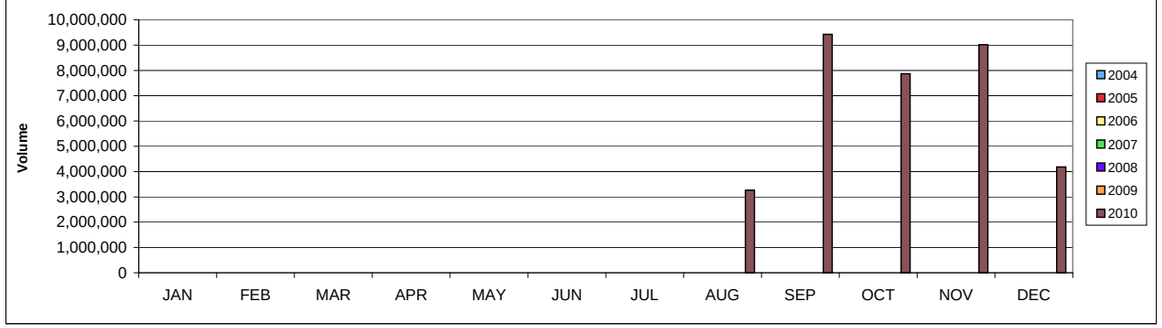
TABLE 6.2

REUSE ANNUAL DIVERSIONS

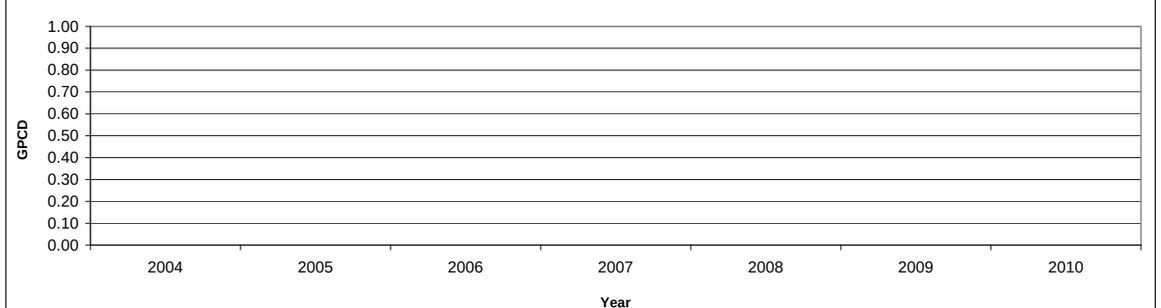
TABLE 6.3

REUSE GPCD
N/A
N/A
N/A
N/A
N/A
N/A
N/A

Reuse Volume
Graph 6.1



Reuse GPCD
Graph 6.2



DATA INPUT SHEET

7. TOTAL WATER DIVERTED AND SUPPLIED

Return to Instructions

City of Las Cruces Utilities

MONTHLY DATA

TABLE 7.1

2010 TO 2004

TOTAL WATER DIVERTED (Monthly) (Gallons (US))

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2010	366,507,000	332,173,000	464,006,000	545,104,000	656,745,000	795,636,000	712,467,000	697,798,000	603,225,000	570,076,000	458,817,000	391,096,000
2009	388,825,700	377,955,000	497,949,800	566,996,000	653,022,000	686,675,000	706,003,600	707,928,000	550,886,000	545,185,000	450,340,000	373,605,200
2008												
2007												
2006												
2005												
2004												

TABLE 7.2

IMPORTED WATER (Monthly)(Gallons (US)) Info

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2010	0	0	0	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	39,005,000	39,785,000	46,517,000	43,553,000	41,974,000	0	0	0
2008												
2007												
2006												
2005												
2004												

TABLE 7.3

EXPORTED WATER (Monthly) (Gallons (US)) Info

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2010	4,000	1,000	0	0	0	0	0	0	0	0	0	0
2009	1,000	0	0	0	0	0	1,000	0	0	0	0	2,000
2008												
2007												
2006												
2005												
2004												

TABLE 7.4

Formula = Total Water Diverted + Imported water - Exported Water

TOTAL WATER SUPPLY (Monthly) (Gallons (US))

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2010	366,503,000	332,172,000	464,006,000	545,104,000	656,745,000	795,636,000	712,467,000	697,798,000	603,225,000	570,076,000	458,817,000	391,096,000
2009	388,824,700	377,955,000	497,949,800	566,996,000	692,027,000	726,460,000	752,519,600	751,481,000	592,860,000	545,185,000	450,340,000	373,603,200
2008	0	0	0	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0	0	#REF!	#REF!	0
2006	0	0	0	0	0	#REF!	#REF!	#REF!	#REF!	0	0	0
2005	0	0	0	0	0	0	0	0	0	0	0	0
2004	0	0	0	0	0	0	0	0	0	0	0	0

ANNUAL DATA

TABLE 7.6

ANNUAL TOTAL DIVERTED

TABLE 7.7

ANNUAL TOTAL DIVERTED CALC
6,593,650,000
6,505,371,300
N/A
N/A
N/A
N/A
N/A

TABLE 7.8

ANNUAL TOTAL IMPORTED

TABLE 7.9

ANNUAL TOTAL IMPORT CALC
N/A
N/A
N/A
#REF!
#REF!
N/A
N/A

TABLE 7.10

ANNUAL TOTAL EXPORTED

TABLE 7.11

ANNUAL TOTAL EXPORT CALC
N/A
N/A
N/A
N/A
N/A
N/A
N/A

TABLE 7.12

ANNUAL TOTAL WATER SUPPLY
6,593,650,000
6,505,371,300
0
#REF!
#REF!
0
0

Info

TABLE 7.13

TOTAL POP. EST.
94,239
92,109
N/A
N/A
N/A
N/A
N/A

Table 7.5

SYSTEM TOTAL GPCD (Monthly)

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2010	125	126	159	193	225	281	244	239	213	195	162	134
2009	136	147	174	205	242	263	264	263	215	191	163	131
2008	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
2007	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	#REF!	#REF!	No Data
2006	No Data	No Data	No Data	No Data	No Data	#REF!	#REF!	#REF!	#REF!	No Data	No Data	No Data
2005	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
2004	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data

COMMENTS:

Total production from CLC wells, imported water from NMSU wells, exported water to Mesilla

TABLE 7.14

Info

Year	SYSTEM TOTAL GPCD
2010	**191.69**
2009	**199.77**
2008	**NA**
2007	**#REF!**
2006	**#REF!**
2005	**NA**
2004	**NA**

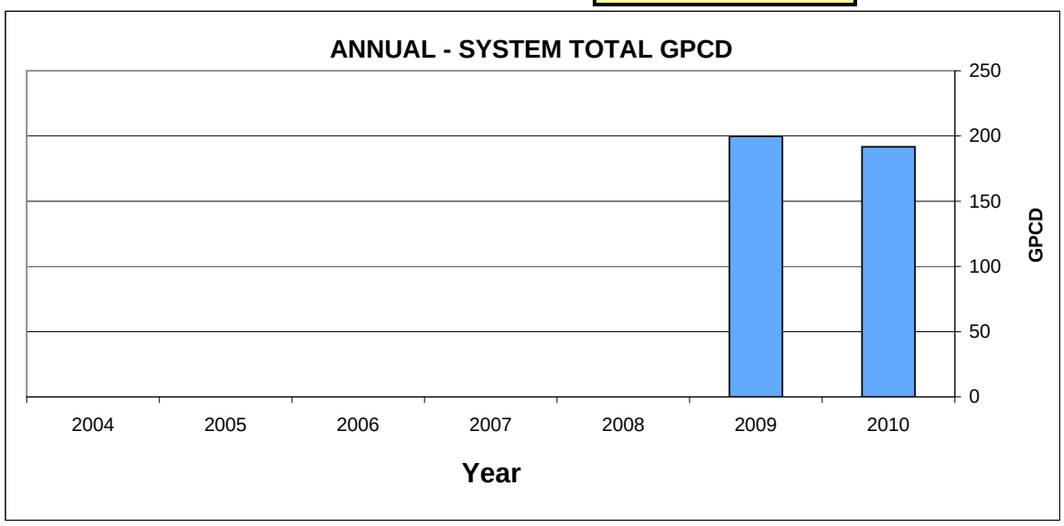
8. GPCD REPORTED DATA

City of Las Cruces Utilities		
2010	To:	2004

Return to Instructions

ANNUAL

Year	SYSTEM GPCD
2010	191.69
2009	199.77
2008	NA
2007	#REF!
2006	#REF!
2005	NA
2004	NA

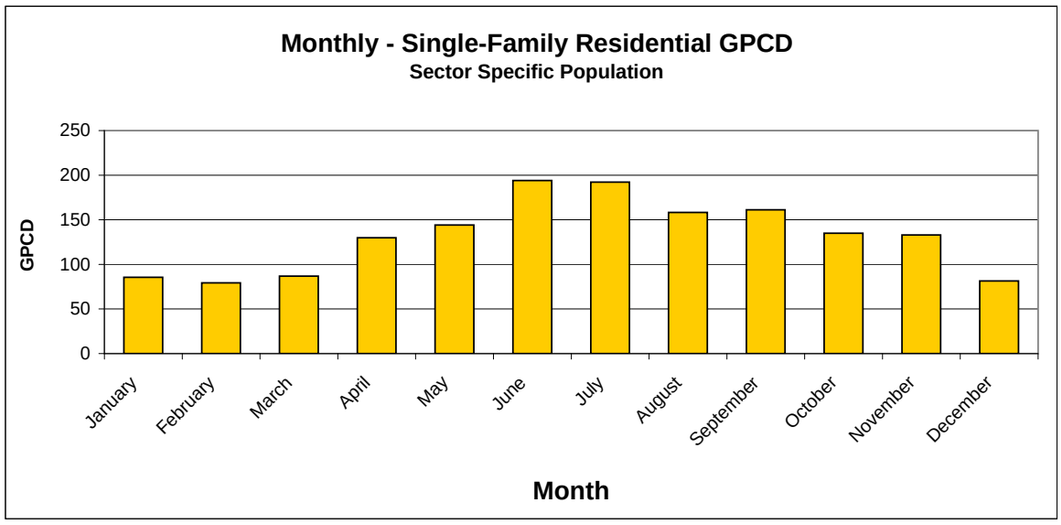


MONTHLY

Month	SFR GPCD
January	85.46
February	79.23
March	86.79
April	129.79
May	144.06
June	194.00
July	192.21
August	158.26
September	161.12
October	134.93
November	132.93
December	81.39

Year	2010

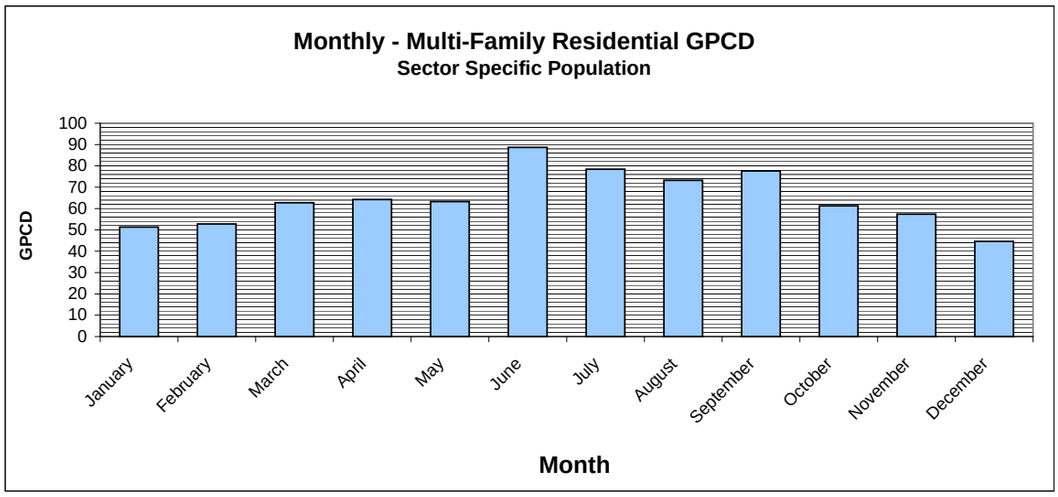
Peak/Ave	1.47



YEAR **2010**

Month	MFR GPCD
January	51.37
February	52.77
March	62.73
April	64.24
May	63.30
June	88.67
July	78.46
August	73.22
September	77.61
October	61.28
November	57.38
December	44.61

Peak/Ave	1.37



YEAR **2010**

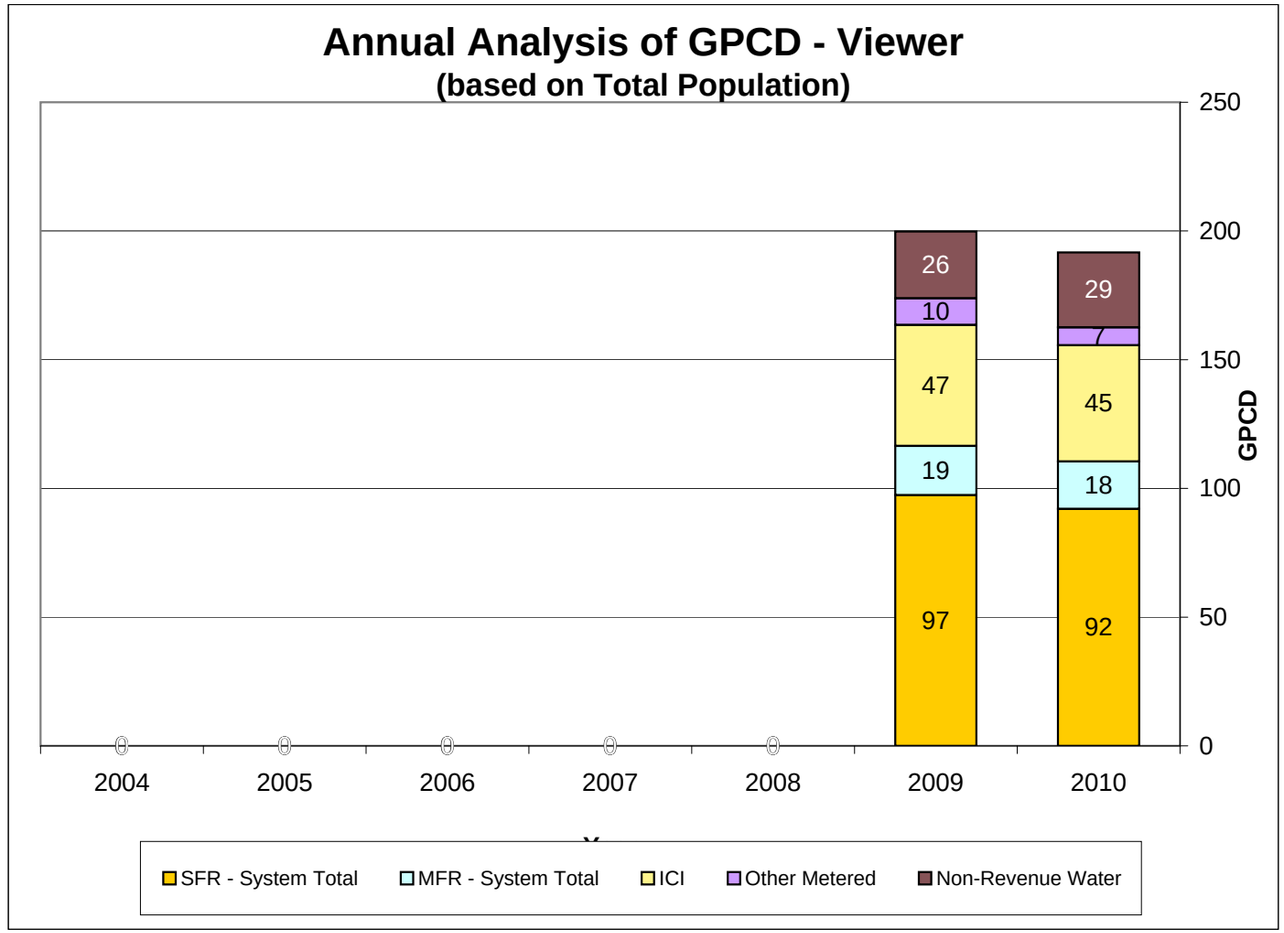
9. Annual Reporting Performance

Return to Instructions

Overall Annual GPCD (based on Total Population)

Year	SFR - System Total	MFR - System Total	ICI	Other Metered	Non-Revenue Water (Info)	Total Supplied	Non-Revenue Volume Million Gallons (US)
On Graph?	Yes	Yes	Yes	Yes	Yes		
2010	92.06	18.39	45.14	6.96	29.14	191.69	1,002.20
2009	97.39	19.12	46.98	10.36	25.92	199.77	660.46
2008	N/A	N/A	N/A	N/A	#VALUE!	#VALUE!	-
2007	N/A	N/A	N/A	N/A	#REF!	#REF!	#REF!
2006	N/A	N/A	N/A	N/A	#REF!	#REF!	#REF!
2005	N/A	N/A	N/A	N/A	#VALUE!	#VALUE!	-
2004	N/A	N/A	N/A	N/A	#VALUE!	#VALUE!	-

City of Las Cruces Utilities		
2010	to	2004



10. Monthly Reporting Performance

Return to Instructions

Choose Year for Monthly Analysis **2010**

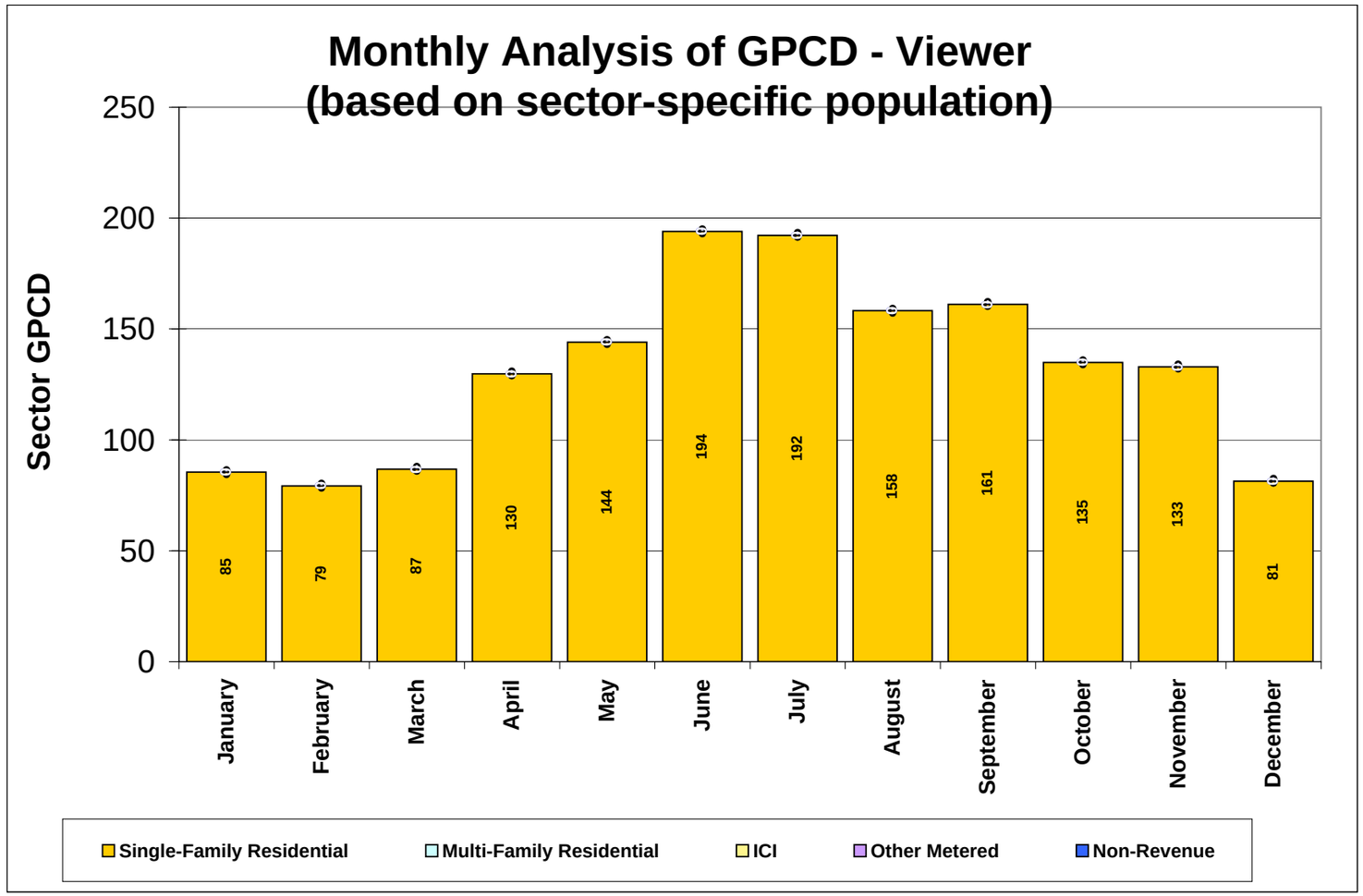
Choose Sector **Single-Family Residential**

Monthly GPCD

Month	Single-Family Residential GPCD	Multi-Family Residential GPCD	ICI GPCD	Other Metered GPCD	Non-Revenue GPCD
JAN	85.46	51.37	25.82	4.43	21.04
FEB	79.23	52.77	25.50	3.75	26.61
MAR	86.79	62.73	38.43	5.18	36.99
APR	129.79	64.24	49.27	8.97	25.46
MAY	144.06	63.30	48.64	9.79	48.10
JUN	194.00	88.67	67.39	12.78	40.48
JUL	192.21	78.46	57.52	11.39	17.99
AUG	158.26	73.22	52.71	7.57	46.84
SEP	161.12	77.61	56.67	7.73	14.66
OCT	134.93	61.28	46.62	6.05	30.86
NOV	132.93	57.38	46.07	3.88	3.53
DEC	81.39	44.61	26.44	1.88	35.78

City of Las Cruces Utilities

2010 to 2004



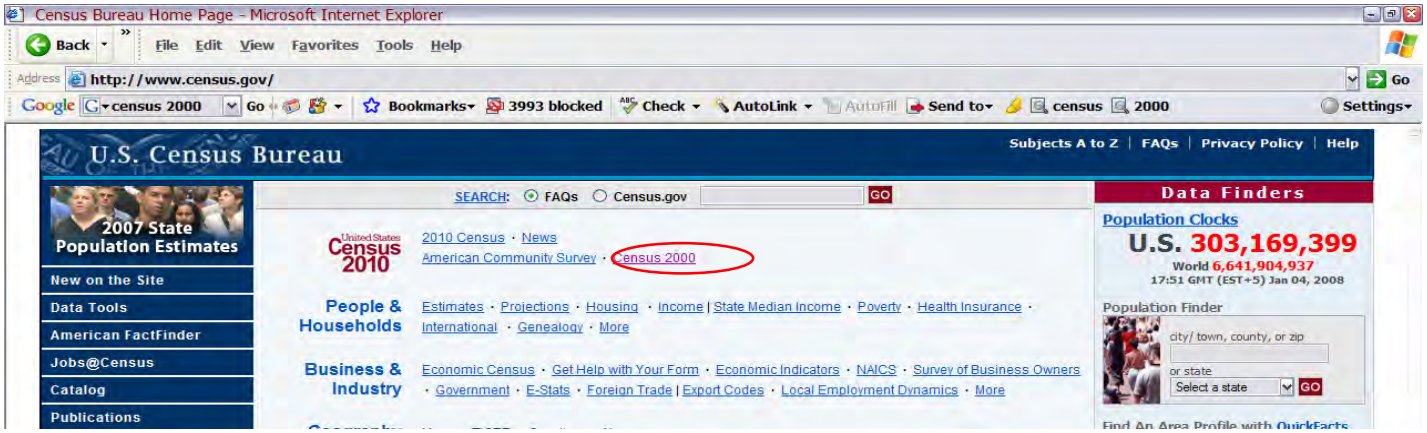
NMOSE GPCD Software: Definitions v2.04©

Back to Instructions

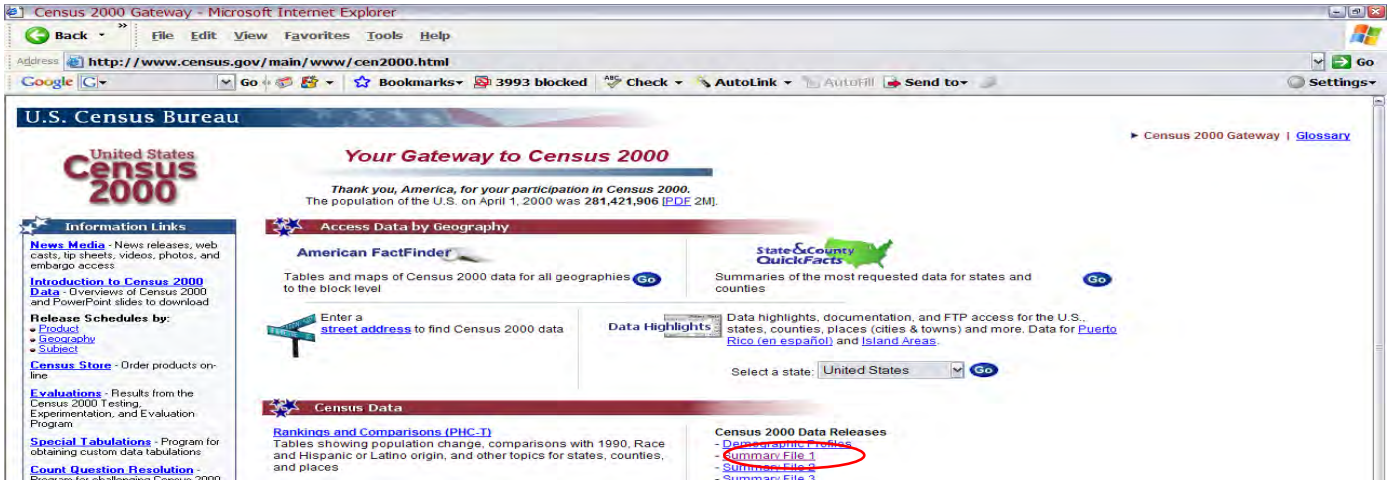
Item Name		Description
Active Connections		All active **Single Family Residential** connections within the utility. Connections that are not occupied or show zero activity are not counted in this category.
Annual Multi-Family Residential GPCD Calculation	Find	The MFR GPCD is Annual MF Calculation (4.6) divided by the annual MFR Population (4.9).
Annual Single Family Residential GPCD Calculation	Find	The SFR GPCD is Annual SFR Calculation (3.7) divided by the annual SFR Population average (3.13).
Billed Water Consumption (Multi-Family Residential)	Find	This is the total billed consumption for **Multi-Family** Residential uses only. Provide the amount of water used (gallons) for multi-family residential connections by month in Table 4.1, or by year in Table 4.5. If multi-family residential is not available as a separate category, provide an explanation in the Comments Box and include usage in the Industrial, Commercial and Institutional Table 5.1 or Other Metered Table 5.2 on Sheet 5.
Billed Water Consumption (Single-Family Residential)	Find	This is the total billed consumption for **Single-Family** residential uses only.
Calculated Growth Rate	Find	The calculated growth rate is a calculation developed to normalize the data to the growth in the utility. The growth is determined by evaluating the percentage change in the number of connections within the utility on an annual basis, provided in Table 3.9 Average Connections Calculated. If there are no more than one years' data, then this will not be calculated. This Table is for the utilities use in checking the growth percentage calculated against their own estimates. It is also used in Table 4.8 Number of (Multi-Family) Units if only the current number of multi-family units can be provided.
Census Data	Find	The Census data is used to standardize the calculation of population by utilizing numbers of people per household. It also records information on the vacancy rate within each city which enables calculation of the number of households actually being used. There is a link to a pdf document in Definitions showing the user how to find and record the relevant data.
Converter	Find	The user may develop a GPCD Analysis based on one of two input unit selections: 1) Gallons (US) 2) Cubic feet Please select the units from the instructions worksheet. An interactive unit converter is also provided below. Input volume in first box below and select units to be converted. 1 | Gallons (US) = 0.134 | Cubic Feet
Exported Water	Find	Enter all water exported from the system. This will include any pass-through arrangements or wholesale contracts to other drinking water suppliers, where the reporting utility is the water rights permit holder.
GPCD		Gallons per capita per day (GPCD) is a method utilized internationally to measure water use by drinking water suppliers. It is most commonly used to describe historical and current water uses, providing a baseline of water use that is not as susceptible to changes in population. GPCD is also used for planning purposes, allowing estimates of future demand requirements based on localized population projections. More sophisticated planning efforts utilize GPCD to determine conservation potential, track the results of program implementation, and calculate projections based on conservation adjusted GPCD.
General Information		The white boxes are data entry cells and are used for inputting data. All other cells except dropdown menus (purple boxes) are protected for the user's benefit to stop any overwriting of formulas and calculated cells. The green boxes are values that have been calculated based on inputs.
Graphing Results	Find	Datasets will automatically be graphed when using the graphing data tools in both the Annual and Monthly Performance worksheets. For example, choosing the year and the use sector from the purple dropdown boxes will allow these variables to be graphed.
Imported Water	Find	Enter all water imported from other systems. This will include any retail contracts with other drinking water suppliers where this utility purchases water from another utility and is not the permit holder.
Inactive and Zero Connections	Find	The inactive and zero connections are recorded in Table 3.3 so that unused single family residential connections will be removed from the calculation of single family population when Total Units is chosen from the drop down list in Table 3.2.

Industrial, Commercial and Institutional (ICI)	Find	Includes industrial properties, such as manufacturing, commercial properties such as restaurants, shopping malls, and institutional customers such as schools, universities and prisons.
Multi-Family Residential Connections	Find	A multifamily unit is living units in an apartment complex, duplexes, triplexes, trailer parks, and condo or town houses that have multiple units serviced by a single connection. They are not counted in the single-family residential category.
Multi-Family Residential Population	Find	Multi-family population is calculated from number of MFR units in the Annual Unit Calculation (4.8) minus Vacant MFR Connections (4.10). That number is then multiplied by Average Size of Occupied Housing Units from the US Census (2.1).
Non-Revenue Water		Non-revenue water is all the water the utility diverts and/or produces, but does not get paid for. Non-revenue water includes apparent losses such as meter inaccuracies, theft, and database errors, real losses such as leaks. It also includes unbilled authorized uses such as fire-fighting, line flushing and disinfection. The Calculator does not provide data entry for unmetered billed water. This might include bulk sales or monthly fees not based on usage. The non-revenue water in the Calculator includes all water that is not metered.
Other Metered	Find	All categories of billed metered use that is not otherwise classified in SFR, MFR or ICI. This provides the user the opportunity to track alternative categories. Examples included irrigation only, stand pipes, and fire hydrant/construction meters. Everything not included in SFR, MFR, ICI or Other will end up in non-revenue water.
Reuse	Find	Reuse, or Recycled water is former wastewater (sewage) that has been treated to remove solids and certain impurities and reused by a water supplier. In most locations, it is only intended to be used for nonpotable uses, such as irrigation, and dust control. This data is not included in any other calculation. It is provided as a tracking tool for the user.
Single Family Residential Connections	Find	SFR Connection is a stand alone or independently metered housing unit. The number used in the Calculator can be Total Connections or Active Connections only.
Single Family Residential Population	Find	Single Family Population (3.13) is calculated from number of active connections times size of average household (3.12). It can be calculated monthly or annually depending on the data provided. If Total Connections is chosen (3.2), then inactive connections are subtracted prior to multiplying by size of average household (3.12). If Active Connections is chosen (3.2), then number of connections are multiplied by size of average household (3.12) without any subtractions.
Size of Average Household	Find	This Table is determined from the US Census data in Table 2.1, Sheet 2. This data is used to determine a total single-family population and total multi-family population for both the monthly and annual data (Tables 3.4 and 3.13, Tables 4.3 and 4.9 respectively).
Total Connections	Find	All active and inactive **Single Family Residential** connections within the utility.
System Total GPCD	Find	The System Total GPCD is calculated by dividing the quantity of Total Water Diverted (plus imports minus exports) by the System Total Population
Total Population	Find	The Total Population estimate is the sum of the single-family population + multi-family population + group quarters population.
Vacant Single-Family Residential Connections	Find	This is a calculated field using either i) the average of the monthly vacant SFR connections, if monthly data are available or ii) an estimated value based on the Census data vacancy rate multiplied by the number of Total SFR connections. When Total Connections is chosen in Table 3.2, vacant single family residential connections are subtracted from Total Connections prior to calculating a population (based on household size) and a single family GPCD.

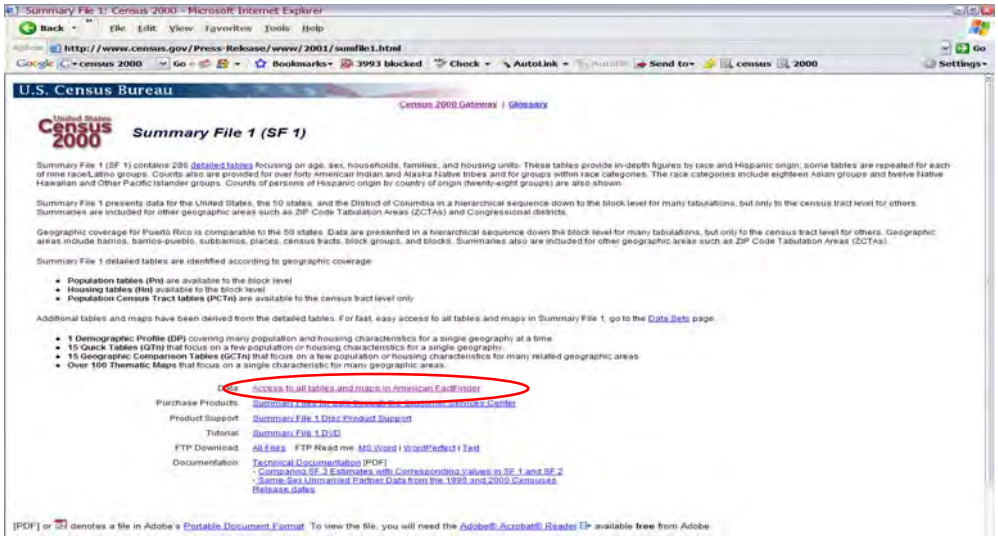
How to find the data required for Census section



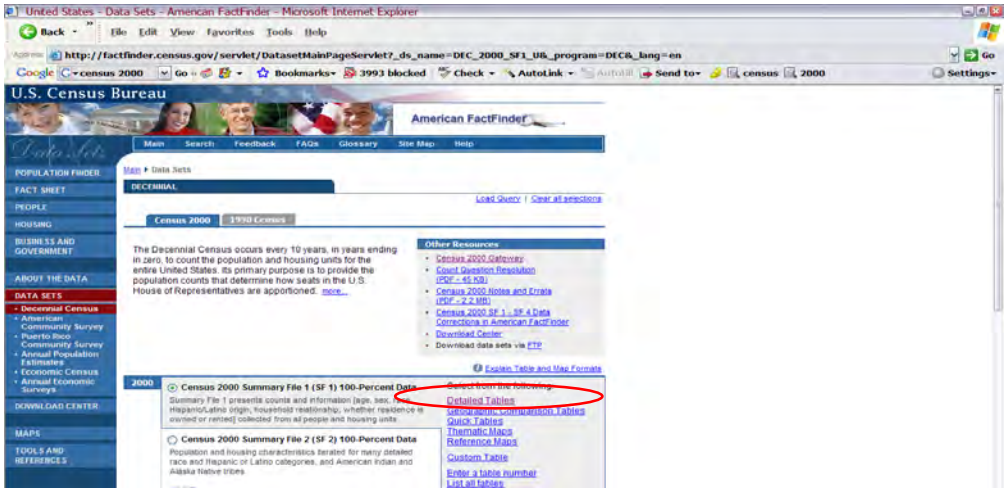
www.census.gov
click on **[Census 2000]**



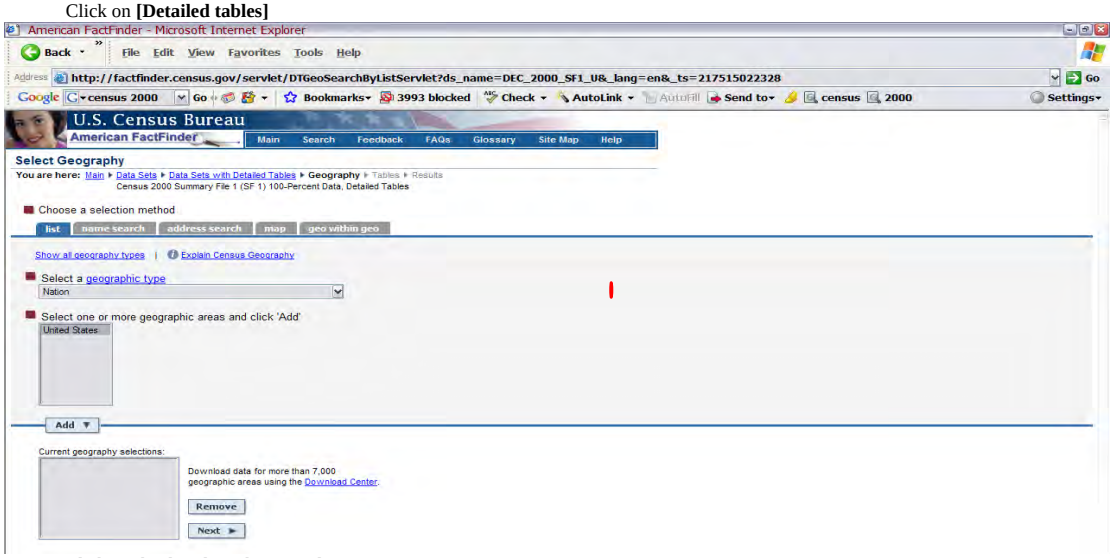
Click on **[Summary File 1]**



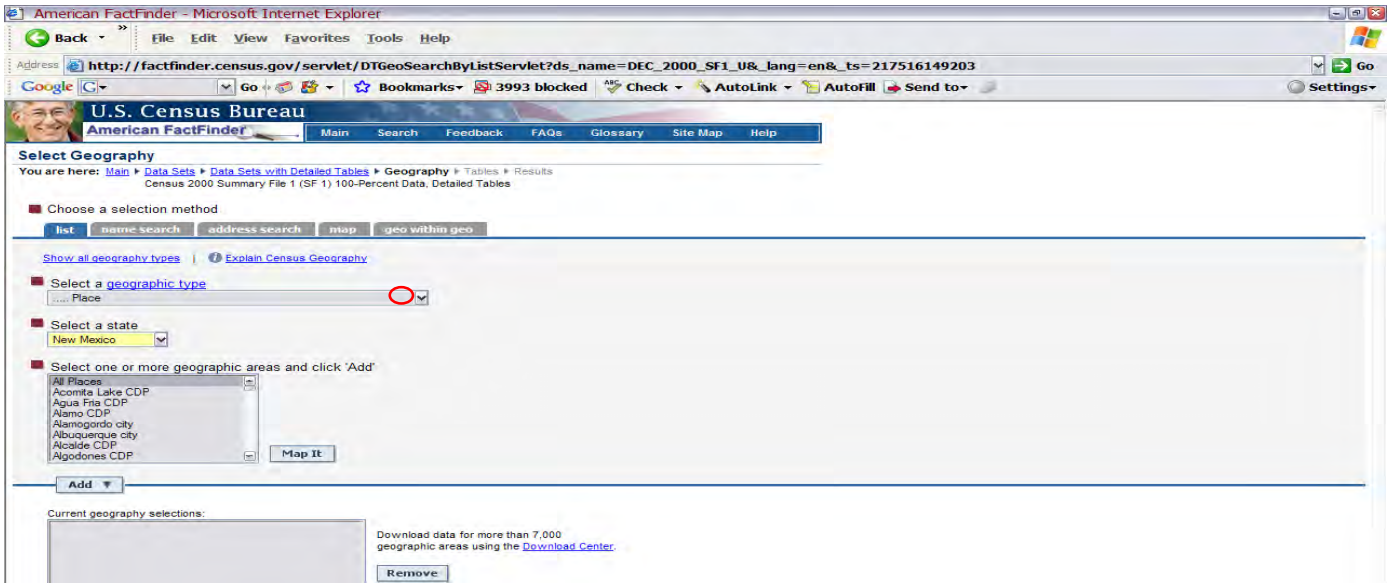
Click on **[Access to all tables and maps in American FactFinder]**



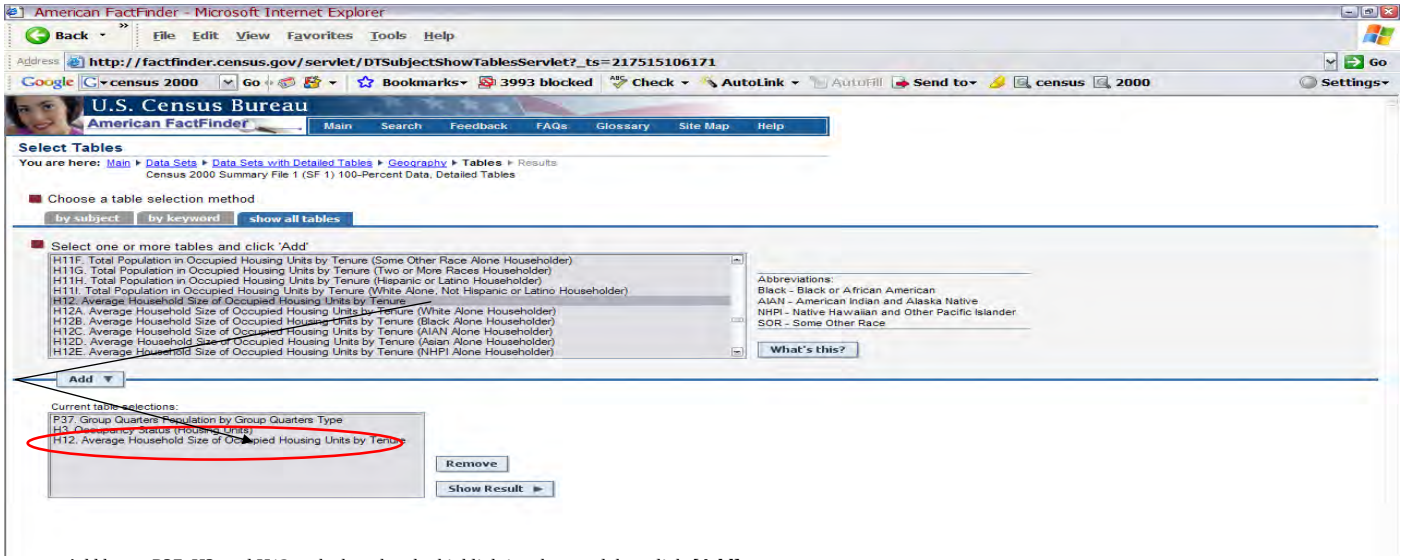
Click on **[Detailed tables]**



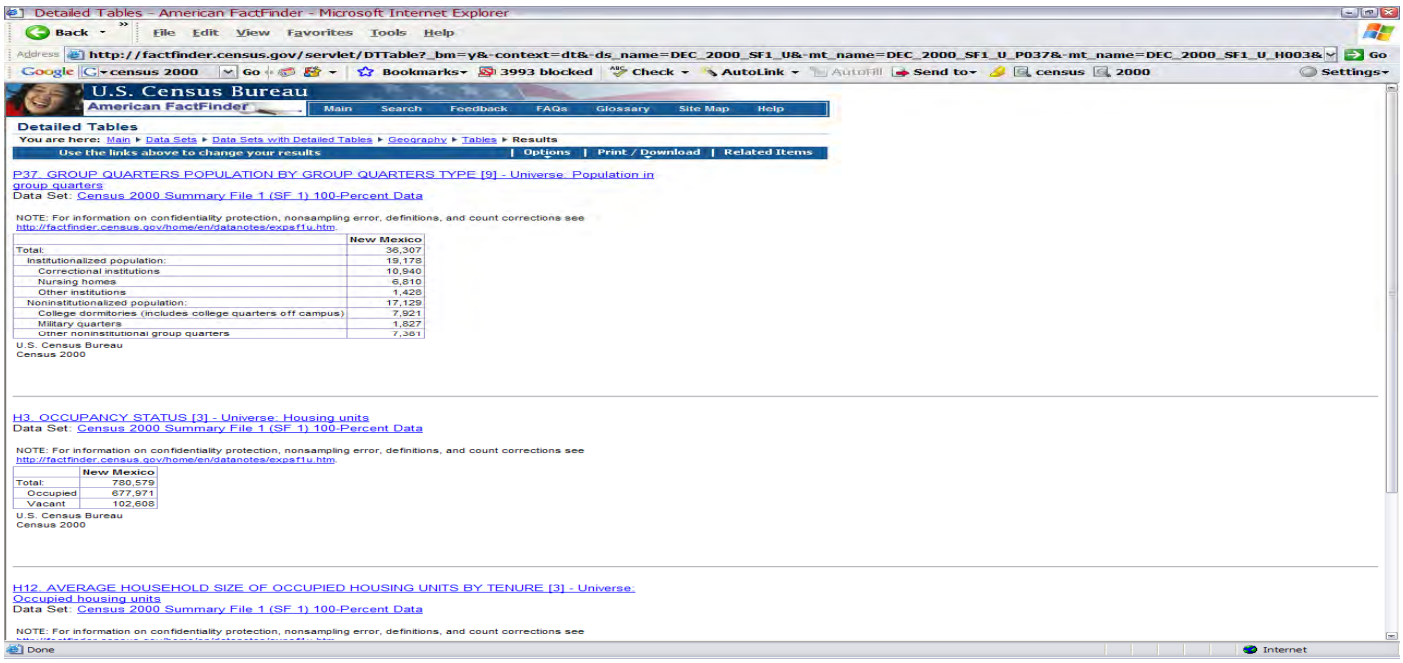
Click on the dropdown boxes and
Select **[Place]**
When "Select a State" box appears
Select **[New Mexico]**
Select Geographic area from drop down list that is the closest description of your service area
Add this to the base box as shown below



Click **[Next]**



Add boxes P37, H3, and H12 to the base box by highlighting them and then click **[Add]**
Once all the tables show in the base box click **[Show Result]**



Transfer results to spreadsheet

END

Beginning of Section

In fiscal year 2010 (July, 2009 to June 2010) the City of Las Cruces adopted a new fiscal monitoring system entitled Munis. The Munis system was designed to facilitate the logistical functions of the City, including the billing for the Utility Department. For fiscal year 2010 and 2011 the Utility Department has been working with the developers of Munis to ease some of the billing problems. Due to this change in the accountability system, the metered usage for July - September, 2009 are somewhat skewed and are not a true representation of the amount of water usage per sector. The numbers in the OSE GPCD Calculator are the best to our knowledge at this point in time for 2009 and 2010. Measures are currently being taken to assure a more accurate

The 2010 US Census count indicates that 2010 household size was 2.3 persons per household. Since this calculation is for 2009 and 2010, we have adjusted household size to 2.31 persons per household. We have also adjusted the group quarters population in accordance with a Census correction issued in 2002.

WATER
TABLE OF CONTENTS

LAS CRUCES UTILITIES

WATER
RESIDENTIAL SERVICE

AVAILABILITY

Available in the Las Cruces Utilities water service area for the exclusive use of a single metered family residence for domestic purposes. Service to buildings attached to the residence, including garages and other minor buildings for the use of the residents, may also be through the residential meter. Service to a residence, which is used in part for commercial purposes but the predominant usage is for residential purposes, shall be served under this rate schedule.

Landscape water meter available per Landscape Meter Schedule, see Sheet No. W-2010-12.

RATE

The bills are the sum of:

Domestic Meter

Access Charge

Per month……	$6.82

Volume Charge

Summer Period (billing months of June, July, August, and September)

First 3,000 gallons ..……..	$0.70
Over 3,000 gallons……	$2.08

Non-Summer Period (all other billing months)

First 3,000 gallons ..……...	$0.70
Over 3,000 gallons……	$1.89

Tax

Applicable Taxes & Payment in Lieu of Franchise Tax assessed by a Governmental Authority and not included in Cost of Service rates.

BILLING UNITS

The unit volume for the purpose of measurement per service shall be 1,000 gallons for the amount consumed in a billing cycle.

LAS CRUCES UTILITIES

WATER
SMALL COMMERCIAL SERVICE

AVAILABILITY

Available in the Las Cruces Utilities water service area for any establishment engaged in the operation of a business, an institution, whether or not for profit, or government entities.

Such enterprises shall include, but not be limited to, clubs, hotels, motels, schools, hospitals, multi-unit complexes, churches, and municipal, county, state and federal buildings.

This rate applies to such customers whose consumption is less than 50,000 gallons for three (3) or more of the twelve (12) months of the rate class review period. The rate class review period is a period of twelve (12) consecutive billing months that Las Cruces Utilities will review to determine the customer's appropriate rate classification. An initial rate review will be conducted in conjunction with the implementation of new rates approved by the Board of Commissioners for the City of Las Cruces Utilities. Subsequent rate reviews will be undertaken approximately twelve (12) months from the effective date of the new rates and every twelve (12) month period thereafter. A customer's rate classification will not be changed as a result of a rate review in the absence of at least twelve (12) consecutive months of billing history.

Landscape water meter available per Landscape Meter Schedule, see Sheet No. W-2010-12.

RATE

The bills are the sum of:

Access Charge
Per month..... $15.75

Volume Charge
Summer Period (billing months of June, July, August, and September)
Per 1,000 gallons $1.26

Non-Summer Period (all other billing months)
Per 1,000 gallons $1.05

Tax
Applicable Taxes & Payment in Lieu of Franchise Tax assessed by a Governmental Authority and not included in Cost of Service rates.

BILLING UNITS

The unit volume for the purpose of measurement per service shall be 1,000 gallons for the amount consumed in a billing cycle.

LAS CRUCES UTILITIES

WATER
LARGE COMMERCIAL SERVICE

AVAILABILITY

Available in the Las Cruces Utilities water service area for any establishment engaged in the operation of a business; an institution, whether or not for profit; or government entities.

Such enterprises shall include, but not be limited to, clubs, hotels, motels, schools, hospitals, multi-unit complexes, churches, municipal, county, state and federal buildings.

This rate applies to customers whose consumption equals to or exceeds 50,000 gallons within the billing cycle during at least ten (10) months of the twelve (12) months within the rate class review period. Customers whose usage is equal to or greater than 1,250,000 gallons within any month of the twelve (12) month review period shall receive service under the Industrial tariff unless the customer can demonstrate to the satisfaction of the Utility Director that the measured usage was the result of a nonrecurring circumstance. The rate class review period is a period of twelve (12) consecutive billing months that Las Cruces Utilities will review to determine the customer's appropriate rate classification. An initial rate review will be conducted in conjunction with the implementation of new rates approved by the Board of Commissioners for the City of Las Cruces Utilities. Subsequent rate reviews will be undertaken approximately twelve (12) months from the effective date of the new rates and every twelve (12) month period thereafter. A customer's rate classification will not be changed as a result of a rate review in the absence of at least twelve (12) consecutive months of billing history.

Landscape water meter available per Landscape Meter Schedule, see Sheet No. W-2010-12.

RATE

The bills are the sum of:

Access Charge

Per month..... $37.00

Volume Charge

Summer Period (billing months of June, July, August, and September)
Per 1,000 gallons $2.05

Non-Summer Period (all other billing months)
Per 1,000 gallons $1.71

Tax

Applicable Taxes & Payment in Lieu of Franchise Tax assessed by a Governmental Authority and not included in Cost of Service rates.

BILLING UNITS

The unit volume for the purpose of measurement per service shall be 1,000 gallons for the amount consumed in a billing cycle.

LAS CRUCES UTILITIES

WATER
LARGE MULTI-UNIT SERVICE

AVAILABILITY

Available in the Las Cruces Utilities water service area for the exclusive use of multiple dwelling, master metered, residential units for domestic purposes such as apartment complexes, townhomes, and mobile home parks.,

This rate applies to customers whose consumption equals to or exceeds 50,000 gallons within the billing cycle during at least ten (10) months of the twelve (12) months within the rate class review period. Customers whose usage is equal to or greater than 1,250,000 gallons within any month of the twelve (12) month review period shall receive service under the Industrial tariff unless the customer can demonstrate to the satisfaction of the Utility Director that the measured usage was the result of a nonrecurring circumstance. The rate class review period is a period of twelve (12) consecutive billing months that Las Cruces Utilities will review to determine the customer's appropriate rate classification. An initial rate review will be conducted in conjunction with the implementation of new rates approved by the Board of Commissioners for the City of Las Cruces Utilities. Subsequent rate reviews will be undertaken approximately twelve (12) months from the effective date of the new rates and every twelve (12) month period thereafter. A customer's rate classification will not be changed as a result of a rate review in the absence of at least twelve (12) consecutive months of billing history.

Landscape water meter available per Landscape Meter Schedule, see Sheet No. W-2010-12.

RATE

The bills are the sum of:

Access Charge

Per month..... $37.00

Volume Charge

Summer Period (billing months of June, July, August, and September)
Per 1,000 gallons $2.05

Non-Summer Period (all other billing months)
Per 1,000 gallons $1.71

Tax

Applicable Taxes & Payment in Lieu of Franchise Tax assessed by a Governmental Authority and not included in Cost of Service rates.

BILLING UNITS

The unit volume for the purpose of measurement per service shall be 1,000 gallons for the amount consumed in a billing cycle.

LAS CRUCES UTILITIES

WATER
INDUSTRIAL

AVAILABILITY

Available in the Las Cruces Utilities water service area for any establishment engaged in the operation of a business; an institution, whether or not for profit; or a governmental entity.

Such enterprises will include, but not limited to, industrial installations, schools, hotels, motels, municipal, county or federal buildings, etc.

This rate applies to such customers whose consumption within the billing cycle equals to or exceeds 1,250,000 gallons within any month of the twelve (12) month rate class review period. The rate class review period is a period of twelve (12) consecutive billing months that Las Cruces Utilities will review to determine the customer's appropriate rate classification. An initial rate review will be conducted in conjunction with the implementation of new rates approved by the Board of Commissioners for the City of Las Cruces Utilities. Subsequent rate reviews will be undertaken approximately twelve (12) months from the effective date of the new rates and every twelve (12) month period thereafter. A customer's rate classification will not be changed as a result of a rate review in the absence of at least twelve (12) consecutive months of billing history.

Landscape water meter available per Landscape Meter Schedule, see Sheet No. W-2010-12.

RATE

The bills are the sum of:

Access Charge
Per month..... $1,000.00

Volume Charge
Summer Period (billing months of June, July, August, and September)
Per 1,000 gallons $1.54

Non-Summer Period (all other billing months)
Per 1,000 gallons $1.28

Tax
Applicable Taxes & Payment in Lieu of Franchise Tax assessed by a Governmental Authority and not included in Cost of Service rates.

BILLING UNITS

The unit volume for the purpose of measurement shall be 1,000 gallons for the amount consumed in a billing cycle.

WATER
PAZ WELL MUNICIPAL PARKS IRRIGATION – NON-POTABLE

AVAILABILITY

Available in the Las Cruces Utilities water service area for any municipally owned park where non-potable water wells are located and used for the purpose of landscape irrigation.

RATE

The bills are the sum of:

Access Charge
Per month..... $0.00

Volume Charge
Summer Period (billing months of June, July, August, and September)
Per 1,000 gallons $1.32

Non-Summer Period (all other billing months)
Per 1,000 gallons $1.32

Tax
Applicable Taxes & Payment in Lieu of Franchise Tax assessed by a Governmental Authority and not included in Cost of Service rates.

BILLING UNITS

The unit volume for the purpose of measurement shall be 1,000 gallons for the amount consumed in a billing cycle.

LAS CRUCES UTILITIES

WATER
BULK WATER – HYDRANT METERED

AVAILABILITY

Available in the Las Cruces Utilities water service area by permit for use in connection with the construction, alteration or repair of buildings or other similar activities requiring temporary service through hydrant meters.

To protect the water system from contamination, a backflow device (reduced pressure principle assembly) may be required to be installed on the hydrant meter. The backflow device shall be provided by Las Cruces Utilities. Testing of the backflow device shall be procured by the customer from Las Cruces Utilities or a certified backflow device testing provider that is accepted and recognized by the City of Las Cruces Pollution Program.

A separate charge will be imposed for each relocation of any bulk water meter.

RATE

The bills are the sum of:

Access Charge
Per month..... $23.50

Volume Charge
Summer Period (billing months of June, July, August, and September)
Per 1,000 gallons $3.74

Non-Summer Period (all other billing months)
Per 1,000 gallons $3.12

Bulk Hydrant Meter Relocation Charge
Per relocation..... $150.00

Backflow Device Fee..... $50.00

Tax

Applicable Taxes & Payment in Lieu of Franchise Tax assessed by a Governmental Authority and not included in Cost of Service rates.

BILLING UNITS

The unit volume for the purpose of measurement shall be 1,000 gallons for the amount consumed in a billing cycle.

LAS CRUCES UTILITIES

WATER
PARKS

AVAILABILITY

Available by contract in the Las Cruces Utilities water service area for parks for the purpose of irrigation. All other related uses will be billed as per the appropriate Commercial rates.

RATE

The bills are the sum of:

Access Charge
Per month…… $82.00

Volume Charge
Summer Period (billing months of June, July, August, and September)
Per 1,000 gallons ……..... $1.93

Non-Summer Period (all other billing months)
Per 1,000 gallons …… $1.61

Tax
Applicable Taxes & Payment in Lieu of Franchise Tax assessed by a Governmental Authority and not included in Cost of Service rates.

BILLING UNITS

The unit volume for the purpose of measurement shall be 1,000 gallons for the amount consumed in a billing cycle.

LAS CRUCES UTILITIES

WATER
GOLF COURSE

AVAILABILITY

Available by contract in the Las Cruces Utilities water service area to any golf course customer.

RATE

The bills are the sum of:

Access Charge
Per month…… $1,000.00

Volume Charge
Per 1,000 gallons ……..... $1.54

Tax
Applicable Taxes & Payment in Lieu of Franchise Tax assessed by a Governmental Authority and not included in Cost of Service rates.

BILLING UNITS

The unit volume for the purpose of measurement shall be 1,000 gallons for the amount consumed in a billing cycle.

LAS CRUCES UTILITIES

Sheet No. W-2010-10
Approval Date: August 12, 2010
Effective Billing Date: October 1, 2010
Case No: **2009 -001 (W)**

WATER
PARKS AND GOLF COURSE INTERRUPTIBLE TIME OF USE

AVAILABILITY

Available in the Las Cruces Utilities (LCU) water service area for golf courses and municipally owned parks for the purpose of irrigation. This will only apply to golf courses having ponding facilities to meet interruption of service events and parks that are willing to meet the operational needs of the utility.

A meter is installed to measure use during on-peak (6:00 a.m. to 6:00 p.m.) and off-peak (6:00 p.m. to 6:00 a.m.) hours. The Off-Peak rate applies to any water used during off-peak (6:00 p.m. to 6:00 a.m.) or any alternate period determined by the utility. All other use not off-peak will be billed at the On-Peak rate.

Service under this schedule shall be subject to interruption as determined by the Utilities Director or designee in response to system operational needs. The customer must cease water consumption upon notification to interrupt service. Customers shall receive notification from the Utilities Director or designee when an interruption of service event has been terminated and consumption of water can be resumed. A single interruption of service notification by LCU shall not exceed ten (10) continuous hours in duration. A customer's failure to cease water consumption upon notification or during an interruption of service event shall be deemed a non-compliance event.

Customers who fail to comply with interruption of service notification will be billed at the On-Peak rate for service taken during the interruption period and will be subject to a penalty as set forth below. The Utilities Director has the option to cancel service under this schedule when a customer fails to comply with interruption of service notification.

A meter shall be installed to measure water use by time of day for service under this schedule. The customer shall install the time of use meter at customer's own expense.

A condition of service under this schedule is signing a contract to include designation of a person responsible for ceasing water consumption.

RATE

The bills are the sum of:

Golf Course

Access Charge
Per month…… $850.00
Volume Charge
On-Peak Rate Volume Charge
Per 1,000 gallons…… $3.09
Off-Peak Rate Volume Charge
Per 1,000 gallons…… $1.03

Parks

Access Charge
Per month…… $82.00
Volume Charge
On-Peak Rate Volume Charge
Per 1,000 gallons…… $3.09
Off-Peak Rate Volume Charge
Per 1,000 gallons…… $1.03
Non-Compliance Penalty
Penalty for each non-compliance event…… 35% of Total Bill for billing cycle
Tax
Applicable Taxes & Payment in Lieu of Franchise Tax assessed by a Governmental Authority and not included in Cost of Service rates.

BILLING UNITS

The unit volume for the purpose of measurement shall be 1,000 gallons for the amount consumed in a billing cycle.

LAS CRUCES UTILITIES

Sheet No. W-2010-11
Approval Date: August 12, 2010
Effective Billing Date: October 1, 2010
Case No: **2009 -001 (W)**

WATER
RECLAIMED WATER SERVICE

AVAILABILITY
Available in the Las Cruces Utilities reclaimed water service area for the exclusive use of golf courses, parks, and medians and for construction water for irrigation, non-potable purposes, or other authorized use through regulations. The customer must execute a reclaimed water use agreement.

RATE
The bills are the sum of:

Access Charge
Per month…… $20.00

Volume Charge
Per 1,000 gallons…… 50% of applicable potable water rate schedule

Tax
Applicable Taxes & Payment in Lieu of Franchise Tax assessed by a Governmental Authority and not included in Cost of Service rates.

BILLING UNITS
The unit volume for the purpose of measurement per service shall be 1,000 gallons for the amount consumed in a billing cycle.

LAS CRUCES UTILITIES

WATER
LANDSCAPE METER

AVAILABILITY
Available in the Las Cruces Utilities to all classes for irrigation purposes except for golf courses and municipal parks. The customer must pay for all expenses associated with the installation of the landscape meter.

RATE
The bills are the sum of:

Access Charge
Per month..... 50% of applicable Access Charge

Volume Charge
Per 1,000 gallons..... Applicable summer rate

Tax
Applicable Taxes & Payment in Lieu of Franchise Tax assessed by a Governmental Authority and not included in Cost of Service rates.

BILLING UNITS
The unit volume for the purpose of measurement per service shall be 1,000 gallons for the amount consumed in a billing cycle.

LAS CRUCES UTILITIES

Sheet No. W-2010-13.1
Approval Date: February 10, 2011
Effective Billing Date: March 1, 2011
LC Utilities Board Resolution 10-11-020

WATER
CONNECTION CHARGES

Line Size	Service Line (up to 25')	Meter Charge	Service Line Additional Ft.	Manifold	Pavement Cut	Pavement Cut (Over 25')	Main Line Extension	Size	Mainline Water Tap Fee
3/4 "	$ 1,020	$ 187	$ 20	$ 100	$ 750	$ 30	$ 40		
1"	$ 1,020	$ 246	$ 20	$ 100	$ 750	$ 30	$ 40		
1 1/2"	$ 1,160	$ 408	$ 20	$ 100	$ 750	$ 30	$ 40		
2 "	$ 1,360	$ 627	$ 20	$ 100	$ 750	$ 30	$ 40		
3 "	$ 1,340	$ 1,644	$ 20	$ 100	$ 750	$ 30	$ 40		
4 "	$ 1,340	$ 2,317	$ 25	$ 100	$ 750	$ 30	$ 50	4"	$ 1,245
6 "	$ 1,590	$ 2,614	$ 25	$ 100	$ 750	$ 30	$ 50	6"	$ 1,245
8 "	Based on Cost								

*** Special metering equipment required to serve a customer, including time of use meters, may cost more than the amounts set forth on this schedule. In such cases, the customer will be responsible for the actual cost of meter installation, including the meter itself, any other equipment or facilities, labor taxes, etc.**

Meter Relocation Charge: Same charge(s) as a connection.

$150 Unable to Connect Service Charge
This charge shall be made when Las Cruces Utilities is notified by the customer or customer's representative that the service site is ready for service and connection and utility personnel have been scheduled to physically connect service, but are unable to connect the service due to, among other things, work site obstructions or incomplete service installation necessary for the utility to perform the necessary and appropriate connection.

LAS CRUCES UTILITIES

WATER
BILLING ISSUES

Disputed Bills
Customers may dispute their billings up to 6 months from the due date.

Refunds
If it is determined the Las Cruces Utilities made or was the cause of a billing error, refunds will be retroactive for up to twelve (12) months from the time the request was submitted to Customer Service for review.

Retroactive Billing due to Tampering
If it is determined that a meter was tampered with, Las Cruces Utilities will make every effort to bill to the latest known billing that was not impacted by tampering. The highest volume between the route or city average for the class will be used for all affected billing periods plus a 30% total pretax billing penalty [(access charge + volume charge = pretax total bill) X 1.30 = adjusted pre-tax bill].

Services rendered without Account Activation
When a customer receives utility services and does not submit an application for services to Customer Service, retroactive billing for a minimum five year period will commence at the time the discovery is made of the unbilled services. The bills for all affected periods will be based on the route or city average for the class. If the customer can prove to the Customer Service Manager's satisfaction that neither they nor any tenant or related person benefited from the services, then the retroactive billing will begin at the time period determined by the Customer Service Manager with consent of the Utilities Director.

LAS CRUCES UTILITIES

Sheet No. W-2010-15
Approval Date: August 12, 2010
Effective Billing Date: October 1, 2010
Case No: 2009-001 (W)

WATER
LITIGATION COST RECOVERY RATE RIDER

APPLICABILTY

All water service provided by Las Cruces Utilities shall be subject to the terms of this rider schedule.

LITIGATION COST RECOVERY RATE RIDER (LCRR)

Applicable Litigation Cost Recovery Rate Rider established by order of the Utilities Board. The LCRR shall enable Las Cruces Utilities to recover or refund litigation expenses exceeding or falling below the level approved in LCUB Case No. 2009-001 (W) and defined as the Baseline Litigation Costs (BLC). A recovery or refund shall be based on the positive or negative difference between the latest fiscal year litigation expenditures and the BLC. The recovery or refund factor shall be calculated based on the total water consumption for the reconciled fiscal year and shall be reflected on customer bills as a charge in dollars and/or cents per 1,000 gallons billed.

TAX

Applicable Taxes & Payment in Lieu of Franchise Tax assessed by a Governmental Authority and not included in Cost of Service rates.

BILLING UNITS

The unit volume for the purpose of measurement per service shall be 1,000 gallons for the amount consumed in a billing cycle.

LAS CRUCES UTILITIES

Sheet No. W-2010-16
Approval Date: August 12, 2010
Effective Billing Date: October 1, 2010
Case No: 2009-001 (W)

WATER
DEVELOPMENT IMPACT FEE RATE RIDER

APPLICABILTY

All water service provided by Las Cruces Utilities shall be subject to the terms of this rider schedule.

DEVELOPMENT IMPACT FEE RATE RIDER (DIFRR)

Applicable Development Impact Fee Rate Rider established by order of the Utilities Board. The DIFRR shall enable to Las Cruces Utilities to recover or refund Development Impact Fee expenses for which ratepayers are responsible exceeding or falling below the level approved in LCUB Case No. 2009-001 (W) defined as the Baseline Development Impact Fee Expense (BDIFE). A recovery or refund shall be based on a positive or negative difference between actual fiscal year development fund expenses for which ratepayers are responsible and the BDIFE. The recovery or refund factor shall be calculated based on the total water consumption for the reconciled fiscal year and shall be reflected on customer bills as a charge in dollars and/or cents per 1,000 gallons billed.

TAX

Applicable Taxes & Payment in Lieu of Franchise Tax assessed by a Governmental Authority and not included in Cost of Service rates.

BILLING UNITS

The unit volume for the purpose of measurement per service shall be 1,000 gallons for the amount consumed in a billing cycle.

(e) *Hearing officer.* Upon timely receipt of a request for hearing, the DWR shall request the appointment of a hearing officer by the city manager. The hearing officer shall not be a city employee and shall have knowledge of the technical requirements. Any reasonable fees and expenses of the hearing officer shall be paid by the city. The user shall reimburse the city for these fees and expenses and for any other reasonable costs of the hearing if the user does not prevail. The hearing officer shall have the discretion to prorate the fees, charges, and costs of the hearing if a compromise decision is reached.

(f) *Continuation of suspension, revocation, or termination.* The suspension, revocation, or termination shall continue in effect from the effective date given in the notice of the suspension, revocation, or termination until completion of the hearing, provided that all such hearings shall begin within 30 days of the day that the DWR received the request for hearing. In the event that hearing is not begun within the 30 day period, the suspension, revocation, or termination shall be delayed until the hearing officer issues a final determination. The hearing officer's final determination shall be the final administrative decision and shall exhaust all administrative remedies of the parties.

(g) *Appeal to district court.* Any party aggrieved by a final decision of the hearing officer may appeal to the state district court within 30 days after receipt of final administrative decision.
(Ord. No. 1793, § I, 4-17-00)

Sec. 28-294. Industrial user noncompliance—Civil action.

(a) *Injunctive relief.* The city attorney may, in the name of the city, file in state district court or such other courts as may have jurisdiction, a suit seeking the issuance of an injunction, damages, or other appropriate relief to enforce the provisions of this article or applicable law or regulation.

(b) *Assessment of damages.* When a discharge of waste causes an obstruction, damage, or any other impairment to the POTW or any other expense to the city, the city shall assess the expenses incurred. The DWR shall file a claim with the user or any other person causing or allowing said damages to occur seeking reimbursement for any expenses incurred by the city. If the claim is ignored or denied, the DWR shall notify the city attorney to take such measures as shall be appropriate to recover any expense or other damage suffered by the city.
(Ord. No. 1793, § I, 4-17-00)

Sec. 28-295. Industrial user noncompliance—Additional remedies.

In addition to other remedies for enforcement provided herein, the DWR may petition NMED or EPA to exercise such methods or remedies as shall be available to such government entities to seek criminal or civil penalties, injunctive relief, or such other remedies as may be provided by applicable federal or state laws to insure compliance by users of applicable pretreatment standards, to prevent the introduction of toxic pollutants or other regulated pollutants into the POTW, or to prevent such other water and/or ground water pollution as may be regulated by state or federal law.
(Ord. No. 1793, § I, 4-17-00)

Secs. 28-296—28-300. Reserved.

ARTICLE VII. WATER CONSERVATION

Sec. 28-301. Title; purpose.

This article shall be known as the Water Conservation Ordinance. This article shall both require and encourage all users of water within the city limits to reduce water consumption and waste.
(Code 1988, § 29-361)

Sec. 28-302. Applicability.

(a) The restrictions contained in this article shall apply to all users of city-provided water and to all users of water provided by water utility companies franchised by the city; however, the water use restrictions contained in subsection 28-304(b)(1) shall apply to all water users within the city limits.

(b) The outdoor vegetation watering restrictions in section 28-303 shall not apply to users of irrigation water provided by Elephant Butte Irri-

gation District, or to users of water provided by mutual domestic water companies or from domestic wells.
(Code 1988, § 29-362)

Sec. 28-303. Outdoor vegetation watering restrictions.

(a) All outdoor vegetation on residential and commercial properties located (i) on the even numbered side of the street shall be watered only on Tuesdays, Thursdays and Saturdays, and (ii) on the odd numbered side of the street shall be watered only on Wednesdays, Fridays and Sundays. For corner buildings or properties having both odd and even numbers, the number shown on the city's or the franchised water companies' utility records shall control.

(b) From April 1 to September 30, all outdoor watering of vegetation is prohibited between the hours of 10:00 a.m. and 6:00 p.m.

(c) A water utility company franchised by the .ty may apply yearly to the city's utilities division for a waiver from the outdoor vegetation watering restrictions in this section in accordance with the following:

(1) The waiver will be granted by the utilities division if it determines that compliance with these restrictions will negatively impact the company's water system operations. The granting and the renewal of any waiver will be based on the company's consumption patterns being comparable to the city's residential water use.

(2) Each waiver request must be accompanied by monthly water use records for the past year. The utilities division may require that the company provide additional information to justify the waiver request.

(3) If the utilities division denies the waiver, the water company may file a written appeal with the city manager within ten days of the denial. The city manager will issue a final written decision within 20 days of receipt.

(4) The waiver may be revoked by the city in a declared water emergency.

(Code 1988, § 29-363)

Sec. 28-304. Miscellaneous water use restrictions.

(a) The washing of vehicles and other types of mobile equipment shall be done only with a handheld bucket or a handheld hose equipped with a functioning shutoff nozzle for quick rinses. This restriction does not apply to the washing of vehicles or mobile equipment at a commercial carwash or commercial service station. When used in this subsection, the term "bucket" means a container holding five gallons of water or less.

(b) The following uses of water are defined as wasting water and are prohibited:

(1) Allowing water to flow onto adjacent property or onto any street, alley or other public right-of-way.

(2) Watering outdoor vegetation excessively so that water ponds on site.

(3) Failing to repair a water leak within five working days of the discovery of the leak.

(4) Washing sidewalks, driveways, parking areas, tennis courts, patios and other impervious surfaces with a hose, except in emergencies to remove spills of hazardous materials or to eliminate dangerous conditions which threaten the public health, safety or welfare. When used in this subsection, the term "impervious surface" means any surface covered with nonporous material.

(Code 1988, § 29-364)

Sec. 28-305. Penalty, injunctive relief authorized.

(a) Any person who is convicted of a violation of any section of this article shall be guilty of a petty misdemeanor and shall be punished in accordance with section 1-10.

(b) With respect to violations that are continuous in time, each day the violation continues is a separate offense.

(c) Violations that are continuous in time may be abated by injunctive or other equitable relief. The imposition of a criminal penalty does not prevent equitable relief.
(Code 1988, § 29-365)

Sec. 28-306. Exceptions to enforcement.

The following shall constitute exceptions from compliance with this article concerning outdoor vegetation watering restrictions and miscellaneous water use restrictions:

(1) The water flow is a result of natural events such as rain or snow, unless the user is watering at the same time.

(2) The water flow is a result of temporary malfunctions of or vandalism to the municipal water supply system.

(3) The water flow is a result of water used for firefighting purposes, including the inspection and pressure testing of fire hydrants, or the use of water for firefighting training activities.

(4) The use of water is required for the control of dust or the compaction of soil as may be required by municipal codes.

(5) The water is used to wash down areas where flammable or otherwise hazardous material has spilled, creating a dangerous condition.

(6) The water is used to prevent or abate public health, safety or accident hazards when alternate methods are not available.

(7) The water is used for routine inspection or maintenance of the municipal water supply system.

(8) The water is used to facilitate construction within public a right-of-way in accordance with city requirements and good construction practices.

(9) The use of the water is permitted under a variance granted by the city.

(10) The water is used for street sweeping, sewer maintenance or other established utility practices.

(11) Watering contrary to the odd/even or time of day requirements is permitted for one day only where application of chemicals requires immediate watering to preserve an existing lawn.

(12) Watering contrary to the odd/even or time of day requirements is permitted for up to two weeks for newly planted landscaping vegetation.
(Code 1988, § 29-366)

Sec. 28-307. Water emergency; restriction of water use.

(a) The city council may declare a water emergency during a severe drought or during any condition which significantly reduces the city's ability to supply water in order to protect the public health, safety or welfare or to preserve the water supply.

(b) During such a water emergency, the city manager may implement water use restrictions approved by the city council.
(Code 1988, § 29-367)

Secs. 28-308—28-350. Reserved.

ARTICLE VIII. ELECTRIC UTILITY*

Sec. 28-351. Authority.

The city council, pursuant to NMSA 1978, § 3-24-1 and article 10, section 6 of the state constitution, enacts this article relating to the establishment of an electric utility as authorized by such sections.
(Code 1988, § 29-351; Ord. No. 1793, § II, 4-17-00)

Sec. 28-352. Purpose.

The purpose of this article is to provide for the efficient delivery of reliable electric power service to electricity consumers in the city at the lowest cost.
(Code 1988, § 29-352; Ord. No. 1793, § II, 4-17-00)

*Editor's note—Ord. No. 1793, § II, adopted April 17, 2000, renumbered former article VI, sections 28-266—28-270 as new article VIII, sections 28-351—28-355.

State law reference—Electric utility, NMSA 1978, § 3-24-1 et seq.

Appendix E: Water Conservation Plan Advisory Committee Comments	
Committee Member Expertise	**Committee Member Comments**
Irrigation and Landscape	• Increase Utilities involvement for permit requirements for new irrigation system installation. (Include site inspection and site audit) • Implement required landscape standard for new residents/buildings to adopt smart /rain sensor controllers • Implement master valve in irrigation designs that will help reduce water loss in cases of leaky valves. • Prohibit use of overhead spray irrigation for watering of trees and shrubs. • Offer incentive programs (i.e. award program for homeowners that lower their gpcd).
Environmental	• Conserve to Enhance Program – Program that allows residents who are motivated to conserve water to reduce their water bills and dedicate the cost savings to local environmental enhancement projects.
Homeowner/Community Organizer	• Implement rainwater harvesting project
Realtor Association	• Education of realtors • Implement water conservation feature to MLS for proper use of irrigation systems and water audits • Develop water conservation materials for title and escrow companies that will become part of closing packets. • Distribute educational materials to new homeowners concerning landscape irrigation. • Promote “green” homes and their environmental benefits.
In-door water use/plumbing/appliance distributor	• Promote EPA WaterSense products • Encourage installation/replacement of low flow toilets for older residential homes. • Encourage installation/replacement

	of low flow showerheads and faucets • Encourage installation of hot water recirculation. • Develop public information materials for involuntary water conservation practices (i.e. fix leaky faucets, use shutoff valve on hose, run clothes and dish washer only with full load • Develop demonstration workshops on current up-to-date water conservation devices
Professor/Extension Turf Specialist	• Identify the purpose of landscape for water conservation. What exactly are the quality expectations? (i.e. high traffic and cold tolerance use Kentucky bluegrass, perennial ryegrass, and tall fescue; for low traffic and cold tolerance use buffalograss and blue grama grasses.) • Identify irrigation requirements/evapotranspiration rate (ET) for specific turf • Use weather stations to identify ET rates • Conduct irrigation audits and workshops • Consider alternative irrigation systems (subsurface drip) that apply water uniformly and more efficient than traditional sprinkler systems
Hotel, Restaurants and Tourism	• Conduct irrigation audits and workshops for landscaping • Consider using graywater for landscape watering • Conduct workshops on water usage for cleaning • Conduct workshops for cleaning staff on water conservation practices (bedding items) • Examine other alternatives for cleaning of floors. • Install low flow toilets in older restaurants and hotels • Conduct leak detection audits (indoor

	use)
Las Cruces Public Schools	• Conduct landscape audits and education for irrigation and grounds maintenance. • Develop and adopt policy for a general irrigation scheduling and water budgets. Currently each school controls their own grounds and watering schedules, which vary from school to school. Conducting in-door water audits.
Medical Institutional	• Currently 90 percent of the hospitals have been retrofitted with water efficiency toilets and showerheads. Maintenance is using microfiber for cleaning of floors. Icemaker has been converted to air-cool instead of water cooled. The hospital does have a variance due to the amount of landscape.

Appendix F: Water Conservation Plan Public Comments:		
Category	**Comments**	**Response**
Public Input Meetings		
Rates	Current rates are very cheap – possibly raise water rates but lower reclaimed water rate.	During the last water rate case (2010) the Rate Advisory Committee requested that LCU review the rates in 2 years; examining the possibility of a third tier for water conservation.
Reuse	1. Allow residents to have water tanks where reuse can be delivered to their homes for outdoor landscape use. Make reuse water available for landscaping (residential/businesses). Make it easier for public to use reuse water. 2. Make it mandatory that companies use reuse water for dust control and other uses instead of potable water. Send out information to construction companies that reuse is available. Explore ways for car washes to use reuse water	1. The discharge permit from New Mexico Environmental Department (NMED) regulates/restricts reclaimed water discharged from the East Mesa Reclamation Plant (EMRP). Currently our discharge permit allows reclaimed water for 2 public parks and other temporary uses. Temporary use can include (but not limited to) dust control, construction usage, and watering of landscape on street medians. We are currently working with Centennial High School on their discharge permit. Reclaimed water will be used for landscape. Sonoma Ranch Golf Course has their own discharge permit which allows them to discharge reclaimed water into their pond and blend with groundwater from their well for landscape usage. 2. The City will encourage the use of reuse for construction. The EMRP discharge permit will be renewed in 2012. At that time we will explore other uses for reclaimed water. Part of the problem with reuse is 1) the lack of purple pipe network throughout the City and 2) the amount of effluent actually going into the EMRP. We currently are only taking in about 250,000 GPD to the EMRP. The plant has the capacity of 1 MGD.
Indoor use	Pass an ordinance for the use of waterless urinals in the City	The International Uniform Plumbing Codes will be released in 2012. The new codes may require waterless urinals for new commercial construction.
Outdoor use (landscape)	Require/mandate all irrigation systems install a shut-off valve that will activate when a sprinkler head is broken. Mandate smart irrigation controllers. Take out the irrigation & design standard (guidelines/encouragement)	This mandate for irrigation systems is being addressed in the City Design Standards Committee. The City is encouraging smart technology and has written a proposal to BOR for a smart irrigation controller rebate. The guidelines for the irrigation & design standards are being address through the City Design Standard Committee. Those listed in the plan are just guidelines. All of the

		guidelines are based on established research conducted at NMSU.
Incentives	Rebates: First meeting it was discussed. Second meeting discussed offering rebate for turf removal.	The current rate structure does not allow financial incentives such as rebates.
Education	Landscaping classes – complement NMSU Master Gardener program. Landscape watering classes. Classes on native vegetation, irrigation controllers, soils, evaporative coolers.	The Water Conservation Program will continue the Lush & Lean Program which was established in 2006. Workshop classes will focus on outdoor irrigation usage.
General comments:	1. Change terminology – Conservation gives a negative connotation to the public; adopt a new program title such as water-wise. 2. Reaching the public, list serve, information cards, publications, 3. Plan needs to be rational and understandable 4. Climate change mentioned in the Plan needs to be focused on local impact. 5. Why do we need a Plan? 6. Water Quality – water has deteriorated over the years. 7. City Council needs to identify ideas to exploit new sources of water, something that goes beyond conservation and promote open space.	1. We will be working with our Public Relations Firm (Suzanne Michaels Communications). Much of the cool water conservation titles have been taken. Water Conservation Program will work on establishing a more positive connotation for the public. 2. We are working on building a list serve, information cards, and publications to reach the public. We will be working with NMSU-CES for help. 3. There was no clarification as to what was not rational or understandable. 4. This section has been removed from the Plan. 5. We need a Water Conservation Plan to meet the City water right permit requirements. Additionally, the City has had a WC program since 1999. Water Conservation is not a new program for the City. 6. Water Quality: Water in this area is moderately hard, which is common to deep groundwater systems. However, hardness in this area has been consistent over time. It is possible that during times of drought the characteristics of our water could change. **7.** The strategic plan has directives that explain the use of reclaim and reuse water which is a new source of water.

E-mail or written comments:		
Golf courses	Concerned about the number of golf courses in such a small radius. Suggested that City Planning re-evaluate if the income generated by more than 3 golf courses outweighs the drain on our water resources. During construction of Red Hawk Golf course they noticed a many leaks in the big line running from the water hydrant to the course.	Currently LCU supplies water to 2 golf courses. One golf course is using nonpotable water while the other golf course is using potable water. Potable water usage is 1% (.0103) of LUC total system water.
Neighborhood Associations	Neighborhood association does not promote or encourage water conservation. Association restricts/does not allow graywater or rainwater harvesting.	We have included the neighborhood associations on our list serve and will encourage associations to participate in the Lush & Lean program and other Water Conservation Programs. Currently conducted a water conservation program presentation at the recent Neighborhood Summit (February, 2012).
Communication	More active with water conservation tips and suggestions in the news.	As mentioned earlier we will be working with PIO and PR firm to promote water conservation tips.
Enforcement	Tougher – codes enforcement needed to be more aggressive with their citations	We will be working closely with codes to address water wasting. As mentioned in the Plan, Codes Enforcement takes a holistic approach combining education and outreach. We will work in unison with Codes on water conservation outreach and educational programs.
Fire hydrant flushing	Fill tankers with the flushed water instead of allowing it to run down the street (2 comments).	1. For 2011 we had 13 schedule water flushes. These flushes are required and needed to test water line pressure on the 550 plus miles of water lines under the City. The flushes can use as little as 7,500 GPM or as much as 60,000 GPM. In order to collect accurate data for water line pressure it is not possible to obstruct or collect the water. Water used for test flushing is equivalent to 0.0001 percent of total water usage on our system. 2. Fire protection and training. Currently the fire department conducts at least 1 to 3 fires or trainings each month. The fire department has taken steps to be more précis on the amount of water used for protection and training. It is very difficult to collect water from their trainings. 3. Dirty water calls requires the LCU to flush the water lines. Water being flushed due to dirty water calls includes a large amount of iron and magnesium in the water. LCU does not advise or encourage the usage of

		this water. Adding additional iron or magnesium may damage or destroy vegetation.
Education	Start a school water conservation campaign.	We will be having our first water festival March 15 at Young Park. We currently have 20 presenters and over 950 third and fourth graders attending the event. We hope to conduct the festival every year. The WC Program has taken part in several school functions (science fairs) and we are providing resources and materials to teachers. Additionally, we hope to have a Project Wet training session summer, 2012 for teachers.
General Comments and Questions:	General Comment and Concern: Since the City has sufficient water resources (45,069 acre feet of water rights) for traditional uses for the foreseeable future, that it is very close (within 8 gpcpd) to the State Engineer's 180 gpcd goal as stipulated in the West Mesa Permit, and that the City has committed itself to a reduction of residential water use for the sole purpose of protecting a single permit for 8,000 acre-feet of water rights to offset industrial uses in the West Mesa Industrial Park. That permit requires the system-wide gpcd of 180 within 20 years of issue (i.e., by 2030) and a further, unstated "aggressive" reduction within 40 years (i.e., by 2050). The City's own plan tasks itself to achieve a reduction of residential gpcd to 121 (from the current 145), but not for another 34 years (by 2045). Concern is that in discussing the issue of water resources, the City does not present these time frames when discussing requirements, and instead provides justification for quickly meeting or exceeding the goal using such emotional issues as drought and endangered species, which do not currently affect our ground water supplies in any appreciable way, nor does there appear to be any future concerns either - at least according to the Region 11 plan, and the City's own 40-year plan. Regarding the amount of water available, I note that in several places of the various plans and reports the City states it intends to meet "additional demand that may occur over the next 40 years [i.e., the difference between the high and maximum demand	Although the West Mesa Permits specifically discuss the requirements of a water conservation plan all of the City's groundwater rights require "conservation". The West Mesa Permits will supply water to all users within the system. Water Conservation is a regulator requirement. It is part of the 40 Year Water Development Plan, and a condition requirement of our permit by the Office of the State Engineer. The Water Conservation Plan is strong in education and programs. Wasting of water unconditionally requires enforcement per the Water Conservation Ordinance. LCU will continue to study and identify potential new sources of water as needed. LCU rates are based on revenue requirements and the cost of conducting business. LCU has designed a rate process that allows intervenors to join the filed rate case on their behalf. Additionally LCU provides support to the Rate Advisory Committee which consists of a 7 member committee that represents the residential and small business rate class in Las Cruces. It is through this process that the water rates will be evaluated and adopted.

	projections - i.e., about 13,000 acre feet per year in 2045] will be met from alternative sources such as desalination, deep wells, importation, and aquifer storage and recovery." However, nowhere in any of the plans or reports are the issues and processes of these solutions addressed at all. Nor are these considered as an alternative to conservation. So, I wonder where the "big idea" in this City regarding water is. It seems that neither Council nor Staff has come forward with any plan other than to create an accelerated time line for conservation goals that rely on threatening City residents with Misdemeanor fines and incarceration for non-compliance. According to the reports, we are using conservation - and doing so in a heavy handed way - solely because it is the easiest and (supposedly) least expensive way to lower demand. However, there is an alternative to conservation measures to meet the gpcd goals, and that is to increase supply from other sources, thus reducing the amount used from current sources. Let's take desalination for example: Las Cruces uses about 20,000 acre feet of water per year today. The new desalination plant in El Paso (on Ft. Bliss) produces 25,000 acre feet per year - 175 million gallons more than we use as a City. Below our bolsons lies an entire ocean of brackish and salt water, and if we would tap into it (using infusion wells to pump the brine into dry strata), we would not need to conserve water at all - or use our fresh water resources. At the very least we could provide the "industrial water" from such a system, saving the residents from the increased cost of such a system. The point is that we are not short of water in any way; the City simply lacks the vision to provide it to the citizenry. First comment: The Plan you are creating is to eliminate those issues which are not germane from future public presentations and justifications for the reduction in gpcd. Second comment: The City ensure that the citizenry	

	understands that the residential reductions, and the associated criminalization of utility "misuse" is to accommodate industrial uses, and should the citizens complain in sufficient numbers, that the City give up the permit that requires this reduction in residential use in favor of industry. You have stated that the report due to the State Engineer will involve no further citizen input, with the exception of sending it out by email to the five people who attended your meeting in October, and myself. The rationale seems to be that the 40-year plan is inviolate, and that the report is simply a staff function. I disagree. Third comment: The implementation of a new phase or period of the 40-year plan should include a thorough review of the 40-year plan. Since the current 40-year plan is only 3 years old, it does not seem that sufficient time has passed to conduct such a review. Which leads to the conclusion that the City is using the State Engineer's 2010 permit requirement to mask a political desire to increase water conservation, when no requirement exists in law or administration, or in nature (by depletion of water resources). Therefore, the City should of course submit the report required by the State Engineer, but pace the reduction in gpcd over the permitted period, i.e., 19 more years, not five. Fourth comment: Many requirements this City has made of its citizens, and that is to decriminalize what are essentially civil issues. When I was the City's Airport Manager, we created a City Ordinance that established misdemeanor crimes for failure to pay rents, for example, which is a strictly civil matter in any normal democracy. I was wrong, wrong, wrong to support such a thing, and the City is now wrong, wrong, wrong to use its police powers to punish citizens for watering their plants on the wrong day. Fourth comment therefore is to limit the City's water conservation efforts to education, and to rescind Sections 28-301 through 28-306 of the proposed Plan.	

	Fifth comment: The artificial cost-of-service fees. Although a graduated fee structure as we currently have was designed to create voluntary conservation**,** steepening the fee gradient for the purposes of conservation should be only be considered as a last resort in the case of a water emergency. Just as the City's easy adoption of ordinances creating criminals out of its utility customers who forget to check the calendar or their watches; it also likes to take the easy solution of soaking (pardon the pun) small groups of citizens with use-specific taxes or fees. This violates the very concept of why we have municipal government control of necessary utilities, and that is to provide those utilities for all legal and reasonable uses, without the profit motive hurting the citizen. That social contract is violated when the government uses its taxing power to force compliance with a self-imposed requirement. Sixth comment is to commission the appropriate plan or study to identify and exploit new sources of water, "such as desalination, deep wells, importation, and aquifer storage and recovery" as a supplement at least, or as a replacement, for the waters in the fresh water basins beneath us.	
Utilities Board Comments:		
Waterless Urinals	Commented on public input: Pass an ordinance for the use of waterless urinals in the City	The Uniform Plumbing Codes will be released in 2012. The new codes may require waterless urinals for new commercial construction.
Swamp coolers	Commissioner commented on water usage versus electricity from a recent AWWA publication on swamp coolers. The publication is in the AWWA February Journal.	LCU does supply information from OSE to the public concerning water usage in swamp coolers. During the development of the WC Plan we did consult with the Albuquerque Water Conservation Coordinator, who stated that the largest water efficiency (savings) program they had in place was their water audit program along with their HET rebate program. Recently Dr. Janie Chermack, Economics Professor from UNM and her PhD graduate student conducted research on the Albuquerque Water Conservation Rebate Program. This

		study outlines that the largest water savings on rebates comes from the HET program.
Education	What are you currently doing on water conservation education in schools?	As mentioned earlier our first water festival is March 15 at Young Park. We currently have 21 presenters and over 950 third and fourth graders attending the event. We hope to conduct the festival every year. The WC Program has taken part in several school science fairs and providing resources to teachers. Additionally, we hope to have a Project Wet training session Summer, 2012 for teachers and interested parties.

Utilities Connection:
“Putting Your Ideas into Action” water conservation meeting TOMORROW

By Esmeralda Almanza and Suzanne Michaels

Las Cruces Utilities is tasked with the enormous responsibility of assuring that we have clean, safe water now... and in the future. Water conservation is a big key to the future, and the city department is trying to learn what is most acceptable and most do-able for Las Cruces residents. You are invited to participate in the “Putting Your Ideas into Action” community meeting tomorrow evening: Thursday, October 6, 2011 from 6:00 to 7:30 pm in City Council Chambers at City Hall 700 N. Main.

Residents' suggestions will become part of the Las Cruces Utilities official Water Conservation Plan. “The Water Conservation Plan is going to be a 20 to 30 year roadmap for us that will be updated every 5 years,” says Leeann DeMouche, Water Conservation Coordinator for Las Cruces Utilities.

One big factor that many water customers don't seem to realize is that 30-50% of our tap water is used for landscaping purposes. Reduce that usage, and you dramatically reduce your water bill, as well as preserve water for the future.

Other factors affecting water availability include population growth and drought. Water is a scarce resource and with the population growth rate in the City (31% over the last decade) residents need to be proactive.

The purpose of the meeting is to obtain community input during the initial phase of the City of Las Cruces Water Conservation Plan. Las Cruces is no stranger to water conservation; the City has a long history conserving water and today the commitment making sure we have water for the future is as strong as ever.

Las Cruces Utilities seeks to reach its water conservation decisions through a public process. The Water Conservation Plan will detail the Las Cruces Utilities water system, as well as past and projected future water use, and water conservation measures and programs.

People unable to attend the public meeting can send written comments and suggestions to Water Conservation Coordinator Leeann DeMouche at ldemouche@las-cruces.org or to P.O. Box 20000, Las Cruces, NM 88004.

For those who want to get a head start on water conservation here are some tips:

- If you water your grass and trees more heavily, but less often, this saves water and builds stronger roots.
- Water lawns during the early morning hours, or evening when temperatures and wind speeds are lowest. This reduces losses from evaporation.
- When washing a car, use soap and water from a bucket. Then, use a hose with a shut-off nozzle for rinsing.
- Run your dishwasher and washing machine only when they are full.
- Never put water down the drain when there may be another use for it such as watering a plant.
- Don’t leave the water running when brushing teeth or shaving. Get in the habit of turning off the water when it’s not being used.

You can reach Las Cruces Utilities at 528-3511 from 8 a.m.-5 p.m. Monday-Friday. Utilities Connection is submitted by Suzanne Michaels Communications, Education and Public Outreach for Las Cruces Utilities: GAS – WATER – WASTEWATER – SOLID WASTE services for almost 100,000 Las Cruces residents.