CITY OF PORTALES
WATER CONSERVATION PLAN

Prepared for

City of Portales

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December 2014

EXECUTIVE SUMMARY

This Water Conservation Plan describes measures to be undertaken by the City of Portales to promote water conservation within the City's Water Utility Department service area. The Plan provides an overview of the need for conservation and a summary of the conservation measures that are expected to meet that need. This Plan updates the City's 2001 Water Conservation Plan by providing information on current water supply and use trends, an updated water demand reduction goal, evaluations of the City's water supply system and water use, and enhanced water conservation measures that have been adopted by the City to meet that goal.

Portales' sole source of water supply is groundwater from the depleting Ogallala/High Plains Aquifer. Because this aquifer is being pumped throughout eastern New Mexico at a rate that far exceeds natural recharge, it is a non-renewable resource and maintaining adequate production capacity will become increasingly difficult. Obtaining supplemental water supplies from the Canadian River at Ute Reservoir is the most promising long-term alternative to the current sole reliance on groundwater pumping. However, the date for completion of the Ute pipeline to Portales roughly coincides with the projected date at which the depleting aquifer may become unable to satisfy the City's current municipal water demand. A delay in completing the Ute project could, therefore, adversely impact the City's ability to meet its water demand. In view of a potential gap between the ability to meet water demands from groundwater pumping and completion of the Ute pipeline to Portales, the City has adopted an interim water demand reduction goal to help bridge that gap. This goal can be achieved through enhanced water conservation measures, through acquiring an additional, interim groundwater supply, or through a combination of both. This Water Conservation Plan describes enhanced water conservation measures that have the potential to achieve that goal.

Portales' water demand reduction goal is to reduce the City's total wellfield pumping by 40% from the 2012 demand of 1,125 million gallons to 700 million gallons/year by 2016. The total reduction of 425 million gallons will provide a buffer that would accommodate an approximately 5-year delay in Ute water delivery from 2025, as currently scheduled, to about 2030. Most of this reduction, an average of about 325 million gallons/year, is expected to be accomplished by the reuse of treated wastewater to irrigate City parks. Wastewater treatment plant upgrades are currently in progress and treated wastewater suitable for irrigation use is expected to be available by 2016.

The remaining reduction of about 100 million gallons is expected from a combination of enhanced seasonal landscape irrigation restrictions, reductions in water distribution system losses, and continued application of existing water conservation measures including a continuing reduction of indoor water use through increased conservation awareness and installation of water conserving fixtures, the continued use of inverted block water rates and progressive increases in those rates, and the enforcement of supporting City water management ordinances. The City's water conservation measures in effect in the four-year period between 2009 and 2013 yielded a water demand reduction of 139 million gallons and an additional reduction of 100 million gallons should be achievable. These measures will be accompanied by an enhanced outreach program to the public and local commercial and industrial water users to explain the need for enhanced water conservation, heighten public

awareness of a limited water supply, and improve the acceptability of necessary water conservation measures. The program will also provide information needed to identify and implement water savings measures that are reasonable and appropriate for individual circumstances.

The water conservation goals of these individual components are summarized below.

Potential Reduction in Wellfield Demand for Prioritized Conservation Measures

Conservation Measure	Potential Annual Reduction in Wellfield Demand by 2016	Target Annual Reduction in Wellfield Demand by 2016
Stakeholder involvement and public/business outreach	No direct reduction but essential for acceptance of other measures	No direct reduction but essential for acceptance of other measures
Seasonal landscape irrigation restrictions	50 to 95 million gallons	70 million gallons
Water conservation rebates	To be determined	To be determined
Reduce system losses	15 to 25 million gallons	20 million gallons
Wastewater reuse	290 to 365 million gallons	325 million gallons
Other current Best Management Practices	5 to 20 million gallons	10 million gallons
Aggregate Reduction	**360 to 505 million gallons**	**425 million gallons**
Target Reduction by 2016	**- -**	**425 million gallons**

Note: Implementing water conservation rebates is a goal of this Plan pending completion of legal and budgetary reviews.

If Ute water is delivered on or near schedule, it will still be desirable to reduce demand to well below the expected full Ute allocation of 1.12 billion gallons per year to create a prudent Ute water reserve for drought years, to have the option to store excess Ute water deliveries underground in the City's wellfields in wet years, and to conserve remaining groundwater in the wellfields for emergency use. Once the Ute Project is completed, it is expected that the City's water demand could be prudently increased depending on the then-forecasted frequency and magnitude of drought cycles, the capability to store Ute water in wet years, and the possible impacts of a progressively warming climate.

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1.0 INTRODUCTION

This 2014 Water Conservation Plan describes measures to be undertaken by the City of Portales to promote water conservation within the City's Water Utility Department service area. The Plan provides an overview of the need for conservation and a summary of the conservation measures that are expected to meet that need. This Plan updates the City's 2001 Water Conservation Plan by providing information on current water supply and use trends, an updated water demand reduction goal, evaluations of the City's water supply system and water use, and enhanced water conservation measures that have been adopted by the City to meet that goal. This Plan was prepared in concert with the City's *40-Year Water Development Plan*, the City's annual *Water Conservation and Use Reports*, and the City's recently prepared *Review of Water Supply Options*. This Water Conservation Plan refers to these other documents for detailed background information on the City's historic and projected growth, its water demands, its water supply, and the success of its water conservation measures.

This Plan and its predecessor 2001 Plan were prepared in stages and involved inputs from the Portales City Council, City employees, members of the public, and the New Mexico Office of the State Engineer. This Plan was prepared following updated guidance provided by the Office of the State Engineer (NMOSE 2013). The most significant changes under this guidance are evaluations of water losses in the City's water supply system and the use of water within the service area. These evaluations were conducted by completing a water loss audit using software provided by the American Water Works Association (AWWA) Water Loss Control Committee and completing a detailed per-capita water use analysis using NMOSE's Gallons per Capita per Day (GPCD) Calculator.

Portales' sole source of water supply is groundwater from the depleting Ogallala/High Plains Aquifer. The first step in preparing the City's Water Conservation Plans was the collection and review of supporting data. This included water supply, water demand, and distribution system data compiled by the City's Water Utility Department, and demographic and housing data from the U.S. Census Bureau, Eastern New Mexico University (ENMU), and local realtors. Information on local climate and other conditions was supplied by the Roosevelt County Agricultural Extension Office and the City of Portales. Review of the water supply and demand included an evaluation of the current and projected future ability of the City's wellfields to meet those demands. Water supply and demand data are prepared monthly through an internal audit program developed by the City's Water Utility Department and published annually in the City's *Water Conservation and Use Reports*. The most recent such report was prepared in 2014 and covers water conservation and use during calendar year 2013 (Wilson 2014). Additional analysis of the City's water supply projections, conservation measures, and the need for an updated water conservation goal was provided by the City's recent comprehensive review of water supply options (Wilson 2013). The results of these analyses provided a clear picture of the need for enhanced water conservation measures given the observed rate of depletion of the City's groundwater supply and the uncertainty in the timing of supplemental surface water supplies from Ute Reservoir on the Canadian River.

Portales' current water conservation program is described in this Plan. The City's past water conservation program is described in Section 2 of this Plan. Section 3 has been structured to identify local conditions and the need for water conservation in Portales. The need for water conservation led to the City's adoption of a new set of aggressive water demand reduction goals in 2013 in anticipation of potential future water shortages due to aquifer depletion. This Plan was developed to document a program for meeting those goals. Development of this program included evaluations of the City's distribution system water losses and water use within the City's service area to identify areas where more aggressive water conservation measures could be employed. These evaluations are described in Section 4. The City's existing and potential new Best Management Practices in water conservation are reviewed in Section 5 and those that can be implemented or enhanced to further reduce system losses, reduce per-capita consumption, and strengthen other aspects water conservation awareness are identified. Section 6 identifies those water conservation measures that have been prioritized to meet the City's current water demand reduction goals. This Plan has been prepared to be compliant with the requirements of §72-14-3.2 NMSA for water conservation plans, as described in Section 7. The last section of this Plan, Section 8, presents an overview of Portales' annual reporting documents.

2.0 PAST WATER CONSERVATION PROGRAMS

The need for enhanced water conservation became evident in 2000 and led to the preparation of the City's 2001 Water Conservation Plan (Wilson 2001a). That Plan was prepared following guidance provided by the NMOSE in *A Water Conservation Guide for Public Utilities* (NMOSE 2001). In addition, information supporting that plan was obtained from a trio of Water Conservation Plans for the cities of Roswell, Artesia, and Carlsbad, New Mexico. Those plans were prepared for the New Mexico Interstate Stream Commission by Lee Wilson and Associates, Inc. (1993a, b, c), and were intended to serve in part as models for preparing such plans. Additional information was provided by Metro Water Conservation, Inc. of Denver, Colorado (1991), the Metropolitan Water District of Southern California (1994), and the American Water Works Association (1993).

In preparing the 2001 Water Conservation Plan, Best Management Practices in water conservation that were found to be effective in other, similar communities were reviewed by the City of Portales Public Works Committee. That review considered many avenues for enhanced water conservation and provided general direction for establishing the type and scope of water conservation practices that would be appropriate for the City of Portales. The Public Works Committee consisted of the City Manager, the City's Public Works Director, several members of the City Council, representatives of the City's Water Utility Department and the Roosevelt County Water Coop, members of the City's Finance Committee and other key City committees, and members of the public. In summary, the following practices were adopted by the Committee and in subsequent meetings of the City Council and Water Utility Department.

- Education and outreach
- Comprehensive and accurate water accounting
- Utility and customer audits
- Distribution system leak identification and repair
- Conservation at public facilities
- Residential, commercial, and industrial demand reduction measures
- Water supply substitution and recycling
- Universal metering
- Water conservation rate structures
- Prohibition of waste
- Water-efficient fixture code
- Water-efficient landscaping code
- Xeriscaping demonstration gardens
- Water-efficient irrigation
- Water conservation rebates
- Emergency and drought water management

These Best Management Practices were again reviewed in preparation of this updated Plan. This review included identifying those water conservation measures that have already been implemented by the City, the potential water savings that could be expected from each additional measure, and the compatibility of alternative measures with the City's socioeconomic structure. Following presentations of current water supply and demand concerns to the City Council in open meetings, a new water demand reduction goal and additional water conservation measures to meet that goal were accepted by the City Council, and their documentation in this updated Plan was authorized.

New elements have been included in this updated plan, consistent with the updated guidance in *New Mexico Water Conservation Planning Guide for Public Water Suppliers* (NMOSE 2013). These new elements include the following:

- Updated information on the need for water conservation
- Additional information on local conditions
- Updated information on the City's distribution system performance including water loss metrics provided by the AWWA water loss audit
- Detailed metrics on the City's per-capita water consumption provided by NMOSE's GPCD Calculator
- A water demand reduction goal consistent with projected aquifer depletion rates and uncertainties in delivery of Canadian River water from Ute Reservoir
- Updated best management practices for water conservation that take into account the City's enhanced water conservation measures and wastewater treatment and reuse projects
- Implementation and performance objectives for new and continuing water conservation measures

This updated Plan has also been prepared to be compliant with the requirements of §72-14-3.2 NMSA (New Mexico Statutes Annotated) 1978 *Water conservation plans;*

municipalities, counties and water suppliers. A complete copy of this statute is included in Appendix C to this Plan. Section 7, Determination of Compliance with §72-14-3.2 NMSA 1978, has been added to this Plan to demonstrate compliance.

3.0 NEED FOR WATER CONSERVATION

3.1 Local Conditions

The City of Portales is located in east-central New Mexico and is the seat of Roosevelt County. Portales is located in a high desert environment on the Llano Estacado. The long-term average precipitation (1912-2013) is 16.56 inches and the most current 5-year average precipitation (2009-2013) is 13.78 inches. Average high/low daily temperatures range from about 60/30 F in winter to 95/65 F in summer.

Portales serves as a residential community for several small industries, Cannon Air Force Base, and Eastern New Mexico University (ENMU). Portales is also a supply center for outlying farms and ranches. The principal water-consuming industries operate both full- and part-time and include a soft drink bottling plant, a cheese factory, and a bioenergy production plant. Based on data from the 2010 U.S. census, ENMU, and the City's Water Utility Department, the estimated resident population within the City's Water Utility Department service area in 2013 was 15,807. This population was used in the 2013 per capita water use estimates presented in this Plan. The population estimate used in the City's 2001 Water Conservation Plan and in previous Water Conservation and Use Reports was larger because it included all people directly using and benefitting from the City's water supply. This included approximately 3,800 people in the surrounding rural area served by the Roosevelt County Water Coop outside the City's Water Utility Department service area and 4,700 non-resident students enrolled at ENMU that are not included in the population estimate for this Plan. According to U.S. Census Bureau data, there is an average of about 2.82 persons per household in Portales.

3.2 Need for Water Conservation

The City's sole source of water supply is groundwater from the Ogallala/High Plains Aquifer. This water is supplied by two wellfields. The principal source is the Blackwater Wellfield, located about 10 miles northeast of the City. A secondary source, used primarily during the higher demand summer months, is the older and smaller Sandhill Wellfield, located about 3 miles north of the City. Water is conveyed to the City in underground pipelines. The City has 9.26 million gallons of water storage capacity in five underground and surface tanks. To supplement its water supply, in 2001 the City purchased the Blackwater Farm and Las Lomas properties along with their appurtenant water rights to create a groundwater reserve adjacent to the City's Blackwater Wellfield. The City's water supply is currently derived from approximately 40 active wells, of which 35 are in the Blackwater Wellfield and five are in the Sandhill Wellfield. A map of the City's Water Utility Department service area is presented in the *40-year Water Development Plan* (Wilson 2001b, Figure 1).

Because the Ogallala/High Plains Aquifer is being pumped throughout eastern New Mexico at a rate that far exceeds natural recharge, it is a non-renewable resource. Meeting the City's water demands has been increasingly challenging because of continuing aquifer depletion. The City has addressed this problem through a long-term program of adding new wells to supplement older wells with declining production capacity. The City's original in-town wells were supplemented by the City's Sandhill wells beginning in the 1950s. This supply was supplemented by the City's Blackwater wells beginning in the 1960s. Today the City no longer uses its in-town wells and the Sandhill wells are nearly depleted. The Sandhill Wellfield typically provides about 10% of the City's water production capacity and the Blackwater Wellfield provides the remaining 90%. The production capacity of the wells in service in January 2014 was about 3,400 gpm, down from about 5,000 gpm in January 2007. Although the City will maintain adequate production capacity through the continuing addition of new wells, this will become increasingly difficult as the aquifer continues to deplete.

An adequate water supply is important to a community and Portales is actively pursuing the identification and acquisition of additional supplies. The City is expanding its existing Blackwater Wellfield into its groundwater reserve, it is seeking to acquire additional groundwater supplies on private land, and it is seeking to acquire a surface water supply from Ute Reservoir. As documented in a recent review of water supply options (Wilson 2013), the most viable long-term alternative is a renewable surface water supply from Ute Reservoir. However, the projected schedule for first Ute water delivery closely coincides with the projected date at which the aquifer may become unable to support the City's current municipal demand. Increased water conservation is essential to reduce the current demand and prolong the life of the aquifer to provide a buffer in the event that delivery of Ute water is delayed. Even if the delivery of Ute water is not delayed, the City's current reservation of Ute water may not satisfy all of its current demand in drought years and the additional impact of droughts on Ute water deliveries makes it important to reduce water demand through additional conservation.

3.3 Water Demand Reduction Goal

Portales' 40-Year Water Development Plan was prepared in February 2001 (Wilson 2001b). In that plan the projected future total water demand within the City's Water Utility Department service area was estimated to the year 2040 based on historic water use trends and on population projections developed by the University of New Mexico Bureau of Business and Economic Research. The total service area population consisted of all people benefitting from the City's water supply and included residents of the City, the surrounding rural area, and all students at ENMU. This population was projected to increase from about 20,000 in 2000 to about 25,000 in 2040. The average total water use in the service area during the five-year period from 1995 through 1999 was 1.31 billion gallons per year. During that period the use ranged from 1.21 to 1.46 billion gallons per year, largely due to dry and wet year cycles. Total per capita water use during that period averaged 192 GPCD. This water use rate was relatively low in comparison with many southwestern communities and reflected the numerous water conservation measures that the City had already implemented. The average annual demand with no additional

conservation measures was projected to increase from about 1.42 billion gallons in 2000 to 1.77 billion gallons in 2040. These values assumed a continuation of the then-current water use rate.

The goal of the 2001 Water Conservation Plan was to implement additional water conservation measures that would decrease the City's average annual water use to 167 GPCD by the year 2040. Achieving that goal required a 13 percent reduction in the City's water use as projected without additional conservation. The City's projected water demands with and without additional conservation as well as the actual total water demands through 2013 are shown graphically in Figure 1.

As will be seen in Section 4.2, the City's water use goal of 167 GPCD was reached in 2012 even when considering only the resident rather than the total benefitting population and was even lower in 2013. However, as described in the City's 2013 *Review of Water Supply Options* (Wilson 2013), additional and more aggressive water conservation measures are now needed given the observed rate of depletion of the City's groundwater supply and the uncertainty in the timing of supplemental surface water supplies from Ute Reservoir.

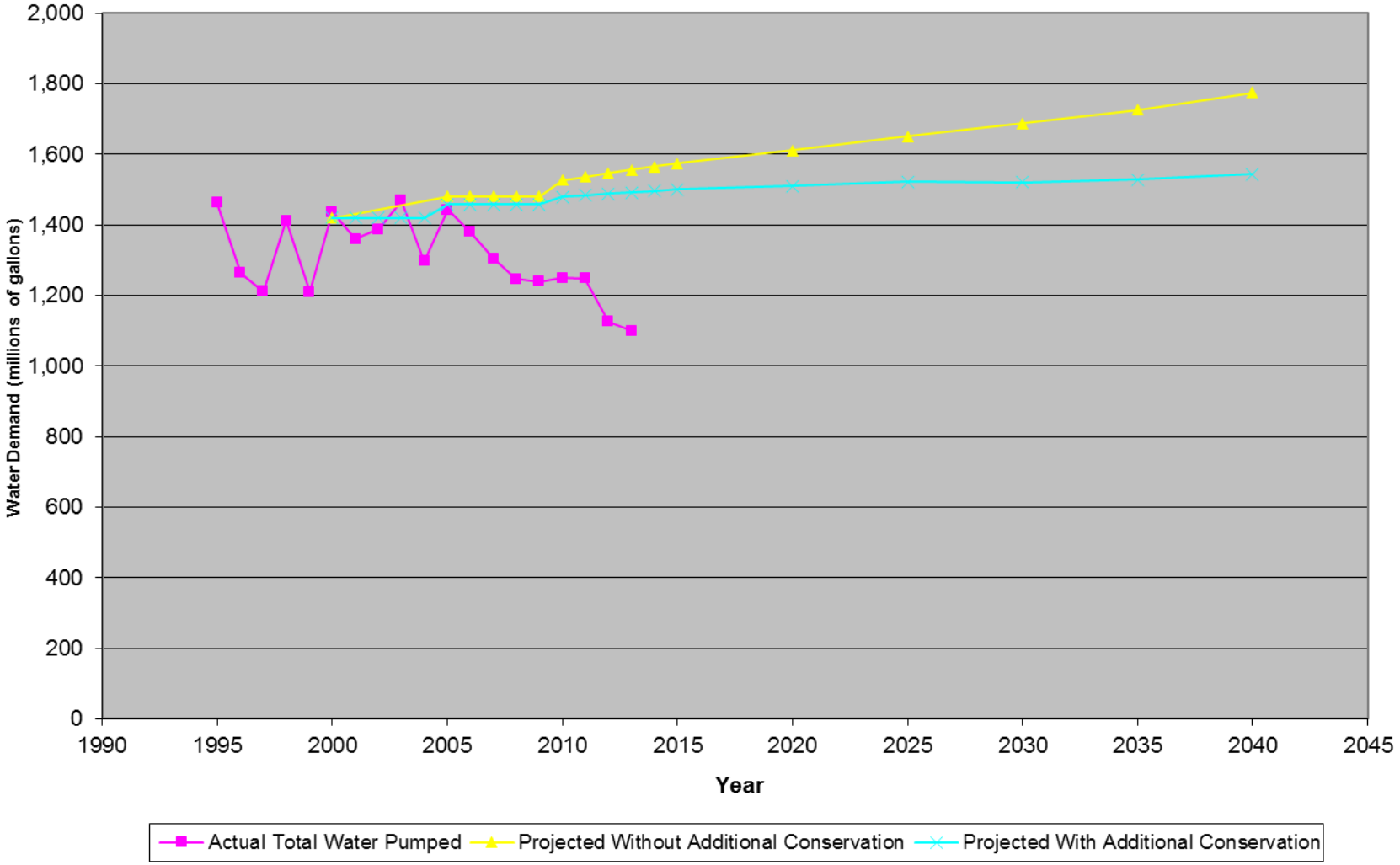
A surface water supply from Ute Reservoir on the Canadian River is the only available alternative that would provide Portales with a demonstrated, renewable water supply in sufficient quantity for municipal use. Portales' full Ute water allocation of 1.12 billion gallons/year is approximately the same as its 2012 total wellfield demand. Integration of a Ute water supply into long-term water management planning requires consideration of two concerns: uncertainty in the timing of project completion and strategies for addressing drought.

- Construction of the Ute conveyance system began in 2013 and is currently scheduled to be completed in 10 to 12 years, or by 2023 to 2025. Shortages of water from the City's wellfields are projected to become increasingly problematic over the next decade unless the demand on the wellfields is reduced. Because delays in water deliveries from Ute Reservoir could occur, the City needs to reduce demands on its wellfields and increase their useful lives.

- Shortages in the Ute water supply are expected during times of drought, and these shortages may be increasingly severe due to climate change. For this reason the City also needs to reduce demands on its wellfields so that a reserve water supply would be available in times of drought.

Both uncertainty in the timing of Ute Project completion and strategies for addressing drought call for reducing demands on the City's wellfields. This can be accomplished in part by seeking additional sources of water supply and in part through increased water conservation. The most readily available additional supplies would come from groundwater pumped from the same depleting Ogallala/High Plains Aquifer and would therefore not provide a long-term water source of sufficient quantity to meet the City's

Figure 1. Actual and Projected Total Water Demands



needs. Even if the City does identify a source of additional groundwater supply, increased water conservation will still be necessary.

To provide a buffer that would accommodate a delay in Ute water delivery, the City has developed a new water demand reduction goal to help accommodate a 5-year delay in Ute Project completion to 2030. This goal is to reduce the total 2012 wellfield demand of 1,125 million gallons by about 40% or 425 million gallons to 700 million gallons/year by 2016 to help bridge the gap caused by such a delay. This reduction includes water used within the City's Water Utility Department service area and water exported to the Roosevelt County Water Coop. As further discussed in Section 6.0, a 40% reduction in wellfield demand would not result in a 40% reduction in water availability to City residents. The reduction in water availability will be on the order of 15% because of the significant beneficial effects of the City's program to irrigate City parks entirely with reclaimed wastewater instead of the currently used wellfield water.

If Ute water is delivered on or near schedule, it will still be desirable to reduce demand to well below the expected full Ute allocation of 1.12 billion gallons per year to create a prudent Ute water reserve for drought years, to have the option to store excess Ute water deliveries underground in the Blackwater or Sandhill Wellfield in wet years, and to conserve remaining groundwater in the wellfields for emergency use. Once the Ute Project is completed, it is expected that the City's water demand could be prudently increased depending on the then-forecasted frequency and magnitude of drought cycles, the capability to store Ute water in wet years, and the possible impacts of a progressively warming climate.

4.0 WATER LOSS AND WATER USE EVALUATIONS

Comparative evaluations of the performance of Portales' water distribution system and community water demand can identify potential areas where water conservation measures can successfully be employed to reduce water use and wastage. Two common indicators of water system performance are the magnitude of water losses on the supply side and per capita consumption on the demand side. Portales' standings in these two areas are discussed in this section.

4.1 AWWA Water Loss Audit

The American Water Works Association (AWWA) Water Loss Control Committee water loss audit provides information that can be used to determine whether Portales' Water Utility Department water losses are consistent with the cost and availability of its water supply. This determination is based on the assumption that higher distribution system losses can be more readily accepted in communities with an abundant, low cost water supply than in communities where water is expensive and scarce. Increasing scarcity and increasing cost increase the cost-effectiveness of maintaining a distribution system with lower losses.

The audit was prepared using AWWA water loss software and its use is part of the NMOSE's updated water conservation planning guidelines (NMOSE 2013). This software was developed by AWWA as an Excel spreadsheet and provides a nationally recognized, systematic method for documenting and evaluating annual water losses within the City's Water Utility Department's service area. The goal of this audit is to provide information to help reduce water losses by demonstrating the cost of those losses and thereby improve overall water supply management.

4.1.1 Audit Input Data

The AWWA categorizes water use as Authorized Consumption, Apparent Losses, and Real Losses. Authorized Consumption includes all known billed and unbilled water demands. Apparent Losses are losses that could potentially be identified and either billed or avoided. They include known or estimated water theft and other unauthorized consumption, customer water meter inaccuracies (they currently read an average of 1% low), and data handling errors. Water not included in these first two categories are called Real Losses. Such losses include pipeline breaks and storage tank spills that cannot be billed and are not readily anticipated or avoided. Losses and other non-billed water are non-revenue water. Financial data for the water supply system is used to determine the cost to the City of non-revenue water.

Copies of audit input and output data sheets are presented in Appendix A. Input data for calendar year 2013 are shown in Figure A-2. The total water supplied in 2013 from the City's wellfield, including an estimated 1% meter underreading error, was 1,110.559 million gallons. Of that, 16% or 179.609 million gallons, also including meter error, was sold to the Roosevelt County Water Coop. This water is treated as being exported to an external water supplier because the Coop operates its own water distribution and billing systems, and is not included in the City's Water Conservation Plan. The total water supplied to the City's service area was 930.949 million gallons. The total authorized consumption of 801.152 million gallons was 86.0% of the City's total water supply. The total apparent losses of 14.466 million gallons were 1.6% of the City's total water supply and the total real losses of 115.332 million gallons were 12.4% of the City's total water supply.

Authorized unbilled and unmetered consumption includes irrigating City parks and facilities, fire suppression, fire hydrant flushing, spills, and known leaks. The City's estimates of such uses in 2013 totaled 7.001 million gallons. Authorized unbilled and unmetered consumption amounted to about 0.8% of the City's total water supply.

The total operating budget for the City's Water Utility Department was about $4.6 milllion in 2013. Wastewater treatment costs in Portales are based on water use and combined with the monthly water bill. The volume weighted average customer unit retail cost including wastewater treatment was about $5.65 per 1,000 gallons in 2013. This average included a fixed base cost of $15.13 for the first 2,000 gallons.

Data entries into the audit spreadsheet are accompanied by a 'grade' ranging from 1 to 10 that provides an indication of data accuracy. Portales' Water Utility Department received grades of 8 or above except for three categories:

1) Master water meter error adjustment received a grade of 3 because the master metering data are not automatically logged into an electronic database; however, storage tank levels are automatically logged and frequently reviewed during periods of high demand.
2) The average operating water pressure received a grade of 5 because telemetry pressure monitoring is not conducted for pressure zones; however, elevation changes within the City are minimal and the distribution system is operated as a single zone.
3) Variable production cost information received a grade of 3 because such information was not previously collected and the data for 2013 was hand-calculated based only on pumping power costs. Cost accounting systems will be modified for subsequent years to include and automatically isolate pumping power, water treatment, and other variable costs.

4.1.2 Audit Results

A copy of the water audit performance indicator outputs is presented in Figure A-3. Performance is reported as financial and operational efficiency indicators.

The financial indicators provide information about the relative amounts of non-revenue water and the cost of water losses in 2013. Non-revenue water (all water that is not sold including losses) amounted to 17.3% of the total volume of water supplied and cost the City about $115,000 or 2.5% of the cost of operating the system. Apparent losses (losses traceable to known and potentially avoidable causes such as theft and meter inaccuracies) were calculated to cost the City $81,733 in 2013. Real losses (losses such as pipeline leaks that are not readily anticipated or avoided) were calculated to cost the City $24,516. AWWA considers the value of apparent losses to be much higher than the value of real losses. This is because apparent losses are traceable to known causes that could potentially have either been avoided or translated into revenue water and are therefore valued at the customer retail unit cost. Real losses are from unknown or unavoidable causes and are valued by AWWA at the variable cost of production.

Operational efficiency indicators address water losses and are provided by the audit in several forms. The total apparent water loss in 2013 was 14.466 million gallons and the total real loss was 115.332 million gallons. As previously noted, this total real loss was about 12.4% of the City's total water supply. The amount of this real loss that was considered by AWWA to be unavoidable was 26.37 million gallons. This is about 23% of the total real loss and 2.8% of the total water supply. The unavoidable annual real loss is a theoretical reference value used by AWWA to represent the lower limit of leakage that could be achieved if all of today's best technology could be successfully applied. AWWA notes that it is not practical for water utilities to set this level as the target level for real losses, unless water is unusually expensive, scarce, or both.

Based on the input data and assigned grades discussed above, the audit provided Portales with an overall Water Audit Data Validity Score of 77 out of 100 and the following recommendations:

1. Master meter error adjustment: Improve the confidence in the master meter measurements of total water production.
2. Variable production cost: Improvements in the accuracy of the variable production cost will provide a more accurate estimate of the cost to the City of real losses.
3. Volume from own sources: Improve the accuracy of metering wellfield production (similar to the first recommendation).

Portales' Water Audit Data Validity Score is based on a weighted scale for the components of consumption and water loss. A score of 77 places Portales in AWWA's Level IV, which comprises a data range of 71 to 90 (see Figure A-5). The following AWWA recommendations are applicable to this level:

- Audit Data Collection: Refine data collection practices and establish as routine business process.
- Short Term Loss Control: Refine, enhance, or expand ongoing programs based upon economic justification.
- Long Term Loss Control: Conduct detailed planning, budgeting, and launch of comprehensive improvements for metering, billing, or infrastructure management.
- Target-setting: Establish mid-range (5 year horizon) apparent and real loss reduction goals.
- Benchmarking: Performance benchmarking - the Infrastructure Leakage Index (ILI) is meaningful [for Portales] in comparing real loss standing.

Another result of the AWWA water audit was the water balance information provided in Figure A-4. Entries in red are unbilled authorized consumption and water losses. Both are non-revenue water and represent potential sources of income as well as water savings. Monitoring trends in these values over time will provide important indicators of the success of the City's water conservation and loss management programs.

The City's apparent loss amounted to 6.78 gallons per service connection per day and the real loss was 54.05 gallons per service connection per day. The Infrastructure Leakage Index (ILI = total real losses divided by unavoidable real losses) was 4.37. As explained in Figure A-6, this index is an indicator for comparing the performance of utilities in operational management of real losses. The ILI provides a measure of the degree to which the City's water pricing and water loss management policies are consistent with the City's water supply availability, cost, and abundance. Low ILI values, ranging from 1 to 3, occur when real losses are relatively low. The AWWA interprets these lower values as indicating that a city is closely controlling its water losses and is aware that its available water supplies are expensive and greatly limited. Portales' ILI falls in the upper end of the midrange. Mid ILI values, ranging from 3 to 5, occur when total real losses are higher and indicate management reflective of a decreasing concern of a limited supply. High ILI values, ranging from 5 to 8 indicate a lower concern about waste and a belief

that "Water resources are plentiful, reliable, and easily extracted." AWWA believes that ILI values greater than 8 represent an extravagant waste and a "…level of leakage [that] is not an effective utilization of water as a resource."

As stated above, Portales' ILI was 4.37. While in the midrange of 3 to 5, it is closer to 5 than to 3 and is consistent with a loss control performance appropriate for a city with only minor concerns about the limitations of its water supply. The AWWA interprets Portales's ILI score as indicative of the following situations:

- With regard to financial considerations, the water system is being managed as if "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." The availability of water resources at a reasonable expense has been historically true for Portales, but the imported Ute Reservoir water that Portales will have to rely upon in the future will be more expensive.
- With regard to operational considerations, the water system is being managed as if "Existing water infrastructure capability is sufficient to meet long-term demand so long as reasonable leakage management controls are in place." Again, this has been historically true for Portales and would continue to be true if depletion of the Ogallala Aquifer were not a problem. But depletion is a problem and loss control will become increasingly important as a water conservation measure until and possibly even after Ute water becomes available if drought conditions prevail.
- With regard to water resources considerations, the water system is being managed as if "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."

It has become increasingly evident over the past 15 years that Portales' existing water resources are no longer believed to be sufficient to meet long-term needs and that Portales is in a transition stage from water system management policies consistent with inexpensive, abundant groundwater supplies to policies consistent with an increasing awareness of the limitations of that supply. According to AWWA standards, Portales' ILI of 4.37 is not consistent with the City's current water supply situation and a reduced ILI should be sought. Reducing Portales' ILI nearer to 3.0 would, by AWWA standards, more closely reflect the City's current water supply situation.

- With regard to financial considerations, the AWWA audit finds that the City's water rates are somewhat low and potentially inconsistent with the cost of obtaining a supplemental supply. City's policy of progressively increasing water rates is consistent with the need to reduce demand and fund efforts to reduce both apparent and real losses.
- With regard to operational considerations, the AWWA audit finds that improved leakage management controls would better reflect the City's water supply situation. AWWA's 2007 Distribution System Water Loss benchmark survey for water purveyors in the South region of the United States found that the median real system loss was 8.9% of total water use, which is considered a benchmark for comparison in this region. Reducing the City's real losses by 32 million gallons to

about 83 million gallons per year would result in an ILI of 3.1 and a real system loss of 8.9%. Such a goal should be achievable.

- With regard to water resources considerations, local water resources are no longer believed to be sufficient to meet long-term needs. Demand management interventions in the form of water-conserving City ordinances, promotion of water conservation through rate structuring and example, water conservation education, and wastewater reuse are being actively pursued and are community goals along with water loss reduction.

4.1.3 Water Loss Management Goals

The City's water loss management goals can address both apparent losses and real losses. Water loss management goals that could be adopted by Portales are described below. These are compared with other water conservation measures in Section 5 of this Plan to provide a final list of measures that together have the potential to meet or exceed the City's water demand reduction goal.

Portales' 2013 apparent losses are small (6.87 gallons per service connection per day) compared with real losses (54.05 gallons per service connection per day) but are costly because they could represent foregone revenue. Apparent losses in Portales consist primarily of metering inaccuracies and data handling errors. An achievable mid-range (5 year horizon) goal would be to reduce annual apparent losses by 50% from about 14 million gallons to about 7 million gallons. Half of this reduction would be achieved by reducing meter error and half by reducing data handling errors. This could be accomplished by 2018, by completing the City-wide installation of a new Automatic Meter Reading (AMR) system with an average measurement error of 0.5% instead of the current average of 1.0%. This replacement program applies to all customer categories and its implementation is currently ahead of schedule. The other half of this reduction would be achieved because the new meters will be automatically read, resulting in an expected reduction in data handling errors from the current 6 million gallons to about 3 million gallons. Unauthorized consumption is included in this category but the amount is small and expected loss reductions from unauthorized consumption would not materially affect the overall goal.

Real losses involve large volumes of water and have been recognized as opportunities for significant water conservation. The City's real loss reduction potential is expressed by the AWWA's Infrastructure Leakage Index (ILI), calculated as total real losses divided by unavoidable real losses. As previously noted, Portales' 2013 ILI value was 4.37 and an achievable mid-range (5 year horizon) goal would be to reduce the value to 3.1 by reducing system losses by 32 million gallons/year. This would be primarily accomplished by reducing pipeline leaks through an enhanced pipeline replacement and metering program.

The foregoing loss management goals are summarized in Table 1.

Table 1. Mid-Range Water Loss Management Goals

Type of Loss	2013 Loss (millions of gallons)	2018 Target Loss (millions of gallons)	Net Loss Reduction (millions of gallons)
Apparent Losses	14	7	7
Real Losses	115	83	32
Total Loss Reduction			**39**

The AWWA water loss audit will be repeated annually to monitor the adequacy of these goals and determine whether the City's water loss management measures are sufficient or need to be more aggressively pursued to help meet the City's overall water demand reduction goal.

4.2 Per Capita Water Consumption

Per capita water consumption provides a demand side performance measure for Portales' water system. Per capita consumption, measured as gallons per person per day (GPCD), is the second of two metrics established in the current NMOSE water conservation planning guidelines (NMOSE 2013). The GPCD metric is calculated as *total daily water use / total user group population*. NMOSE has prepared an Excel-based GPCD Calculator that provides a standard approach to calculating monthly and annual per capita water use for four key sectors of a city's economy: single-family residential (SFR) use, multi-family residential (MFR) use, industrial, commercial and institutional (ICI) use, and total use. SFR and MFR are separately calculated to isolate the SFR water use for landscape irrigation, which can be a target for water conservation. The objective of the calculations is to provide an opportunity to assess individual water use sectors for water conservation potential. The GPCD Calculator was used to evaluate Portales' water supply and consumption data for the most recent five-year period, from 2009 to 2013. Copies of the input and output GPCD Calculator data sheets are presented in Appendix B.

4.2.1 GPCD Calculator Input Data

Census Information: Basic demographic and housing information used by the GPCD Calculator are entered as shown in Figure B-2. This information is based on the 2010 Census updated to 2013 with more recent data from City of Portales, Eastern New Mexico University, and local realtors. The 2013 'Occupancy Status' and vacancy rate data on Figure B-2 are for MFR housing units. These data are used by the Calculator to estimate the average MFR housing unit occupancy rate and account for the large seasonal variations in student housing occupancy at ENMU as well as the smaller seasonal variation in MFR occupancy in the rest of the City. MFR occupancy rate is used to estimate the average MFR population. Unlike the MFR population, the SFR population estimate is not based occupancy rate but on the number of active SFR water service connections. The average household size of 2.82 includes both MFR and SFR residents and is from the 2010 US Census.

Single Family Residential Water Users: SFRs are stand-alone housing units, generally constructed as one unit per city lot. SFR data for Portales are entered as shown in Figure B-3. The SFR GPCD Calculator requires the City's SFR water use. The Calculator uses the number of active billing accounts to estimate of the number of single family residences, which is multiplied by the average household size to estimate the SFR population. Portales' water billing system provides a breakdown of SFR water use and number of active billing accounts by categories similar to those used in the GPCD Calculator. For this first year application of the Calculator, the City's billing information was used without modification to determine the total SFR water use and the total number of active billing accounts by month during the 2009-2013 study period. The water use and population data were then used to calculate the SFR GPCD.

All newer apartment complexes within Portales' Water Utility Department service area have been required to install separate water meters for each MFR apartment unit and those apartment units have been combined with single family residences in the City's billing accounts. The City is currently changing its billing account structure to separately identify these apartment units so that their water use can be combined with that of other, older apartment complexes that have only a single water meter. This change is expected to be completed by December 2014 so that the SFR and MFR data used in future GPCD Calculator applications will be more accurate.

Multi-Family Residential Water Users: As defined in the City's current billing records, MFRs are apartment buildings, duplexes, trailer parks, condominiums, and other complexes that have multiple residential units serviced by a single metered water connection. MFRs are treated separately from SFRs because MFRs typically have significantly lower landscape irrigation demands. MFR data from the City's billing records were entered into the GPCD Calculator as shown in Figure B-4. The method used to estimate the City's MFR population was not the same as for the SFR population. Multiple MFR households can be served by a single water meter so the number of active MFR accounts can be significantly less than the number of occupied MFR housing units. As previously mentioned, the number of occupied MFR units is estimated as the total number of units minus the number of vacant units, as estimated by vacancy rate data. The MFR population is then estimated as the number of occupied units multiplied by the average household size.

Portales' MFR population includes both the ENMU student resident population and the more typical in-City resident population. Because these two populations have significantly different vacancy rate characteristics, they have been estimated separately.

ENMU has approximately 400 residence hall units and 190 apartment units whose water use is not metered individually. Based on ENMU data, the vacancy rate for its residence halls typically varies from 5% in the fall semester to 15% in the spring semester to 100% in the summer. The vacancy rate for ENMU's apartment complexes depends on the age of the complex. For the newer complex the vacancy rate ranges from near zero in the fall and spring to 20% in the summer, while vacancies in the older complex range from 10%

in the fall and spring to 70% in the summer. The total number of ENMU MFR units has remained unchanged since 2009.

As previously noted, the current in-City MFR billing records include only the older multiple household MFR complexes served by a single water meter. The City bills these older MFR complexes on an average per-housing unit basis and therefore its billing database includes the total number of MFR housing units within those complexes. In 2013 there were a total of 737 older in-City MFR housing units in Portales. The number of occupied older in-City MFRs in 2013 was estimated based on this total number of older MFRs multiplied by the typical MFR vacancy rate obtained from local realtors. In-City MFR vacancies in Portales are reported to be typically very low because of steady demand from Cannon Air Force Base personnel and the demand for off-campus housing by ENMU students. The typical turnover time for apartments is only about 2 weeks and the average vacancy rate was estimated to be about 2%. Following NMOSE guidance, the total number of in-City MFRs was assumed to have increased during the study period at the same rate as the increase in SFRs. It is anticipated that the number of in-City MFRs will increase and the number of SFRs will decrease as a result of separating the newer MFRs from the SFR data in the City's billing records.

The number of vacant ENMU MFR housing units was combined with the vacant in-City MFR units and subtracted from the total number of units on a monthly basis to calculate the total number of occupied units within the Water Utility Department service area. This total was multiplied by the aforementioned average number of people per household to estimate the total MFR population. The water use and population data were then used to calculate the MFR GPCD.

Industrial, Commercial, and Institutional Water Users: This category includes manufacturing sites; commercial properties such as restaurants and shops; institutional consumers such as schools, hospitals, and municipal use; and other metered users. ICI data for Portales includes all metered uses that are not categorized as SFR or MFR and are entered into the GPCD Calculator as shown in Figure B-5. Portales' billing records have separate entries for these users and their total water use was directly calculated. The relevant population for these use categories is the total service area population, calculated as the sum of SFR and MFR populations. ENMU student quarters were not included among the institutional water users because ENMU apartments and residence halls are more like MFR apartments than prisons. The separate category of 'group quarters population' was therefore not used in the GPCD calculations.

Reused or Recycled Water: Wastewater reuse data are entered into the GPCD Calculator as shown in Figure B-6. This category does not currently apply to Portales and zero water use was entered. However, the City's wastewater treatment plant is currently being upgraded and treated wastewater of sufficient quality for irrigating City parks is expected to become available by 2016.

Imported and Exported Water: Imported and exported water data are entered into the GPCD Calculator as shown in Figure B-7. Although Portales does not currently import

water from outside its own supplies, the City has reserved an imported supply from Ute Reservoir that is expected to be available by about 2025. Portales' Water Utility Department currently exports treated water to the Roosevelt County Water Coop, which distributes the water to its rural Roosevelt County customers through its own conveyance system. The City's water conservation measures do not apply to this exported water, which is subtracted from the City's total water diverted (total water pumped from its wellfields) when calculating the City's per capita water use.

Total Water Diverted and Supplied: Total water diversions and supplies are also entered into the GPCD Calculator as shown in Figure B-7. These system totals constitute the last data input category. The total water diverted is the total volume pumped from the City's wellfields. The total water supplied within the Water Utility Department's service area is the total diverted plus the total imported (presently zero) minus the total exported to Roosevelt County Water Coop. The total diverted and total exported are metered and documented in the billing records on a monthly basis. The system total GPCD equals the total supplied divided by the total service area population. The system total GPCD therefore takes into account all water uses, including industrial and commercial, within the service area.

4.2.2 GPCD Calculator Results

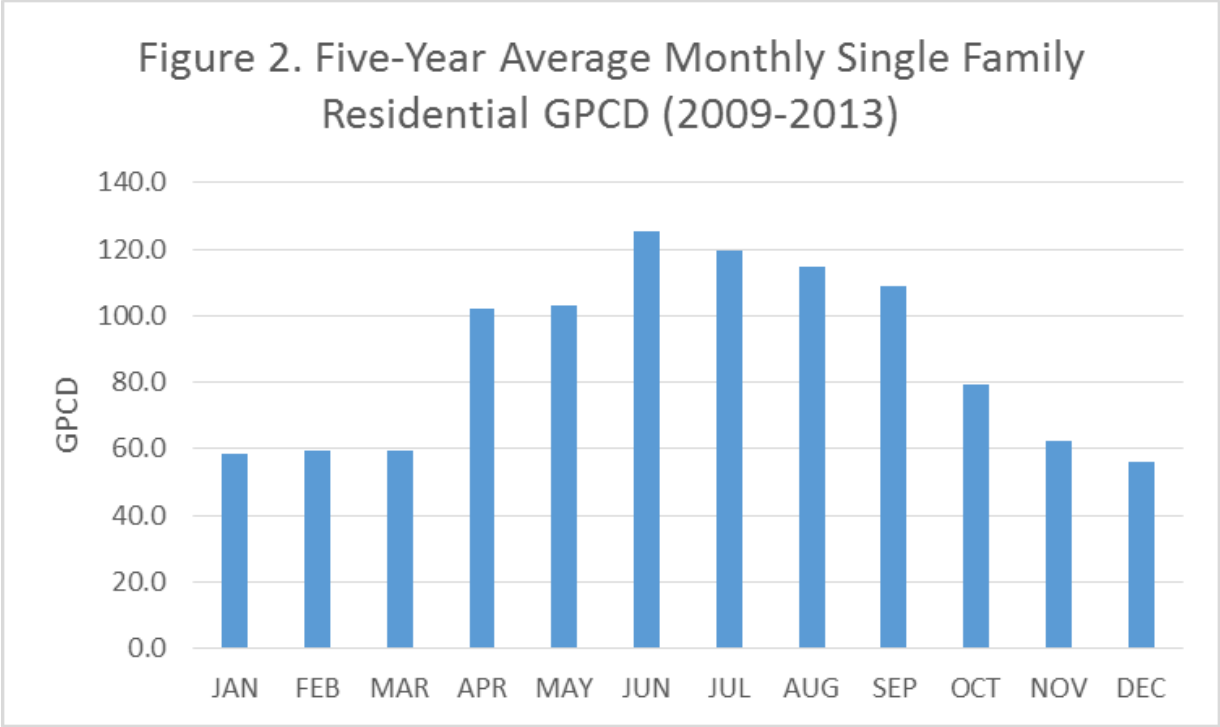
GPCD Calculator results are provided beginning on Figure B-8 and are described below. The results provide per capita use information for the aforementioned categories of metered water and insights into potential opportunities for water conservation.

Single Family Residential Water Use: SFR annual water use metrics are summarized in Table 2. The annual average SFR GPCD ranged from a low of 80.16 in 2013 to a high of 98.12 in 2011. The 5-year average SFR GPCD from 2009 to 2013 was 87.59. Although it is heartening that the lowest per-capita consumption was in the most recent year, the overall average is high and there is no clear trend to the data. Indoor water use, measured as indoor GPCD, is estimated as the average of the three winter months with the lowest water use. The 5-year average indoor SFR GPCD was 56.06 and was fairly consistent in each year. Outdoor water use is estimated as the difference between indoor use and total use, with a 5-year average SFR GPCD of 31.53. Although the 2013 indoor water use was close to the average, the 2013 outdoor SFR GPCD of 25.08 was the lowest in the study period. Although outdoor water use is clearly influenced by precipitation (2011 and 2012 were dry years while 2013 was slightly above normal), the water use data indicate that there is greater flexibility in outdoor water use than in indoor water use. Because this flexibility makes SFR outdoor water use more adaptable to water conservation, the total volumes of outdoor water use are also shown in the table. The 5-year average annual outdoor SFR water use in Portales was 150,415,000 gallons. Reduction of this amount will be considered as a potential water conservation goal.

Table 2. Single Family Residential Annual Water Use Summary

Year	SFR Population	Annual Average GPCD	Indoor GPCD	Outdoor GPCD	Total Outdoor Use (gallons)
2009	12,216	85.56	53.99	31.57	146,455,000
2010	12,429	82.34	53.05	29.29	140,159,000
2011	12,569	98.12	63.03	35.08	168,189,000
2012	12,658	91.79	55.14	36.65	173,251,000
2013	12,658	80.16	55.08	25.08	124,023,000
5-Year Average	**12,506**	**87.59**	**56.06**	**31.53**	**150,415,000**

SFR monthly GPCD results are shown by year in Figures B-10.1 through B-10.5 and 5-year monthly averages are shown in Figure 2. The differences between winter (primarily indoor) and summer (indoor and outdoor) uses are evident in every figure.



Multi-Family Residential Water Use: MFR annual water use metrics are summarized in Table 3. The annual average MFR GPCD ranged from a low of 72.83 in 2011 to a high of 79.55 in 2012. The 5-year average from 2009 to 2013 was 75.95. Although there is little variation in the annual average MFR GPCD, the indoor MFR GPCD is quite variable. As a result, the outdoor MFR GPCD and water use, which are calculated as residuals, are also quite variable. The indoor MFR GPCD values for 2010 and 2013 are low and inconsistent with the other years. There is a known meter overreading error in the March 2013 data for ENMU which was compensated for by entering zero consumption (and therefore a zero charge) in the City's ENMU billing for ENMU in

December 2013. The result was a substantial reduction in estimated 2013 indoor use and a substantial increase in estimated outdoor use. The 2010 data are similar to the 2013 data and may reflect a similar problem.

Separate averages were calculated for the more consistent 2009, 2011, and 2012 MFR data and these averages will be used for analysis. The average indoor MFR GPCD of 44.41 is less than the average indoor SFR GPCD of 56.06 and the average outdoor MFR GPCD of 32.77 is slightly more than the average outdoor SFR GPCD of 31.53. As previously noted, the current SFR data includes some MFR housing units which would tend to decrease the calculated SFR outdoor use. The planned change to completely separate accounting of the SFR and MFR data will improve the accuracy of these analyses.

The average annual outdoor MFR water use in Portales was approximately 39 million gallons. Reduction of this amount will be considered as a potential water conservation goal along with reduction of the annual outdoor SFR water use.

Table 3. Multi-Family Residential Annual Water Use Summary

Year	MFR Population	Annual Average GPCD	Indoor GPCD	Outdoor GPCD	Total Outdoor Use (gallons)
2009	3,085	79.15	49.81	29.34	37,698,000
2010	3,116	73.80	32.78	41.02	46,708,000
2011	3,135	72.83	43.33	29.50	33,773,000
2012	3,149	79.55	40.08	39.47	45,359,000
2013	3,147	74.41	30.90	43.51	49,961,000
5-Year Average	**3,126**	**75.95**	**39.38**	**36.57**	**42,700,000**
5-Year Average without 2010 & 2013		**77.18**	**44.41**	**32.77**	**38,943,000**

MFR monthly GPCD results are shown by year in Figures B-10.6 through B-10.10 and 5-year monthly averages are shown in Figure 3. The figures show that multi-family residences in Portales have differences between winter and summer use that are as pronounced as for single family residences.

Industrial, Commercial, and Institutional Water Use: ICI water use metrics for Portales are summarized in Table 4. The ICI water use sector consists primarily of three principal water consuming industries (a soft drink bottling plant, a cheese factory, and a bioenergy production plant); retail stores, hotels, and other commercial entities common to a city; City schools; and the City of Portales itself. The ICI GPCD is calculated using the total system population. The annual average ICI GPCD ranged from a low of 53.73 in 2012 to a high of 82.46 in 2011. The 5-year average from 2009 to 2013 was 64.56. Variations in ICI use are primarily attributed to industries that are not continuously operated. The total ICI water use is roughly the same as for single family residences.

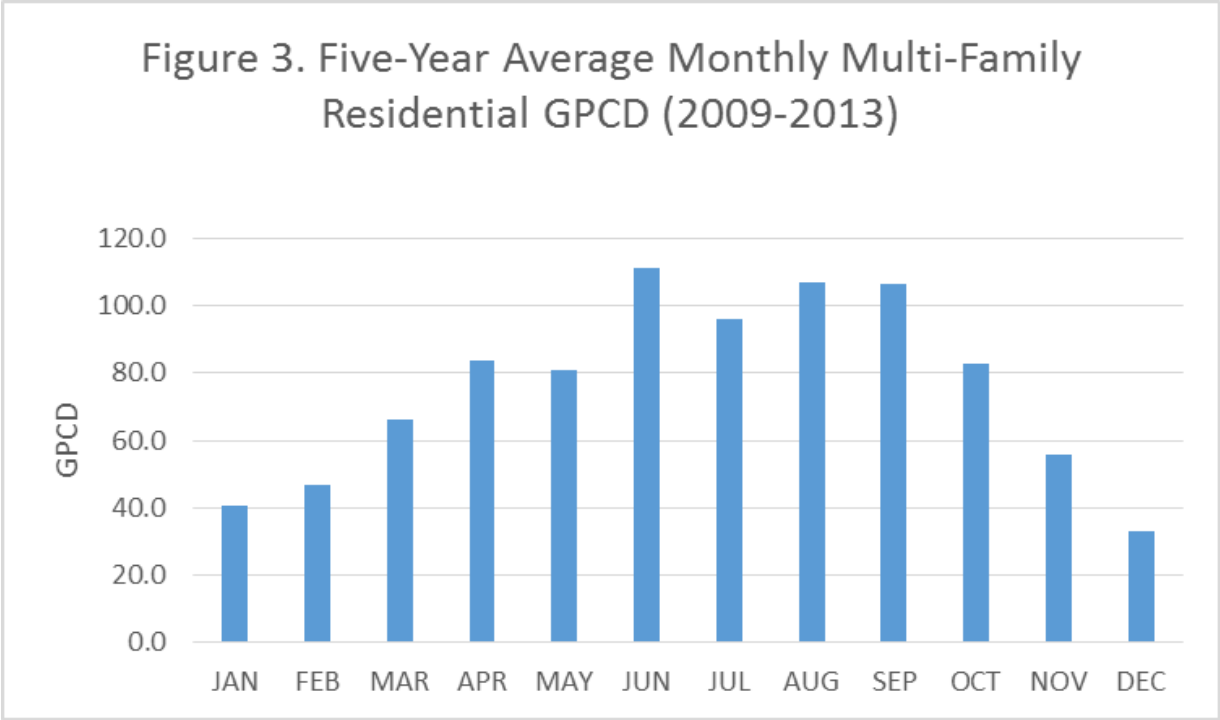


Table 4. Industrial, Commercial, and Institutional Annual Water Use Summary

Year	Total System Population	Annual Average GPCD	ICI Water Use (gallons)
2009	15,302	68.83	338,351,000
2010	15,545	59.21	309,973,000
2011	15,705	82.46	472,666,000
2012	15,807	53.73	335,983,000
2013	15,805	58.65	384,413,000
5-Year Average	**15,633**	**64.56**	**368,277,000**

Monthly ICI GPCD results are shown by year in Figures B-10.11 through B-10.15 and 5-year monthly averages are shown in Figure 4. These figures do not consistently show summer peaking in ICI use.

Total System Water Use: Total annual water use metrics for Portales are summarized in Table 5. The total system GPCD is calculated using the total system population. The annual average GPCD ranged from 159.78 in 2013 to 187.95 in 2009. The 5-year average from 2009 to 2013 was 175.50. As seen on the table, the average annual total system GPCD has been progressively dropping since 2009. This decline is illustrated graphically in Figure B-8. The City's aforementioned 2040 water use goal of 167 GPCD was reached in 2012 and was even lower in 2013.

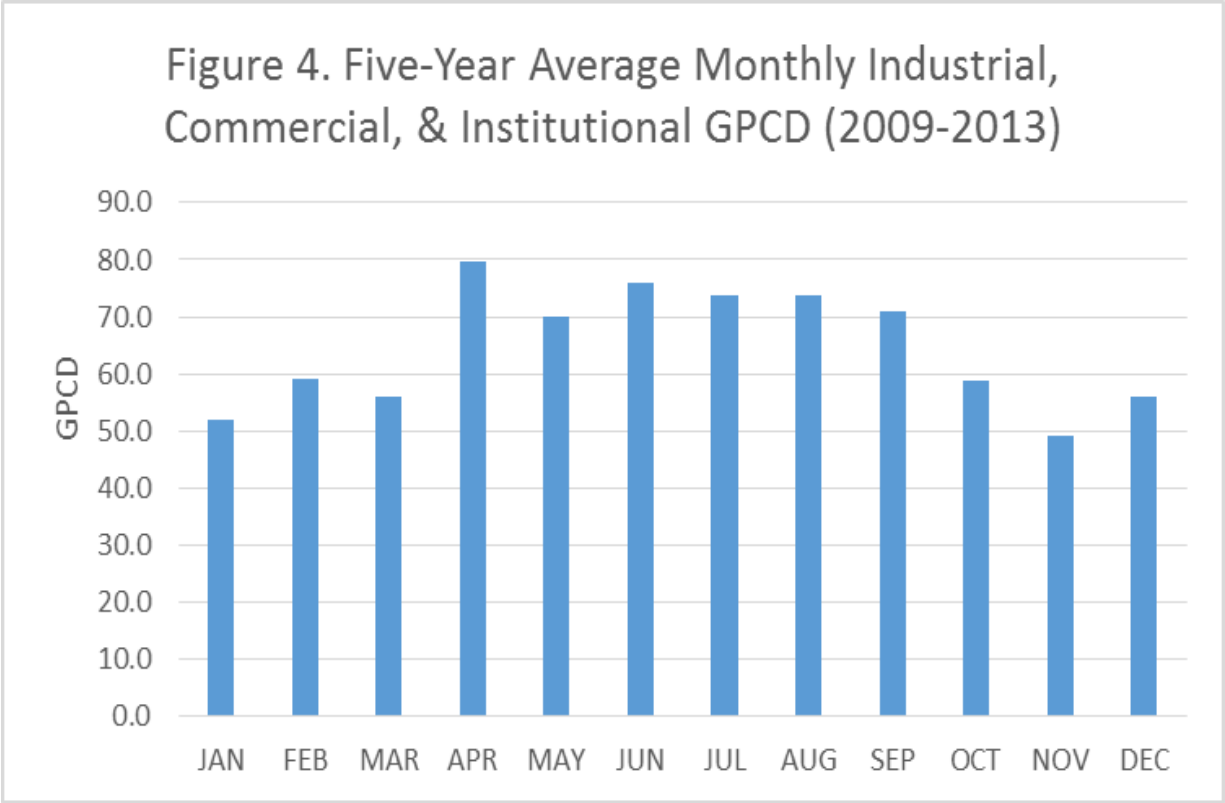
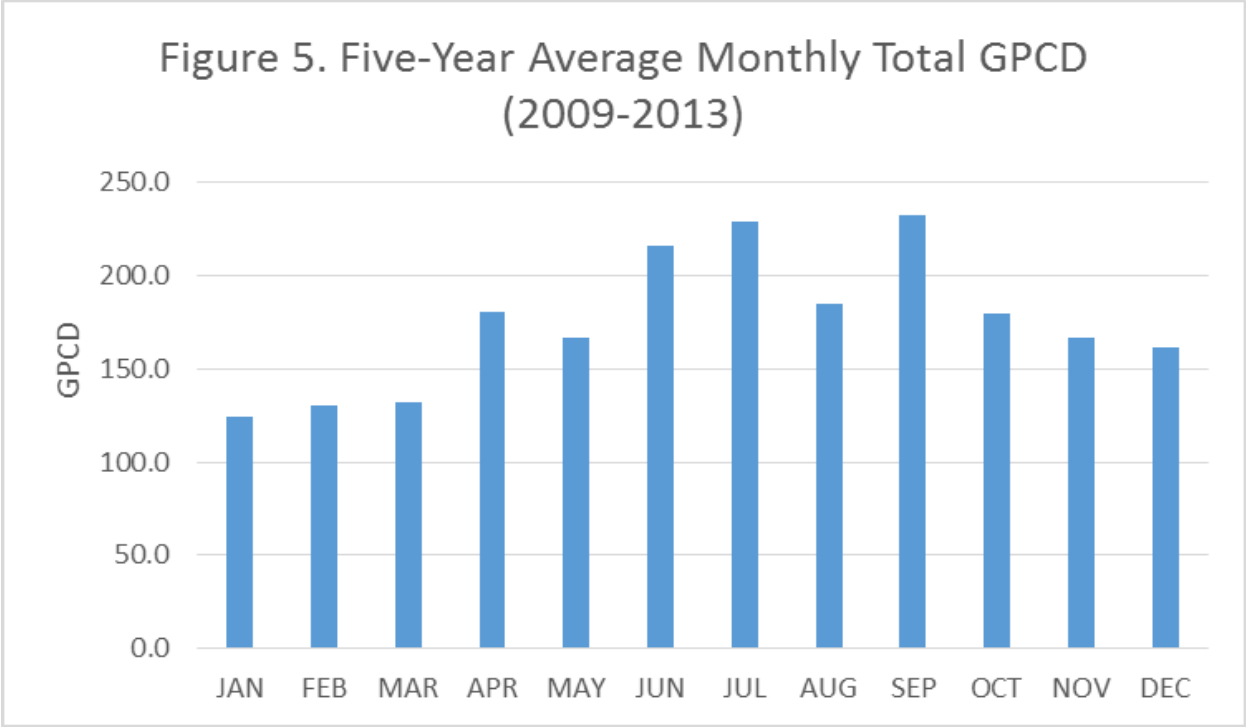


Table 5. Total System Annual Water Use Summary

Year	Total System Population	Annual Average GPCD	Total Water Use (gallons)
2009	15,302	187.95	1,049,729,000
2010	15,545	187.09	1,061,528,000
2011	15,705	179.52	1,029,047,000
2012	15,807	163.14	941,230,000
2013	15,805	159.78	921,732,000
5-Year Average	**15,633**	**175.50**	**1,000,653,000**

Five-year monthly average total system water use is shown in Figure 5. The figure shows that peak summer water demands are typically from June through September and the lowest demands are typically in the winter months of January, February, and March.



A breakdown of the total system GPCD by sector is shown in Figure B-9. The bar chart in Figure B-8 was divided by the GPCD Calculator into segments representing total annual SFR, MFR, ICI, and non-revenue water uses, with each use divided by the total system population instead of the individual sector population. The non-revenue water is calculated as the difference between the total use and the uses by the other three sectors, and represents unmetered losses. The uncharacteristically small volume of non-revenue water in 2011 may result from an underestimate of total pumping due to wellfield water meter failures.

Per-Capita Water Use Summary: A summary of 5-year average annual per-capita water use categories is presented in Table 6.

Table 6. Five-Year Average Per-Capita Water Use (2009-2013)

Community Sector	Gallons per Person per Day (GPCD)
Single Family Residential Total	88
Single Family Residential Indoor	56
Single Family Residential Outdoor	32
Multi-Family Residential Total	77
Multi-Family Residential Indoor	44
Multi-Family Residential Outdoor	33
Industrial, Commercial, and Institutional	65
Total System Water Use	176

5.0 BEST MANAGEMENT PRACTICES IN WATER CONSERVATION

Water conservation is one of the least expensive ways to extend a water supply. Most conservation measures do not create additional supplies but through reducing demand they do extend the useful life of a limited supply. The importance of water conservation for the City of Portales is increasing because of the ever decreasing, finite life of the Ogallala/High Plains Aquifer as a high yield source of water and because of uncertainties in the quantity of water available from alternative sources.

The City of Portales has been actively promoting water conservation for decades. Summaries of the City's historic and ongoing conservation measures are presented in the City's 2001 Water Conservation Plan (Wilson 2001a) and in the City's annual Water Conservation and Use Reports (see, for example, Wilson 2014). The following discussion of water conservation measures focuses on those that are likely to be the most effective for the City and are amenable to increased emphasis, given the increasing importance of conserving existing supplies.

This section describes water conservation strategies that have been considered and adopted by the City. These strategies include enhancing public education and awareness, seasonal watering restrictions, inverted block water rates, a free water use survey program, low water use landscaping regulations, and reducing unaccounted for water losses. The City's wastewater reuse program can also be considered a conservation measure because it results in a beneficial reduction in wellfield demand. These strategies can be generally applied to all categories of water users including residential, commercial, industrial, institutional, and municipal. Descriptions of these and other conservation measures are presented below. Although the City has already implemented many water conservation measures, increasingly stringent measures are needed as part of an overall strategy for meeting future water demands. Implementation specifics are described in Section 6.0.

5.1 Indoor Water Conservation

The American Water Works Association (AWWA) completed a study in 1999 that examined residential indoor water use (Mayer et al. 1999). The study determined the following average uses: toilets (26.7%); washing machines (21.7%); showerheads (16.8%); faucets (15.7%); leaks (13.7%); other (dishwasher, bath, etc.; 5.4%). Replacing old fixtures with new, water-efficient models reduces overall water use. New toilets use 1.6 gallons per flush, whereas toilets pre-dating 1992 use between 3.0 and 5.0 gallons per flush. New commercial washing machines are estimated to save 37,800 gallons of water per machine per year, and new residential washing machines are estimated to save 8,500 gallons of water per machine per year. New showerheads meet 2.5 gpm flow rate standards, whereas older showerheads use more than 3.0 gpm (Spear and Dunn 2013, Appendix C). All categories of water users (residential, commercial, industrial, institutional, and municipal) have indoor water uses and the following water conservation measures apply to them all.

Water-Conserving Fixture Rebates. Residential water use is the largest single water demand category in Portales. Indoor water conservation may be stimulated by providing rebate incentives for residential, commercial, and institutional facilities for the replacement of the two greatest water using fixtures, toilets and washing machines, with new water-efficient models. The City is performing additional legal and budgetary reviews of the water conservation rebate aspects of this Plan before committing to such programs. Water-conserving fixture rebates will be included as goals of this Plan to be implemented pending completion of these reviews.

Water Use Conservation Surveys. Free, voluntary conservation surveys that address both indoor and outdoor water uses have been offered by the City's Water Utility Department for all customers since 2002. Implementation of survey findings is also voluntary. The surveys identify faucet and toilet leaks, indoor and outdoor water use patterns, and older and less water-efficient fixtures. The customer is provided with survey results, including estimates of average indoor and outdoor use, and the water savings that could be attained using water saving fixtures and leak repair. Although experience to date has shown that few customers have requested these surveys, they will continue to be offered and are expected to be increasingly requested due to the increasing cost of water and increasing public awareness of water-wise conservation practices. The City's Water Conservation Survey Checklist is presented in Appendix D and the procedure for conducting the survey is presented in Appendix E.

Sewer Rate Schedules. Sewer rate schedules are tied to water use and are therefore also structured to encourage water conservation. Again, this practice applies to all categories of water users. Sewer rates outside the City limits are 50% higher than inside the City limits. This conservation practice will continue to be implemented.

Low Water Pressure. Low water pressures (40 to 60 psi) are maintained in the distribution system to reduce waste from leaks and running faucets. This conservation practice applies to all categories of water users and will continue to be implemented.

5.2 Conservation Water Rates

Conservation water rates are rates that increase as water use increases. This is called an inverted block rate structure. Increasing block rates have been a part of Portales' water billing structure since 1995 and are designed to encourage water conservation and reuse. Portales currently has five water rate blocks for residential and commercial customers, and for educational institutions. Roosevelt County Water Coop and industrial customers are charged flat rates. Rates increase by water rate block and higher base rates are charged for residential and commercial customers outside City limits, for the Coop, and for industrial customers. Block 1 usage represents the minimum service charge and includes the first 2,000 gallons/month of water use. The Block 1 volume was set at less than the expected minimum usage to encourage water use awareness. The remaining blocks represent increasing water use and include a household's seasonal or non-essential water use. Five-year schedules of increasing water rates were renewed by the Portales

City Council in 2001 and again in 2007 and 2012. The current schedule extends to 2017 and raises most rates by 10% in the first year and 5% per year thereafter.

Raising water rates has been found to be one of the most effective methods for increasing conservation awareness and reducing water demands. Higher water rates also provide funding for rising water costs and help cushion "rate shock" when more expensive water must eventually be used. Increasing water rates with increasing water use more rapidly encourages customers to reduce their seasonal or non-essential water usage. A water rate study by the National Bureau of Economic Research revealed that a 10% increase in water rates can result in a 3% to 6% reduction in water demand (Olmstead and Stavins 2008). The City intends to maintain its use of inverted block rate structures and continue to periodically increase water rates as a conservation measure.

5.3 Reducing System Losses

A detailed evaluation of the City's 2013 system losses is presented in Section 4.1. Two types of losses are apparent losses and real losses. Apparent losses are traceable to known and potentially avoidable causes such as meter inaccuracies and data handling errors. Real losses are not readily anticipated or avoided, such as pipeline leaks and storage tank overflows. Apparent losses totaled 14.466 million gallons in 2013 and were 2.8% of the City's total internal water use. Real losses totaled 115.332 million gallons and were 12.4% of the City's total internal water use. Water exported to Roosevelt County Water Coop is not used inside the City and was not included in these figures.

Leak Detection and Repair. Leak detection and pipe repair/replacement programs have been implemented by the City's Water Utility Department since its inception to reduce real losses. Information on the type and age of water mains in the distribution system is maintained by the Department and the replacement program is both proactive and responsive. Aging water mains that are approaching the ends of their useful lives are replaced proactively before significant breaks or leaks occur, and the upgraded water metering described below allows the Department to quickly identify and respond to unexpected leaks. AWWA's 2007 Distribution System Water Loss benchmark survey for water purveyors in the South region of the United States found that the top 25% achieves real system losses of 3.8% or lower and the bottom 25% achieves 14.1% or higher (AWWA 2007). The median real system loss was 8.9% of total water use, which is considered an achievable benchmark for comparison in this region. Reducing real system losses to 8.9% of total water use would save Portales an estimated 32 million gallons/year.

Replacement Water Meters. Replacement water meters were installed at 488 residential, commercial, and institutional locations in Portales in 2013 as part of an ongoing replacement program. The old meters often measured less than the actual flow and the improved accuracy and reliability of the replacement meters is expected to result in additional water savings. Most of these replacement meters support the City's new Automatic Meter Reading (AMR) system. This replacement program applies to all

customer categories and will reduce apparent system losses by an estimated 7 million gallons/year due to metering inaccuracies and data handling errors.

Expanded Water Metering. Portales reduced its unmetered water use in 2011 by installing meters at the City's swimming pool and in City parks. In addition, portable meters have been provided for fire hydrant and street department use. The City's goal of 100% metering will continue to be actively pursued. Accurate measurement of water use is key to identifying and correcting major real system losses as well as other forms of wasteful use.

Automatic Water Metering. Portales is installing a fixed base Automatic Meter Reading (AMR) system that allows water meters to be read at City Hall through a wireless network. The City is progressively replacing existing water meters with automatic meters that are more accurate and the increased accessibility to consumption data is expected to reduce water losses. The AMR system became operational in 2010. It applies to all customer categories and will continue to be expanded. Apparent losses due to metering inaccuracies and data handling errors will be reduced by an estimated 7 million gallons/year because of the City's conversion to these automatic meters.

Water Use Monitoring. Water meter readings are monitored for excessively high and low values and checked for accuracy. High readings trigger onsite leak checks and informal water use surveys. This conservation measure applies to all customer categories and will continue to be implemented.

Water Utility Internal Audits. Portales' Water Utility Department conducts annual internal water use audits that provide much of the information used in the City's annual Water Conservation and Use Reports. This program will continue to be implemented because it is essential to identifying areas of excessive water use and to evaluating the effectiveness of the City's conservation programs.

5.4 Public and Business Education and Outreach

Educating the public and local businesses on the importance of water conservation is an important component of Portales' water conservation efforts. An awareness of the factors affecting the City's water supply will help customers make wise water use decisions in their personal and business lives and will help achieve greater understanding and acceptance of increasingly stringent water conservation measures that may be needed. Information about water conservation measures and practices is available from NMOSE and was used in preparing this Plan. Portales routinely obtains free water-wise guides for indoor and outdoor water use from NMOSE and other sources. These guides are available to the public in Portales' City Hall and are being disseminated to community groups and public schools.

Education and Outreach during the Planning Process. Public participation during the planning process is important to the success of this Plan. As previously described, in preparing the City's 2001 Water Conservation Plan, members of the public served on the

City of Portales Public Works Committee and participated in considering a wide range of Best Management Practices for water conservation and in selecting certain practices for implementation that were best suited to meeting the City's conservation goal consistent with the City's socioeconomic conditions. Those conditions have not substantially changed since 2001 and the considerations established by the Committee in selecting Best Management Practices for the 2001 Plan remain relevant and have been applied to this updated Plan. The new water demand reduction goal in this updated Plan, the water supply conditions upon which that goal was based, and the water conservation measures selected to meet that goal were presented in the City's open report *Review of Water Supply Options* (Wilson 2013). In addition, the findings and conclusions of annual reports on the City's water supply and demand conditions have been presented to the City Council and the general public in open meetings and have been described for the general public in the Portales News-Tribune. The entire *Review of Water Supply Options* report is available for public review and comment on the City's website.

Education and Outreach during Plan Implementation. Education is an essential ingredient in any effective water conservation program. The benefit of public education and outreach is two-fold. First, education will heighten public awareness of a limited water supply and encourage social responsibility in water conservation. Second, education will provide the public with the information needed to identify and implement water savings measures that are reasonable and appropriate for individual circumstances. For example, landscape irrigation may account for more than half of a customer's current water use. Through the education and examples provided by this program, people can become aware that drought-resistant plantings can be colorful and attractive.

While some water savings can be directly attributed to an increased public awareness of a limited resource and an increased social responsibility, much of the benefit of this education and outreach program is expected to come from an increased public support and acceptance of other water conservation measures. As one example, education can explain the reasons for the increasing water costs and inverted block rates discussed in Section 5.2 and provide customers with ideas on how to respond to those increases.

The City's education and outreach program has four elements: distribution of written materials; presentations and other outreach; support for school education efforts; and demonstration facilities. Descriptions of each of these elements are presented in the following paragraphs.

Distribution of Written Materials. Written materials describing the need for water conservation and providing information on ways to conserve water will continue to be obtained and distributed. These materials address the following subjects.

- The source of Portales' present and future water supply
- How to design and plant water-efficient landscapes
- How to efficiently irrigate home gardens
- How to detect and fix leaks
- Types, benefits and costs of water-conserving household fixtures

- Good indoor water-conserving practices

Written materials describing most of the foregoing water conservation subjects have been prepared and are available in Portales's City Hall from sources such as AWWA and NMOSE. Information on local demonstration projects and the City's present and future water supply have been disseminated by the Portales News-Tribune and by the City's Water Utility Department. The City may also choose to rewrite some of the standard materials to make the information more specific to local conditions.

The typical written material is a single piece of paper, sized and folded to fit in an envelope or displayed in a brochure rack. Written materials are also distributed with local water bills; in standalone mailings; as handouts at City offices, banks, and other businesses; and as handouts during educational presentations. Additional materials relating to wastewater are readily incorporated into this type of program.

*Presentations and other Outreach***.** Individuals such as Water Utility Department and other City employees, representatives of other government agencies such as agricultural extension agents, and other outside individuals are made available to speak to community groups and the media on water supply and conservation issues, and to respond to customer questions. The City proactively coordinates this effort with other government agencies, commercial and industry groups, and public interest groups. Elements of the program include:

- The use of paid and public service advertising
- Other uses of the news media, such as periodic news releases and "water awareness" articles in the Portales News-Tribune and Clovis News Journal
- Development of a water conservation library of books, videos and other information that can be used in conjunction with presentations
- Support for printing and distributing water conservation messages for motels, restaurants and other commercial and institutional customers

Support for School Education Efforts. The City will continue to take a proactive role in supporting water conservation efforts within the public and private school system. This includes such measures as distributing water conservation curricula developed by the NMOSE; encouraging water conservation on school property; making presentations to school groups and organizations; providing teachers with information and teaching materials on Portales' water supply issues and conservation needs; and sponsoring water conservation poster or other water awareness contests. Outreach to schools also include ENMU groups and the University's newspaper and public television services.

Support for Industrial, Commercial, and Institutional Education Efforts. The City will continue to take a proactive role in supporting water conservation efforts within the local business community. This includes presentations on the need for enhanced water conservation before local business and community organizations and providing informative and educational water conservation materials to businesses for customer use. High water using businesses and businesses with significant landscape irrigation needs

will continue to be identified and specifically targeted for outreach. As a major water user itself, this program has also been made available to City employees.

Demonstration Gardens and Homes. The conservation awareness programs described below feature conversion to drought-resistant residential landscaping. Landscape irrigation naturally increases in summer months and accounts for much of the peak summer water demands that are increasingly difficult to meet. The City's 5-year average (2009-2013) SFR and MFR outdoor water use totaled an estimated 190 million gallons. Widespread conversion to drought-resistant residential landscaping could significantly reduce demand on the City's wellfields.

The City of Portales has developed a xeric demonstration garden at the City Hall and roadside demonstration gardens along NM 206 to Lovington and at the north and south entrances to town along US 70. In addition, a mile-long xeric garden was established in 2009 in the median along US 70 north of town. Another demonstration of xeric landscaping is provided by Eastern New Mexico University. These gardens provide ongoing models of water-wise landscaping. These programs will be expanded by encouraging local residents and businesses to convert their gardens to xeric hardscaping by replacing grass and shrubs with decorative gravel and highly drought-resistant plants.

Xeriscaping Rebate Program. Although many residents are voluntarily converting their gardens, an incentive program may be implemented that offers rebates to residential, commercial, and institutional customers who convert traditional grass lawns to hardscape or drought resistant plants. If xeric landscaping is associated with homes featuring water conserving fixtures and materials, such homes could also be included in an annual Parade of Homes, to be on display for citizens to tour. The City is performing additional legal and budgetary reviews of the water conservation rebate aspects of this Plan before committing to rebate programs. Xeriscaping rebates will be included as goals of this Plan to be implemented pending completion of these reviews.

Home & Garden Shows. The City is working with *Pride in Portales* and *New Mexico Clean and Beautiful* organizations to promote water-conserving landscaping on road medians and adjacent areas. As part of this effort, the City is promoting and/or participating in annual Home and Garden Shows where Water Utility Department representatives can be present to provide information, answer questions, make presentations, and support a community-wide water conservation effort through home and landscape design. The City is working with Master Gardeners and garden clubs to develop Water Wise Garden Tours of selected gardens that demonstrate the use of native, water-efficient landscaping and conservation water use. Information on water-efficient plants and landscape design available through the NMOSE will continue to be routinely available at Portales' City Hall.

Landscape Irrigation and Xeric Garden Consultation. Offering free one-on-one consultation to residents and businesses on landscape irrigation and xeric garden conversions will help identify unnecessarily wasteful irrigation practices and encourage water-wise landscaping. When requested, Water Utility Department personnel will

provide advice on measuring soil moisture content to determine the need to irrigate. They will assist in xeric landscaping by providing illustrations of drought resistant plants suitable for east-central New Mexico and illustrations of completed conversion projects using information prepared by the NMOSE and other sources.

5.5 Rainwater Harvesting and Cisterns

Rainwater runoff from roofs, from other hard surfaces, and even from soils can be collected and redirected for beneficial use. The simplest approach that can be implemented by a homeowner, business or institution involves redirecting runoff for landscape irrigation. In commercial districts runoff from streets and parking lots can be redirected to catch basins for groundwater recharge. More elaborate harvesting involves the use of rain barrels or cisterns to save rainwater for future use. A free guide to rainwater harvesting and system design prepared by the City of Albuquerque is available for customer use.

The City of Portales has installed a rainwater catchment and cistern system to accompany the xeric landscaping demonstration project at City Hall. Rainwater from the City Hall roof is collected in two 1,500-gallon tanks and pumped to a xeric demonstration garden in front of the Portales City Hall. The irrigation demand is expected to be about 5,000 gallons per year. The system became operational in September 2005 and is designed to harvest an average of 7,500 gallons per year. The City of Portales has prepared a free brochure describing the system and providing information on its xeric landscaping. Increasing water rates and the City Hall demonstration project are expected to provide customers from all categories with incentives for installing rainwater catchment and redirection systems.

5.6 Wastewater and Gray Water Reuse

For purposes of this Water Conservation Plan, the term *wastewater* refers to water collected in a municipal sewer system and treated in a treatment plant. *Gray water* refers to untreated household water that has not come in contact with toilet waste. Both types of water can be collected for reuse.

City Park Irrigation with Wastewater. Wastewater is currently collected by the City of Portales in a sewer system and conveyed to a treatment plant. The treated water is released to a discharge area southeast of town where it is beneficially used to irrigate up to 300 acres of agricultural land. The City is upgrading its treatment plant to improve the quality of the discharged water so it can be used to irrigate the City's public parks. Treated wastewater used for irrigation will reduce demand on the City's primary groundwater supply and can therefore be considered a water conservation measure.

The City's wastewater treatment plant is being upgraded to produce Class 1A reclaimed wastewater. As defined by the New Mexico Environment Department (NMED 2007), Class 1A reclaimed wastewater has no human access or residential setback limitations and may be used for any purpose except direct consumption, food handling and

processing, and spray irrigation of food crops. The City is planning to use this water to irrigate public parks and the sludge residues from the treatment process will be suitable for reuse as compost by local farmers.

The upgraded treatment plant is designed to meet a future average daily flow of 1.6 MGD and a peak flow of 3.2 MGD. The current average flow of the City's treatment plant is about 0.8 MGD (292 million gallons/year) and is expected to reach an average of 1.6 MGD (584 million gallons/year) within about 20 years due to population growth. The Abengoa Bioenergy Plant adds about 0.2 MGD to the treatment plant flow when it is operating, for a periodic current total of about 1 MGD (365 million gallons/year). Water losses will be minimized by recycling waste process water, such as filter backwash, to the upstream plant headworks. Construction began in March 2014 and the upgraded treatment plant is expected to be operational in the summer of 2015. Additional information on the treatment processes is presented in Wilson (2013).

The reclaimed wastewater distribution system is planned to be completed at the same time as the treatment plant. The irrigation demands of City parks, the golf course/Country Club, and ENMU are greater than the future average treatment plant flow of 1.6 MGD and are therefore also greater than the current average flow of 0.8 to 1.0 MGD. The City is therefore not considering reclaimed wastewater use for industrial, commercial, agricultural, or drinking water purposes.

To achieve the goal of reducing demand on the City's wellfields, the reclaimed wastewater will be used at locations where irrigation water is currently supplied from those wellfields. The additional 0.8 to 1.0 MGD (292 to 365 million gallons/year) that reclaimed wastewater will currently provide the City amounts to a reduction in wellfield demand of about 25 to 30 percent, which is significant. Reclaimed wastewater also has the distinct advantage of providing a relatively stable supply.

Water conservation in the City's public parks has been an important part of the City's conservation effort even before the planned introduction of reclaimed wastewater. Automatic, timed sprinkler systems have been installed in City parks allowing for controlled use of water and nighttime watering. In addition, sprinkler systems in the parks are designed with controlled nozzle sizes and equal overlap to minimize overwatering. These conservation efforts will continue to be implemented.

Potable Uses of Treated Wastewater. The option to extend wastewater treatment to include directly supplementing Portales' drinking water supply has been considered by the City Council. The advantages and disadvantages of such an action are described in the City's recent *Review of Water Supply Options* (Wilson 2013). Advantages include potential further reductions in wellfield demand and increased flexibility in reclaimed water use. Disadvantages include additional treatment costs and potentially negative public perceptions. In weighing the advantages and disadvantages, the City Council has concluded that potable uses of treated wastewater are not appropriate for implementation at this time.

Household Irrigation with Gray Water. Gray water is defined by the NMOSE as untreated household wastewater that has not come in contact with toilet waste. Gray water includes wastewater from bathtubs, showers, washbasins, clothes washing machines and laundry tubs. It does not include wastewater from kitchen sinks, dishwashers, or laundry water from the washing of material soiled with human waste, such as diapers. Gray water is distinguished from "black water," which is wastewater from toilets, kitchen sinks and dishwashers. Black water should not be reused in the home without proper treatment because of the high risk of contamination by bacteria, viruses, and other pathogens.

Gray water can be captured and successfully used to irrigate household landscaping and fruit trees, and reduces the amount of potable water that would otherwise have been used. Gray water should not be used where it may come in contact with the edible part of food crops. Biodegradable and environmentally friendly soap products should be used. Soaps that contain borax and are high in salts and sulfates, including many powdered soaps, should be avoided. Gray water containing chlorine bleach should also be avoided.

A state permit is not required to apply less than 250 gallons per day of private residential gray water for a resident's household gardening, composting or landscape irrigation if certain conditions of use are met. Gray water systems designed to discharge more than 250 gallons per day require a permit from the New Mexico Environment Department. Additional information on gray water and the limitations in its use are available from the NMOSE. Increasing water rates and an increased emphasis on public education are expected to provide residential customers with incentives for gray water reuse.

5.7 Water Conservation Ordinances

Portales' City Council has adopted ordinances for emergency drought management and to encourage customers to reduce water use. Ordinances will also be developed to address waste of water. Such ordinances include:

Water Rate Ordinance. This ordinance defines the City's conservation block rate structure where higher rates apply to higher volumes of water consumed. As previously described, such an ordinance is in place in Portales and is renewed every five years.

Xeriscaping Ordinance. This ordinance requires landscaping with drought-tolerant plants over most yard areas for new developments and when substantial improvements are made to existing developments. The ordinance provides for runoff controls and encourages rainwater harvesting. Landscape design reviews by the City are required prior to issuing landscape permits.

Emergency Drought Management Ordinance. The City Council has given the City Manager emergency water management authority including initiating water conservation and drought management practices.

Waste of Water Ordinance. This ordinance is being considered and will outline water use standards for outdoor irrigation. It will be developed with public inputs and adopted in open meetings of the City Council.

5.8 Consistency with Regional Water Plans

Roosevelt County and the City of Portales are included in the Northeast New Mexico Regional Water Plan (Daniel B. Stevens and Associates 2007). That plan was adopted by the New Mexico Interstate Stream Commission in 2007. Increased water conservation is included in the plan as a strategy for meeting future demands and recommended municipal conservation activities are presented in Table 8-1 of that plan. The following recommendations are identified for the City of Portales:

- Enforce the water conservation measure that has been adopted by the City
- Make water conservation plan improvements as recommended in the 2004 Water Conservation and Use Report
- Complete a water system audit
- Consider providing xeriscape incentives and requiring xeriscaping and graywater and/or rainwater systems in all new development

Section E of the aforementioned New Mexico water conservation statute §72-14-3.2 NMSA 1978 requires that water conservation plans shall reference the relevant regional water plan and cite the conservation guidelines mentioned in the regional water plan that have been adopted in the City's Water Conservation Plan. Each of the foregoing recommended activities has been adopted in this Plan and the current status of these activities is described below.

Enforce the water conservation measure that has been adopted by the City. The City's enforceable water conservation measures are those that have been adopted by City ordinance. As described in Section 5.7, Portales now has three water conservation ordinances in effect and one additional ordinance being considered. All ordinances that are in effect are being enforced.

Make water conservation plan improvements as recommended in the 2004 Water Conservation and Use Report. The three water conservation recommendations made in the cited report and the current status of those recommendations are presented below.

- Expand drought-resistant landscaping in City parks to reduce water demands in dry summers.
  As part of its wastewater reuse plans described in Section 5.6 and further addressed below in Section 6.0, the City is supporting a strategy of encouraging residents and businesses to convert to drought-resistant plants and hardscapes while retaining City parks as oasis-like greenscapes. However, in concert with its xeriscaping ordinance described in Section 5.7, drought-resistant landscaping will be expanded in all new City parks and when substantially modifying existing parks.
- Encourage ENMU to accelerate its drought-resistant landscaping program.

ENMU's drought-resistant landscaping program has now evolved to a satisfactory level. The University's annual system demand decreased from nearly 150 million gallons as recently as 2003 to about 55 million gallons in 2007 and has since been relatively constant at between 50 and 60 million gallons per year. While substantial summer water demand increases are still seen, overall use has remained small.

- Expand water metering to help identify and control the large volume of unaccounted-for water use.
  The City's water metering has been expanded and upgraded as described in Section 5.3 and this program is continuing. However, as described in Section 5.3 and in Section 6.0 below, real system losses are still a sufficiently large percentage of total water diversions that they remain a target for further improvement.

Complete a water system audit. Internal water system audits are being conducted annually by the City's Water Utility Department. Although these audits do not completely follow the comprehensive AWWA methodology because of cost considerations, they have provided sufficient information to support the City's annual Water Conservation and Use Reports that track supply and demand trends and the effectiveness of the City's water conservation measures. In addition, an AWWA water loss management audit was performed for 2013 and the results are described in Section 4.1 of this Plan. The approach to system auditing taken by Portales has been found to successfully support significant reductions in wellfield demand while remaining fiscally responsible.

Consider providing xeriscape incentives and requiring xeriscaping and graywater and/or rainwater systems in all new development. Xeriscape incentives have been considered by Portales and are incorporated in the City's xeriscaping rebate program described in Section 5.4. As described in Section 5.7, xeric landscaping is required by ordinance in all new developments and when substantial improvements are made to existing developments. The City has considered and is promoting but has not yet required graywater or rainwater harvesting systems.

6.0 PRIORITY WATER CONSERVATION MEASURES AND GOALS

The aggressive goal of further reducing the City's total annual wellfield demand (including exports to Roosevelt County Water Coop) by 425 million gallons from the 2012 level of 1,125 million gallons to about 700 million gallons by 2016 is primarily driven by the need to provide a buffer that would accommodate a delay in Ute water delivery. Such a reduction will also help to maintain a strategic groundwater reserve in the Ogallala/High Plains Aquifer for future emergency drought conditions. The target wellfield demand of 700 million gallons/year would be supplemented by approximately 325 million gallons/year of recycled wastewater for a total water supply of approximately 1 billion gallons/year. This leaves a residual reduction of about 100 million gallons/year to be accomplished in four years by the Portales community. Given the City's past

achievements in reducing total pumping by 139 million gallons in the four years from 2009 to 2013, this additional reduction can be achievable without imposing a significant burden.

The conservation measures described in Section 5.0 have been adopted by the City and most are currently implemented and account for the reductions in water use that have already been achieved. Those conservation measures that are amenable to achieving more aggressive water savings have been prioritized and are described below. These include continued stakeholder involvement and a strengthened public education and outreach program; more stringent seasonal landscape irrigation restrictions; reducing unaccounted-for system losses; and wastewater reuse. Additional detailed elements of this Water Conservation Plan will be developed with the input of citizens and the business community, staged over time, and key plan provisions will adopted in open meetings by City ordinances as they have been in the past.

6.1 Stakeholder Involvement and Public Outreach

Program Summary: Selecting and implementing stringent water conservation measures can rapidly become a contentious issue because of the restrictions they place on the landscaping of a private home or business and on a person's lifestyle and pocketbook. Acceptance of such measures involves a recognition that we are living in a water-scarce environment and broadening our concepts of beauty. As such, water conservation measures will be implemented progressively and with careful planning. The primary means of preparing for increasing conservation is through increasing public awareness of the need to conserve and demonstrations of the beauty that can be attained from water-wise landscaping and living in a water-efficient home.
Program Selection: Needed to support other conservation measures.
Program Implementation: See Section 5.4.
Implementation Responsibility and Dates: Implementation by City of Portales; program is ongoing.
Targeted Users: City-wide with increased emphasis on youth and local commercial and industrial water users.
Funding Source, Staffing and Anticipated Cost: Funding by City of Portales Public Works Department; staffing by Public Works and other City personnel; anticipated cost is $5,000 per year.
Anticipated Results: No direct reduction in water use but essential for acceptance of other measures.
Tracking and Evaluation: Subjective evaluation of targeted user response plus degree of acceptance of other measures.
Estimated Lifetime Impact: An increased awareness of the value of a good water supply.
Annual Reporting and Updates: An annual Water Conservation and Use Report will be prepared by the City of Portales Water Utilities Department. See Section 8.0.

6.2 Seasonal Landscape Irrigation Restrictions

Program Summary: Standards for landscape irrigation will be promulgated in a Waste of Water ordinance and will apply to residential, commercial, and institutional customers. These standards will identify the times of day that landscapes can be watered (such as between 6 p.m. and 10 a.m. from April to September) and prohibit uncontrolled runoff to streets. The ordinance will also recognize that the City may, at times, enact more restrictive emergency watering schedules, limiting the number of times customers can irrigate their landscapes during a given day or week. Portales has currently initiated a voluntary program of watering every other day with no watering on Mondays or between 10 am and 6 pm daily. The more stringent mandatory water use restrictions will become effective if voluntary measures are found to be insufficient. A Waste of Water ordinance is expected to be adopted by the City Council in 2015. This program is coupled with public outreach on the installation of rainwater cisterns to provide supplemental residential irrigation water.
Program Selection: Potential for significant water savings without significant hardship.
Program Implementation: See Sections 5.5 (cisterns) and 5.7 (ordinances).
Implementation Responsibility and Dates: Implementation by City of Portales; initial voluntary program is currently in effect; water savings goal to be achieved by 2016 and maintained as long as water supplies remain scarce.
Targeted Users: Single and multi-family residences and commercial water users.
Funding Source, Staffing and Anticipated Cost: Funding and staffing by City of Portales; no cost for ordinance; voluntary compliance is expected to be enhanced by public outreach program; cost of enforcement is variable depending on degree of compliance.
Anticipated Results: Total average SFR and MFR outdoor use is 189 million gallons/year. Anticipated reduction in average outdoor water use is 50 to 95 million gallons/year with a target average reduction of 70 million gallons/year by 2016.
Tracking and Evaluation: SFR and MFR outdoor water use will be tracked annually using the NMOSE GPCD Calculator and compared with goal.
Estimated Lifetime Impact: An increased conversion to low water use landscaping that will endure as long as water supplies remain scarce.
Annual Reporting and Updates: An annual Water Conservation and Use Report will be prepared by the City of Portales Water Utilities Department that will include updated NMOSE GPCD Calculator results. See Section 8.0.

6.3 Distribution System Loss Reduction

Program Summary: Apparent and real system losses amounted to almost 130 million gallons in 2013. Some of these losses, such as pipeline leaks, are large and wasteful, and some are modest but potentially achievable reductions in these losses could result in significant water savings. Enhanced reductions in system losses will be achieved by replacing older water mains; replacing older water meters with newer, more accurate meters; reducing data handling errors with new Automatic Meter Reading systems; metering fire hydrant, street department, and construction water uses; and metering currently unmetered uses such as public park irrigation. The midrange 5-year water savings goal of 39 million gallons/year will reduce system losses to the AWWA expected

median level for Southern water distribution systems. The target date for this midrange goal is 2018. An intermediate water savings goal of 20 million gallons/year with a range of 15 to 25 million gallons/year is targeted in this Plan to be achieved by 2016.
Program Selection: Potential for intermediate water savings while implementing long-term distribution system improvements.
Program Implementation: See Section 5.3.
Implementation Responsibility and Dates: Implementation by City of Portales Public Works Department; intermediate water savings goal to be achieved by 2016.
Targeted Users: City of Portales Water Utility Department.
Funding Source, Staffing and Anticipated Cost: Funding by City of Portales; staffing by City of Portales Department of Public Works and potential contractors; anticipated cost is $25,000 per year.
Anticipated Results: Water savings of 20 million gallons/year with a range of 15 to 25 million gallons/year by 2016.
Tracking and Evaluation: Distribution system water losses will be tracked by conducting annual AWWA water loss audits and compared with goal.
Estimated Lifetime Impact: Long-term distribution system upgrades resulting in long-term reductions in water loss.
Annual Reporting and Updates: An annual Water Conservation and Use Report will be prepared by the City of Portales Water Utilities Department that will include updated AWWA water loss audit results. See Section 8.0.

6.4 Wastewater Reuse

Program Summary: Reclaiming wastewater for irrigation use will substantially reduce demands on the City's wellfields and satisfy most of the burden for meeting the updated water conservation goal. The City's plans for irrigating public parks will also supplement a conservation strategy for reducing landscape irrigation at individual residences and businesses. The City will, for example, support a strategy of encouraging residents and businesses to convert to drought-resistant plants and hardscapes while retaining City parks as oasis-like greenscapes. Reclaimed wastewater has the distinct advantage of a fairly stable supply and any application that reduces demand on the City's wellfield will be beneficial.
Program Selection: Potential for significant reduction in wellfield demand while maintaining City parks as important community amenities.
Program Implementation: See Section 5.6.
Implementation Responsibility and Dates: Implementation by City of Portales Public Works Department; expected completion by 2016.
Targeted Users: The Portales community.
Funding Source, Staffing and Anticipated Cost: Funding by City of Portales; construction and staffing by City of Portales Department of Public Works and City contractors; anticipated cost for treatment plant upgrades and distribution system is $24.5 million.
Anticipated Results: Average water savings of 325 million gallons/year with a range of 292 to 365 million gallons/year by 2016.
Tracking and Evaluation: Wastewater reuse volumes and reductions in wellfield demands for City park irrigation will be tracked in annual reports and compared with goal.

Estimated Lifetime Impact: Long-term reductions in wellfield demands for City park irrigation.
Annual Reporting and Updates: An annual Water Conservation and Use Report will be prepared by the City of Portales Water Utilities Department that will include updated wastewater reuse volumes and reductions in wellfield demands for City park irrigation. See Section 8.0.

6.5 Other Best Management Practices

Program Summary: Four of Portales' Best Management Practices in water conservation were selected for more aggressive implementation to meet the City's 2016 water demand reduction goal and are individually described above. The City's remaining water conservation measures will remain in effect and are expected to contribute to reaching the 2016 goal. The more effective of these remaining measures are reduced indoor water use through increased conservation awareness and installation of water conserving fixtures (Section 5.1); the continued use of inverted block water rates and progressive increases in those rates (Section 5.2), and the supporting City ordinances (Section 5.7). The City is performing additional legal and budgetary reviews of providing water conservation rebates for installing low water use fixtures and low water use landscaping. Implementing a rebate program pending completion of these reviews is a goal of this Plan. The City's Best Management Practices in effect between 2009 and 2013 yielded the aforementioned water demand reduction of 139 million gallons. The City has established a conservative water demand reduction goal of 10 million gallons with a range of 5 to 20 million gallons to be achieved by 2016 through these other practices.
Program Selection: Potential for a continued modest reduction in wellfield demand.
Program Implementation: See Sections 5.1, 5.2, and 5.7.
Implementation Responsibility and Dates: Implementation by City of Portales Public Works Department; implementation is ongoing; expected completion by 2016.
Targeted Users: The Portales community including residents and industrial, commercial, and institutional users.
Funding Source, Staffing and Anticipated Cost: Funding and staffing by City of Portales; cost is expected to be minimal.
Anticipated Results: Average water savings of 10 million gallons/year with a range of 5 to 20 million gallons/year by 2016.
Tracking and Evaluation: Attributing water demand reductions directly to these remaining Best Management Practices is difficult and is not expected. Success will be evaluated by overall water demand reductions achieved.
Estimated Lifetime Impact: Long-term reductions in wellfield demands are expected as residential and commercial/industrial water conservation practices become routine aspects of daily living.
Annual Reporting and Updates: An annual Water Conservation and Use Report will be prepared by the City of Portales Water Utilities Department that will include updated wellfield demand data for all community sectors. See Section 8.0.

6.6 Summary of 2016 Water Conservation Goals

A summary of Portales' 2016 water conservation goals is presented in Table 7.

Table 7. Potential Reduction in Wellfield Demand for Prioritized Conservation Measures

Conservation Measure	Potential Annual Reduction in Wellfield Demand by 2016	Target Annual Reduction in Wellfield Demand by 2016
Stakeholder involvement and public outreach	No direct reduction but essential for acceptance of other measures	No direct reduction but essential for acceptance of other measures
Seasonal landscape irrigation restrictions	50 to 95 million gallons	70 million gallons
Water conservation rebates	To be determined	To be determined
Reduce system losses	15 to 25 million gallons	20 million gallons
Wastewater reuse	290 to 365 million gallons	325 million gallons
Other current Best Management Practices	5 to 20 million gallons	10 million gallons
Aggregate Reduction	**360 to 505 million gallons**	**425 million gallons**
Target Reduction by 2016	- -	**425 million gallons**

Note: Implementing water conservation rebates is a goal of this Plan pending completion of legal and budgetary reviews.

The overall goal of the Water Conservation Plan is to reduce the City's total annual wellfield demand to 700 million gallons by 2016. The anticipated results from aggressive implementation of Portales' water conservation measures are summarized for key water use metrics in Table 8. Tabulated data for 2013 are actual and data for 2016 are Water Conservation Plan goals. Intermediate data are linearly proportioned and provide benchmarks for measuring progress. Groundwater pumping drops significantly in 2016 when large volumes of reclaimed wastewater become available resulting in a significant drop in system total GPCD. A similar drop in single family residential water use is not seen in 2016 because that use will not involve reclaimed wastewater.

However, the anticipated increasing difficulty of making additional water demand reductions based on conservation alone supports the City's multifaceted strategy of reducing demand through increasingly stringent water conservation efforts, increased accuracy in accounting for water use so that the success of the conservation efforts can be measured, and identification of interim sources of water supply. The success of the City's water conservation programs will continue to be tracked in its annual Water Conservation and Use Reports. These reports will evaluate the progress made and identify any modifications to the Water Conservation Plan that may be needed to achieve its goal.

Table 8. Anticipated Reductions in Overall Water Use

Water Use Metric	Volumes in Thousands of gallons			
	2013	2014	2015	2016
Total Groundwater Pumping	1,099,563	1,074,709	1,049,854	700,000
Wastewater Reuse				325,000
Total Water Available	1,099,563	1,074,709	1,049,854	1,025,000
Exports to County Coop	177,831	173,811	169,792	165,772
Total Water Use in Service Area	921,732	900,897	880,063	859,228
Projected Total Service Area Population	15,807	15,938	16,071	16,204
System Total GPCD	159.8	154.9	150.0	118.4
Single Family Residential Water Use	370,331	361,960	353,589	345,218
Single Family Residential Population	12,659	12,773	12,887	13,002
Single Family Residential GPCD	80.2	77.6	75.2	72.7
Unmetered Non-Revenue Water Use	127,581	124,697	121,813	118,930

7.0 DETERMINATION OF COMPLIANCE WITH §72-14-3.2 NMSA 1978

This updated Plan has been prepared to be compliant with the requirements of §72-14-3.2 NMSA 1978 *Water conservation plans; municipalities, counties and water suppliers.* A complete copy of this statute is included in Appendix C to this Plan. This section provides references to sections of this report that address the requirements of this statute regarding the content and scope of the City's Water Conservation Plan.

§72-14-3.2.A. As used in this section, "covered entity" means municipalities, counties and any other person that supplies, distributes or otherwise provides at least five hundred acre-feet of water annually for domestic, commercial, industrial or government customers for other than agricultural purposes, but does not include Indian tribes, pueblos, nations, chapters or any entity of a tribe, pueblo, nation or chapter.

The City provides more than 500 acre-feet of water annually and is therefore a covered entity.

§72-14-3.2.B. A covered entity may develop, adopt and submit to the state engineer by December 31, 2005 a comprehensive water conservation plan, including a drought management plan.

The City has submitted the required documents. This updated Water Conservation Plan supersedes the City's original 2001 Water Conservation Plan.

§72-14-3.2.C. The manner in which the covered entity develops, adopts and implements a comprehensive water conservation plan shall be determined by the covered entity. The plan shall be accompanied by a program for its implementation.

The City has developed, adopted, and implemented this updated Water Conservation Plan pursuant to the guidance and examples described therein. This Plan includes implementation programs, schedules, and details for those water conservation measures that have not been previously implemented.

§72-14-3.2.D.1 Municipalities and counties shall consider ordinances and codes to encourage conservation measures; covered entities without ordinance or code enforcement ability shall consider incentives to encourage voluntary compliance with a set of conservation guidelines. Covered entities shall identify and implement best practices in their operations to improve conservation of the resources.

Ordinances adopted by the City to encourage conservation measures are described in Section 5.7 of this Plan. Best management practices identified and implemented by the City of Portales are described in Section 5 of this Plan.

§72-14-3.2.D.2 The covered entity shall consider, and incorporate into its plan if appropriate, at least the following:

§72-14-3.2.D.2.a Water-efficient fixtures and appliances, including toilets, urinals, showerheads and faucets.

The benefits of water-efficient fixtures and appliances are described in Section 5.1 and incorporated into this Plan through indoor water use surveys, sewer rate schedules, and low water pressures. Incentives for installing such fixtures and appliances are also provided by the City's inverted block water rate structure described in Section 5.2.

§72-14-3.2.D.2.b Low-water-use landscaping and efficient irrigation

Low water use landscaping and efficient irrigation are described in Section 5.4 and incorporated into this plan through dissemination of information on water-efficient landscapes, demonstration gardens, participation in Home & Garden Shows, and providing landscape irrigation and xeric garden consultation. In addition, a xeriscaping ordinance is described in Section 5.7. Low water use landscaping and efficient irrigation are included as prioritized and enhanced best management practices in Section 6.2.

§72-14-3.2.D.2.c Water-efficient commercial and industrial water-use processes

Efficient indoor water use at commercial and industrial facilities is included in Section 5.1 by offering free water use surveys to those facilities. Inverted block water rates are applied to commercial enterprises as described in Section 5.2. Education and outreach programs specifically include commercial, industrial, and institutional groups and organizations and emphasize the importance of water-efficient processing technologies as described in Section 5.4. These programs also specifically include enhanced water conservation within the City's own municipal facilities.

§72-14-3.2.D.2.d Water reuse systems for both potable and nonpotable water

Recycling of wastewater and gray water for nonpotable and potable uses is addressed in Section 5.6. The City's program to irrigate City parks with treated wastewater is a significant part of its overall effort to reduce wellfield demands. In addition, rainwater harvesting and cisterns are encouraged by demonstration and statute, as described in Sections 5.5 and 5.7. Wastewater reuse was included as a prioritized and enhanced best management practice in Section 6.4.

§72-14-3.2.D.2.e Distribution system leak repair

The City's distribution system leak repair program is described in Section 5.3 along with other programs to reduce system losses. Distribution system leak repair was included as a prioritized and enhanced best management practice in Section 6.3.

§72-14-3.2.D.2.f Dissemination of information regarding water-use efficiency measures, including public education programs and demonstrations of water-saving techniques

The City's program of disseminating information on water conservation measures is described in Section 5.4 and includes education and outreach programs for businesses and the public as well as water-efficient demonstration gardens and homes. This program was included as a prioritized and enhanced best management practice in Section 6.1.

§72-14-3.2.D.2.g Water rate structures designed to encourage water-use efficiency and reuse in a fiscally responsible manner

Portales' conservation water rate structure is described in Section 5.2 and the related water conservation ordinances are described in Section 5.7.

§72-14-3.2.D.2.h Incentives to implement water-use efficiency techniques, including rebates to customers or others, to encourage the installation of water-use efficiency and reuse measures

Incentives to implement water-use efficiency techniques include free water use surveys that are primarily directed at indoor uses but also have an outdoor component (Section 5.1); an inverted block water rate structure that discourages excessive water use and encourages water reuse (Section 5.2); ordinances encouraging replacing grass lawns with hardscapes or drought resistant plants and requiring such practices in new construction (Section 5.7); and City ordinances that both encourage and require other forms of water conservation (Section 5.7).

§72-14-3.2.E The water conservation plan shall contain a section that references the regional water plans in the area that have been accepted by the interstate stream commission. The section shall cite conservation guidelines mentioned in the regional plan that have been adopted into the covered entity's water conservation plan.

The consistency of this Plan with the Northeastern New Mexico Regional Water Plan is described in Section 5.8.

§72-14-3.2.F. A covered entity may at any time adopt changes to its water conservation plan and shall submit changes to the state engineer.

Modifications and updates to this Plan will be submitted to the state engineer as required.

§72-14-3.2.G. After December 31, 2005, neither the water trust board nor the New Mexico finance authority shall accept an application from a covered entity for financial assistance in the construction of any water diversion, storage, conveyance, water treatment or wastewater treatment facility unless the covered entity includes a copy of its water conservation plan.

A copy of the City's current Water Conservation Plan will accompany applications for financial assistance as required.

8.0 ANNUAL REPORTING

An annual Water Conservation and Use Report will be prepared by the City of Portales Water Utilities Department. The report will describe the City's water use and supply, conservation measure implementation, and water use trends. The report will also include updated evaluations of distribution system water losses using AWWA water loss audit software and updated evaluations of water use using the NMOSE GPCD Calculator. The characteristics of the water utility service area, water supply system, and water rights are presented in the City's 40-Year Water Development Plan and will not be repeated in the Water Conservation and Use reports except as they are relevant to the discussions in those reports. Sections of the report will provide the following information.

- Water use and water use trends
- Sources and amounts of water supply
- Evaluations of water losses and use metrics
- Conservation measures employed
- Conservation measure performance
- Recommended actions and improvements

The annual reports will be designed to assist Water Utility Department and City Council planning. They will serve to identify problems, document water use trends, and provide a basis for periodically updating the City's 40-Year Water Development Plan and Water Conservation Plan. Guidelines for the contents of the major sections of the report are presented in the following paragraphs. The emphasis of each annual report will vary, focusing on the activities and events of the past year. Detailed water use and supply records supporting the annual reports will be retained for at least 10 years and summary records will be retained indefinitely.

Water Use and Water Use Trends. Updated total and per capita water use within the utility's service area will be evaluated using the NMOSE GPCD Calculator and documented. Water use trends will be evaluated by type of customer to help identify changes that may impact water supply planning, the effectiveness of the City's adopted water conservation measures, and the appropriateness of total per capita water use as a measure of conservation. Per capita water use will be calculated as a running 5-year average. These values will be compared with target values to provide a measure of the overall effectiveness of the City's water conservation program. The discussion of water use will include the results of the Water Utility Department's annual system-wide audit and evaluations of the success of the City's distribution system water loss reduction program using AWWA water loss audit software.

Sources and Amounts of Water Supply. The status of the City's water supply will be reviewed to monitor the impacts of aquifer depletion and help assure an adequate continuing supply. Static water levels measured in the City's wells in January and February will be used to determine the rate at which the water table is dropping. The Water Utility Department's annual and peaking supply capacities will be calculated and compared with water use. Projections will be made of future water supplies and plans for additional supplies will be described as needed.

Conservation Measures Employed. The conservation measures employed by the City during the past year will be described and evaluated as relevant to the year's activities. The descriptions will include specific information on individual measures that can be used to help evaluate their success. Examples of this information include the number and types of customers surveyed, the number of water meters tested and repaired or replaced, and the number of pipeline leaks detected and repaired. The implementation of each measure will include gathering information needed to help evaluate the measure's effectiveness. For example, to assist in followup evaluations, the Education and Outreach program will include recording the contact methods, the number and types of people contacted, and where feasible, the names and addresses of the people contacted.

Conservation Measure Performance. The overall performance of the City's water conservation measures will be evaluated using the water use data described above. Water uses will be analyzed on both a current year and running 5-year average basis. Water use will be compared with precipitation, temperature, and other information as appropriate to help explain fluctuations. The performance of individual water conservation measures may also be evaluated in this section. Emphasis will be given to the prioritized measures described in Section 6.0 that are expected to provide the greatest water savings and that are the most amenable to individual evaluation. Measures most amenable to individual evaluation include those where water savings can be directly measured or calculated, such as conversion to drought-resistant landscaping, and measures with specifically identified target populations that can be contacted for followup information. For new measures, the methods for evaluating the measure's performance will be identified before the measure is implemented to help assure that the needed information is collected.

Recommended Actions and Improvements. Recommendations to the Water Utility Department and the City Council will be made in this section based on the results of the foregoing evaluations. Recommendations may address the need for supplemental water supplies as well as the need for changes in the City's conservation program emphasis. No recommendations may be provided in the early years of the program while baseline data are being collected and a firm basis for evaluation is being developed. This section of the report will also include an overview of water conservation program activities planned for the following year. Minor changes in the City's water conservation program, including the adoption of new conservation elements or modifying the emphasis given to existing elements, will be documented in the annual report and will not require modification of this Plan.

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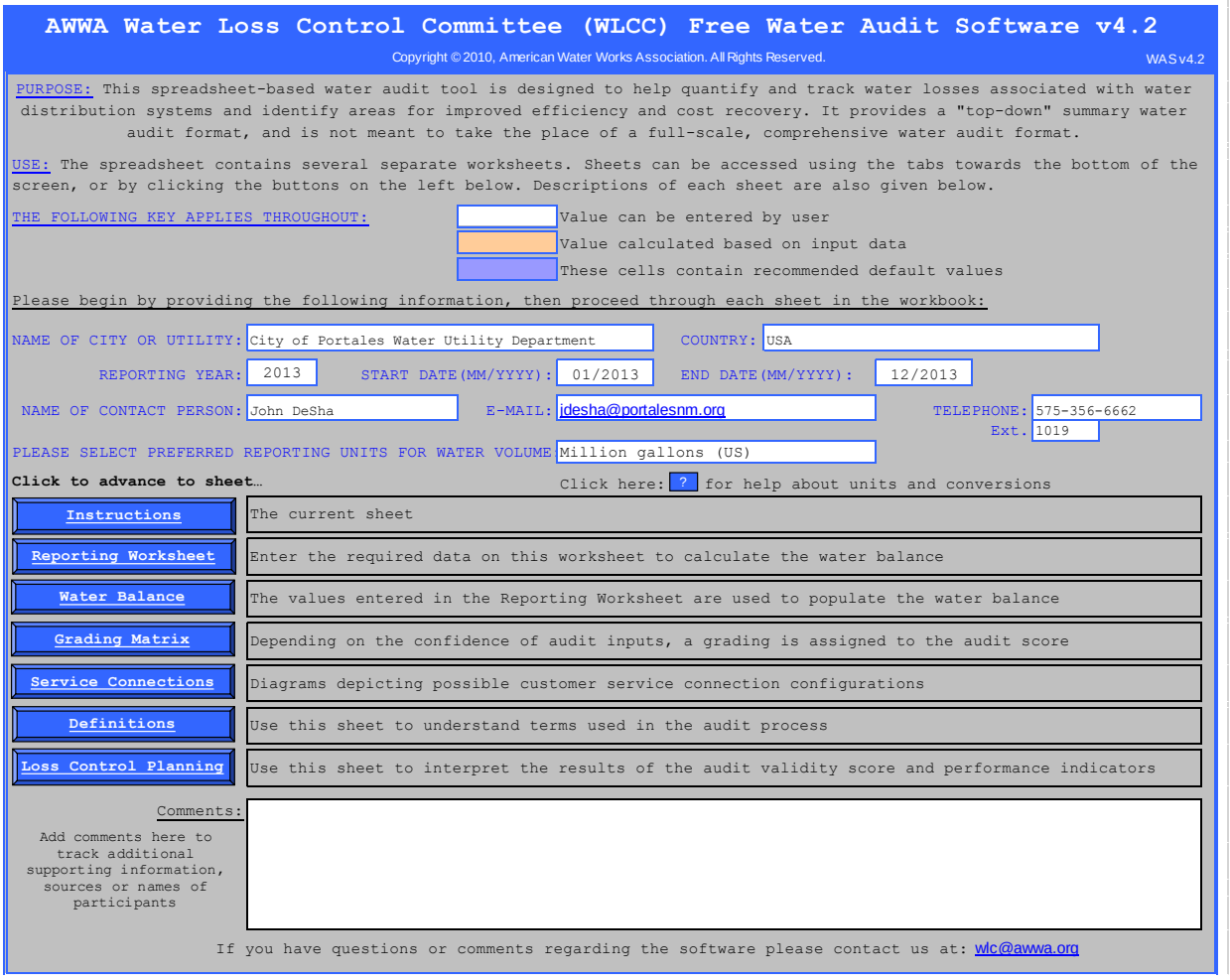
Appendix A

AWWA Water Loss Control Audit Data Sheets

Figure A-1. AWWA Water Audit Instructions



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: City of Portales Water Utility Department COUNTRY: USA

REPORTING YEAR: 2013 START DATE (MM/YYYY): 01/2013 END DATE (MM/YYYY): 12/2013

NAME OF CONTACT PERSON: John DeSha E-MAIL: idesha@portalesnm.org TELEPHONE: 575-356-6662 Ext. 1019

PLEASE SELECT PREFERRED REPORTING UNITS FOR WATER VOLUME: Million gallons (US)

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

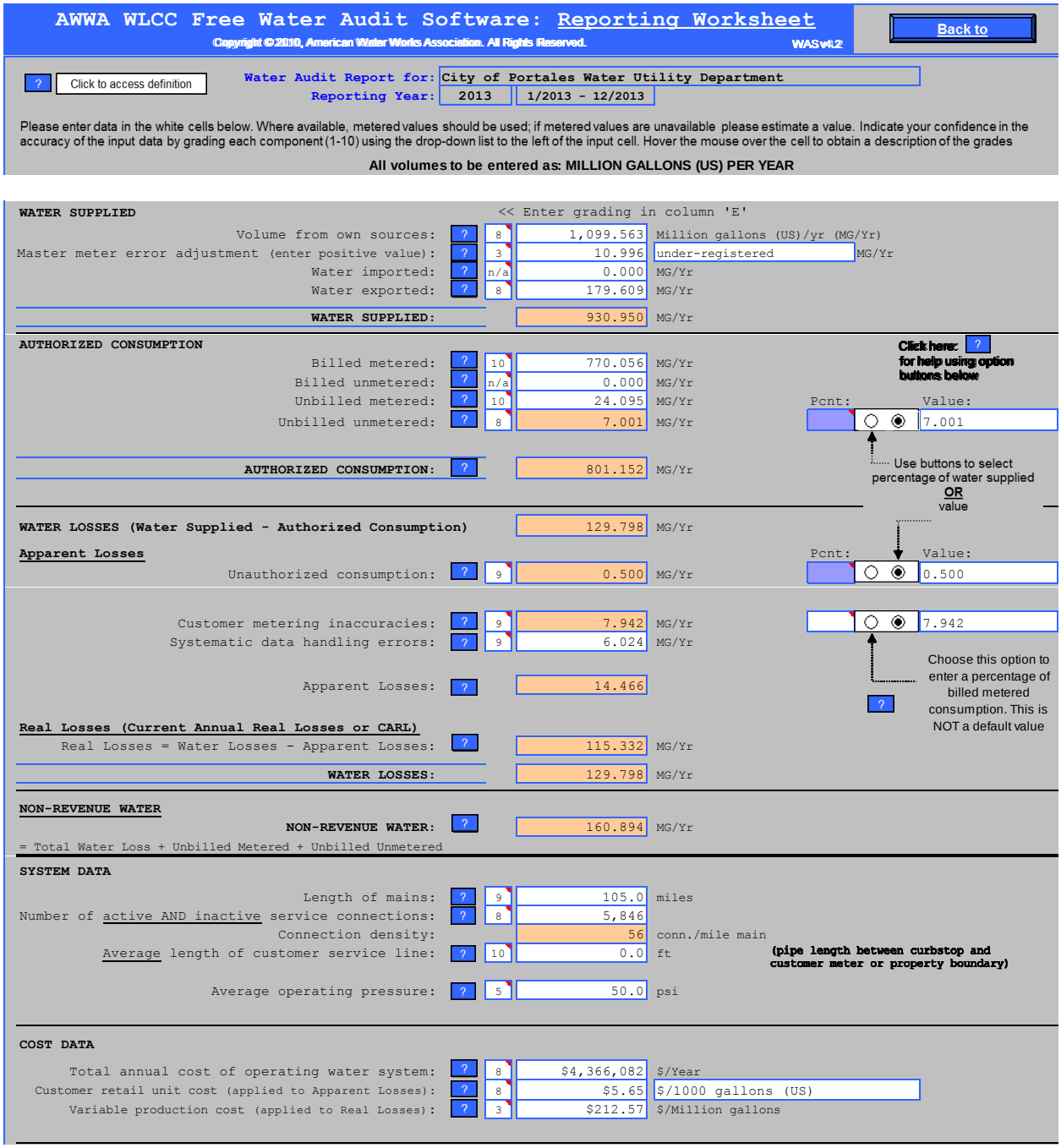
Instructions	The current sheet
Reporting Worksheet	Enter the required data on this worksheet to calculate the water balance
Water Balance	The values entered in the Reporting Worksheet are used to populate the water balance
Grading Matrix	Depending on the confidence of audit inputs, a grading is assigned 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

Figure A-2. AWWA Water Audit Reporting Worksheet



AWWA WLCC Free Water Audit Software: Reporting Worksheet — WAS v4.2

Back to

Click to access definition

Water Audit Report for: City of Portales Water Utility Department

Reporting Year: 2013 (1/2013 - 12/2013)

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:	8	1,099.563	Million gallons (US)/yr (MG/Yr)	
Master meter error adjustment (enter positive value):	3	10.996	under-registered	MG/Yr
Water imported:	n/a	0.000	MG/Yr	
Water exported:	8	179.609	MG/Yr	
WATER SUPPLIED:		930.950	MG/Yr	

AUTHORIZED CONSUMPTION

Click here: for help using option buttons below

				Pcnt:	Value:
Billed metered:	10	770.056	MG/Yr		
Billed unmetered:	n/a	0.000	MG/Yr		
Unbilled metered:	10	24.095	MG/Yr		
Unbilled unmetered:	8	7.001	MG/Yr		7.001
AUTHORIZED CONSUMPTION:		801.152	MG/Yr		

Use buttons to select percentage of water supplied OR value

WATER LOSSES (Water Supplied - Authorized Consumption) 129.798 MG/Yr

Apparent Losses

				Pcnt:	Value:
Unauthorized consumption:	9	0.500	MG/Yr		0.500
Customer metering inaccuracies:	9	7.942	MG/Yr		7.942
Systematic data handling errors:	9	6.024	MG/Yr		
Apparent Losses:		14.466			

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: 115.332 MG/Yr

WATER LOSSES: 129.798 MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER: 160.894 MG/Yr

= Total Water Loss + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	9	105.0	miles	
Number of active AND inactive service connections:	8	5,846		
Connection density:		56	conn./mile main	
Average length of customer service line:	10	0.0	ft	(pipe length between curbstop and customer meter or property boundary)
Average operating pressure:	5	50.0	psi	

COST DATA

Total annual cost of operating water system:	8	$4,366,082	$/Year	
Customer retail unit cost (applied to Apparent Losses):	8	$5.65	$/1000 gallons (US)	
Variable production cost (applied to Real Losses):	3	$212.57	$/Million gallons	

Figure A-3. AWWA Water Audit Performance Indicators

PERFORMANCE INDICATORS

Financial Indicators

Non-revenue water as percent by volume of Water Supplied:	17.3%	
Non-revenue water as percent by cost of operating system:	2.5%	
Annual cost of Apparent Losses:	$81,733	
Annual cost of Real Losses:	$24,516	

Operational Efficiency Indicators

Apparent Losses per service connection per day:	6.78	gallons/connection/day
Real Losses per service connection per day*:	54.05	gallons/connection/day
Real Losses per length of main per day*:	N/A	
Real Losses per service connection per day per psi pressure:	1.08	gallons/connection/day/psi
? Unavoidable Annual Real Losses (UARL):	26.37	million gallons/year
From Above, Real Losses = Current Annual Real Losses (CARL):	115.33	million gallons/year
? Infrastructure Leakage Index (ILI) [CARL/UARL]:	4.37	

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

WATER AUDIT DATA VALIDITY SCORE:

*** YOUR SCORE IS: 77 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: Master meter error adjustment

2: Variable production cost (applied to Real Losses)

3: Volume from own sources

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

Figure A-4. AWWA Water Audit Water Balance Results

AWWA WLCC Free Water Audit Software: Water Balance

WAS v4.2

Water Audit Report For:	Report Yr:
Utility Department	2013

	Water Exported 179.609	Billed Water Exported			
Own Sources (Adjusted for known errors) 1,110.559	Water Supplied 930.950	Authorized Consumption 801.152	Billed Authorized Consumption 770.056	Billed Metered Consumption (inc. water exported) 770.056	Revenue Water 770.056
				Billed Unmetered Consumption 0.000	
			Unbilled Authorized Consumption 31.096	Unbilled Metered Consumption 24.095	Non-Revenue Water (NRW) 160.894
				Unbilled Unmetered Consumption 7.001	
		Water Losses 129.798	Apparent Losses 14.466	Unauthorized Consumption 0.500	
				Customer Metering Inaccuracies 7.942	
				Systematic Data Handling Errors 6.024	
Water Imported 0.000			Real Losses 115.332	Leakage on Transmission and/or Distribution Mains Not broken down	
				Leakage and Overflows at Utility's Storage Tanks Not broken down	
				Leakage on Service Connections Not broken down	

Figure A-5. AWWA Water Audit Water Loss Control Planning Guide

AWWA WLCC Free Water Audit Software: Determining Water Loss Standing

WAS v4.2

Back to Instructions

Water Loss Control Planning Guide

Functional Focus Area	Water Audit Data Validity Level / Score				
	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.

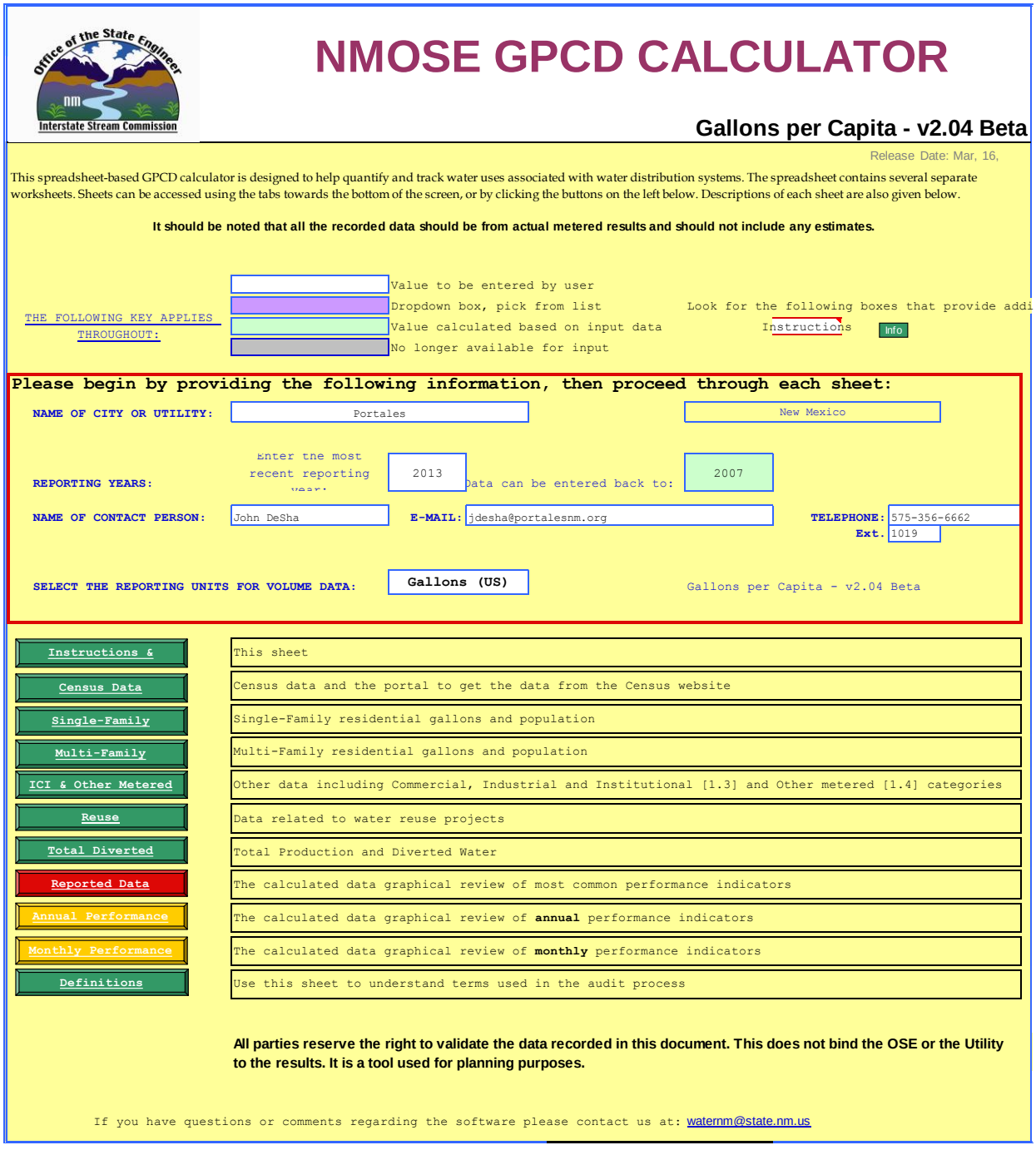
Figure A-6. AWWA Water Audit Guidelines for Setting a Target Infrastructure Leakage Index

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.		

Appendix B

NMOSE GPCD Calculator Input and Output Data Sheets

Figure B-1. NMOSE GPCD Calculator Instruction Sheet



NMOSE GPCD CALCULATOR

Gallons per Capita - v2.04 Beta

Release Date: Mar, 16,

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 addi

Instructions Info

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

NAME OF CITY OR UTILITY: Portales — New Mexico

REPORTING YEARS: Enter the most recent reporting year: 2013 — Data can be entered back to: 2007

NAME OF CONTACT PERSON: John DeSha — **E-MAIL:** jdesha@portalesnm.org — **TELEPHONE:** 575-356-6662 **Ext.** 1019

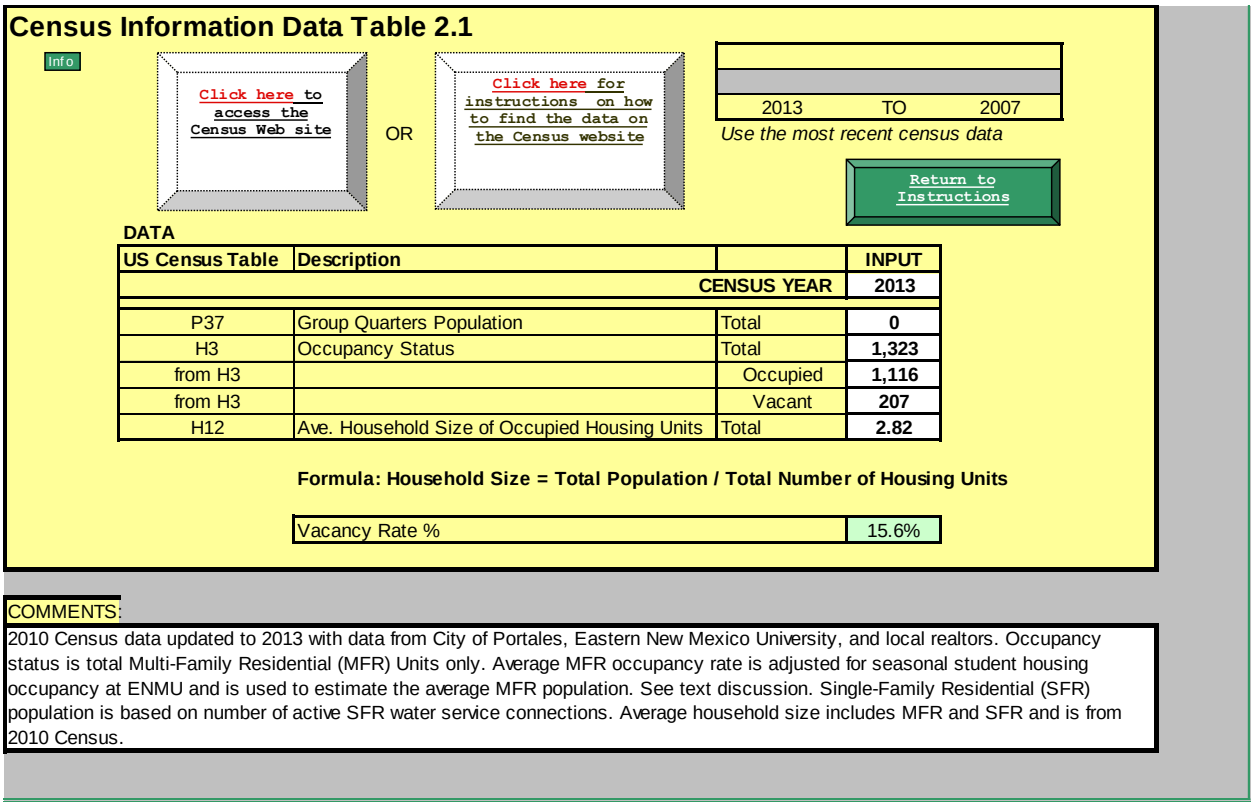
SELECT THE REPORTING UNITS FOR VOLUME DATA: Gallons (US) — Gallons per Capita - v2.04 Beta

Instructions &	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

Figure B-2. NMOSE GPCD Calculator Census Information Data Table



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

2013 TO 2007

Use the most recent census data

Return to Instructions

DATA

US Census Table	Description		INPUT
		CENSUS YEAR	2013
P37	Group Quarters Population	Total	0
H3	Occupancy Status	Total	1,323
from H3		Occupied	1,116
from H3		Vacant	207
H12	Ave. Household Size of Occupied Housing Units	Total	2.82

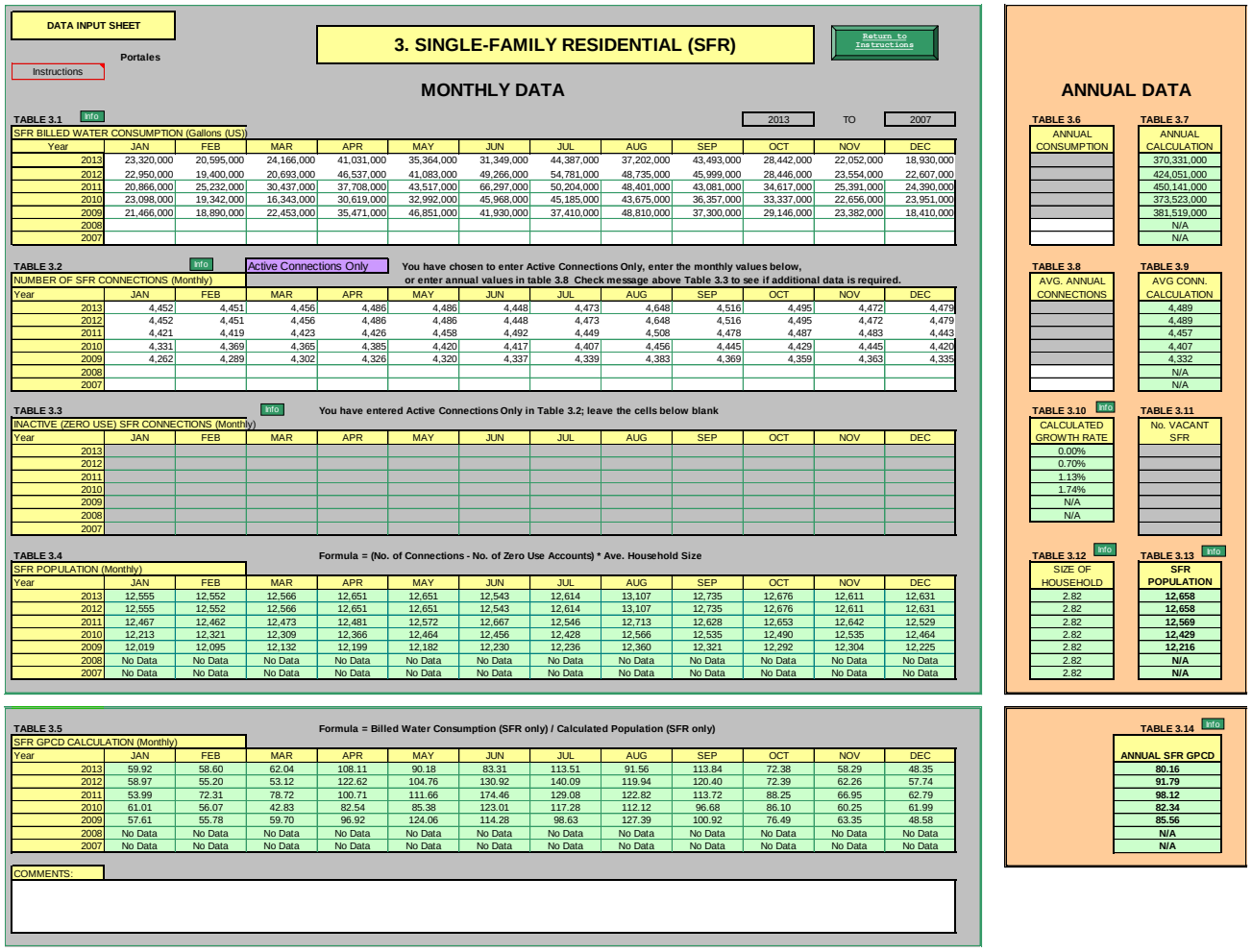
Formula: Household Size = Total Population / Total Number of Housing Units

Vacancy Rate %	15.6%

COMMENTS:

2010 Census data updated to 2013 with data from City of Portales, Eastern New Mexico University, and local realtors. Occupancy status is total Multi-Family Residential (MFR) Units only. Average MFR occupancy rate is adjusted for seasonal student housing occupancy at ENMU and is used to estimate the average MFR population. See text discussion. Single-Family Residential (SFR) population is based on number of active SFR water service connections. Average household size includes MFR and SFR and is from 2010 Census.

Figure B-3. NMOSE GPCD Calculator Single Family Residential Data Table 3



DATA INPUT SHEET

Portales

Instructions

3. SINGLE-FAMILY RESIDENTIAL (SFR)

Return to Instructions

MONTHLY DATA

TABLE 3.1 info — 2013 TO 2007

SFR BILLED WATER CONSUMPTION (Gallons (US))

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2013	23,320,000	20,595,000	24,166,000	41,031,000	35,364,000	31,349,000	44,387,000	37,202,000	43,493,000	28,442,000	22,052,000	18,930,000
2012	22,950,000	19,400,000	20,693,000	46,537,000	41,083,000	49,266,000	54,781,000	48,735,000	45,999,000	28,446,000	23,554,000	22,607,000
2011	20,866,000	25,232,000	30,437,000	37,708,000	43,517,000	66,297,000	50,204,000	48,401,000	43,081,000	34,617,000	25,391,000	24,390,000
2010	23,098,000	19,342,000	16,343,000	30,619,000	32,992,000	45,968,000	45,185,000	43,675,000	36,357,000	33,337,000	22,656,000	23,951,000
2009	21,466,000	18,890,000	22,453,000	35,471,000	46,851,000	41,930,000	37,410,000	48,810,000	37,300,000	29,146,000	23,382,000	18,410,000
2008												
2007												

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
2013	4,452	4,451	4,456	4,486	4,486	4,448	4,473	4,648	4,516	4,495	4,472	4,479
2012	4,452	4,451	4,456	4,486	4,486	4,448	4,473	4,648	4,516	4,495	4,472	4,479
2011	4,421	4,419	4,423	4,426	4,458	4,492	4,449	4,508	4,478	4,487	4,483	4,443
2010	4,331	4,369	4,365	4,385	4,420	4,417	4,407	4,456	4,445	4,429	4,445	4,420
2009	4,262	4,289	4,302	4,326	4,320	4,337	4,339	4,383	4,369	4,359	4,363	4,335
2008												
2007												

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
2013												
2012												
2011												
2010												
2009												
2008												
2007												

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
2013	12,555	12,552	12,566	12,651	12,651	12,543	12,614	13,107	12,735	12,676	12,611	12,631
2012	12,555	12,552	12,566	12,651	12,651	12,543	12,614	13,107	12,735	12,676	12,611	12,631
2011	12,467	12,462	12,473	12,481	12,572	12,667	12,546	12,713	12,628	12,653	12,642	12,529
2010	12,213	12,321	12,309	12,366	12,464	12,456	12,428	12,566	12,535	12,490	12,535	12,464
2009	12,019	12,095	12,132	12,199	12,182	12,230	12,236	12,360	12,321	12,292	12,304	12,225
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

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
2013	59.92	58.60	62.04	108.11	90.18	83.31	113.51	91.56	113.84	72.38	58.29	48.35
2012	58.97	55.20	53.12	122.62	104.76	130.92	140.09	119.94	120.40	72.39	62.26	57.74
2011	53.99	72.31	78.72	100.71	111.66	174.46	129.08	122.82	113.72	88.25	66.95	62.79
2010	61.01	56.07	42.83	82.54	85.38	123.01	117.28	112.12	96.68	86.10	60.25	61.99
2009	57.61	55.78	59.70	96.92	124.06	114.28	98.63	127.39	100.92	76.49	63.35	48.58
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

COMMENTS:

ANNUAL DATA

TABLE 3.6 ANNUAL CONSUMPTION

TABLE 3.7 ANNUAL CALCULATION

	370,331,000
	424,051,000
	450,141,000
	373,523,000
	381,519,000
	N/A
	N/A

TABLE 3.8 AVG. ANNUAL CONNECTIONS

TABLE 3.9 AVG CONN. CALCULATION

	4,489
	4,489
	4,457
	4,407
	4,332
	N/A
	N/A

TABLE 3.10 info CALCULATED GROWTH RATE

TABLE 3.11 No. VACANT SFR

0.00%	
0.70%	
1.13%	
1.74%	
N/A	
N/A	

TABLE 3.12 info SIZE OF HOUSEHOLD

TABLE 3.13 info **SFR POPULATION**

2.82	**12,658**
2.82	**12,658**
2.82	**12,569**
2.82	**12,429**
2.82	**12,216**
2.82	**N/A**
2.82	**N/A**

TABLE 3.14 info **ANNUAL SFR GPCD**

80.16
91.79
98.12
82.34
85.56
N/A
N/A

Figure B-4. NMOSE GPCD Calculator Multi-Family Residential Data Table 4

DATA INPUT SHEET

Portales

Instructions

4. MULTI-FAMILY RESIDENTIAL (MFR)

Return to Instructions

MONTHLY DATA

2013 TO 2007

TABLE 4.1 Info

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

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2013	3,823,000	3,208,000	13,135,000	10,051,000	7,133,000	6,664,000	10,530,000	6,547,000	9,468,000	8,253,000	4,811,000	1,846,000
2012	3,244,000	4,095,000	4,250,000	6,339,000	6,880,000	15,254,000	9,316,000	13,060,000	11,377,000	7,691,000	5,758,000	4,183,000
2011	4,760,000	5,374,000	5,502,000	7,136,000	9,669,000	9,617,000	6,871,000	9,330,000	9,094,000	8,081,000	5,649,000	2,258,000
2010	3,407,000	3,021,000	2,880,000	5,935,000	6,861,000	10,255,000	12,395,000	10,808,000	10,872,000	8,420,000	4,965,000	4,121,000
2009	4,523,000	4,724,000	6,265,000	9,723,000	8,740,000	10,351,000	7,451,000	11,951,000	9,177,000	7,645,000	4,969,000	3,611,000
2008												
2007												

TABLE 4.2 **If only Current Number of Units is Known, put this number in Table 4.7**

NUMBER OF MFR UNITS (Monthly)

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2013	1,323	1,323	1,323	1,323	1,323	1,323	1,323	1,323	1,323	1,323	1,323	1,323
2012	1,324	1,324	1,324	1,324	1,324	1,324	1,324	1,324	1,324	1,324	1,324	1,324
2011	1,318	1,318	1,318	1,318	1,318	1,318	1,318	1,318	1,318	1,318	1,318	1,318
2010	1,310	1,310	1,310	1,310	1,310	1,310	1,310	1,310	1,310	1,310	1,310	1,310
2009	1,297	1,297	1,297	1,297	1,297	1,297	1,297	1,297	1,297	1,297	1,297	1,297
2008												
2007												

TABLE 4.3 **Formula = (Number of Units - Vacant MFR Connections) * Ave. Household Size**

MFR POPULATION (Monthly)

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2013	3,147	3,147	3,147	3,147	3,147	3,147	3,147	3,147	3,147	3,147	3,147	3,147
2012	3,149	3,149	3,149	3,149	3,149	3,149	3,149	3,149	3,149	3,149	3,149	3,149
2011	3,135	3,135	3,135	3,135	3,135	3,135	3,135	3,135	3,135	3,135	3,135	3,135
2010	3,116	3,116	3,116	3,116	3,116	3,116	3,116	3,116	3,116	3,116	3,116	3,116
2009	3,085	3,085	3,085	3,085	3,085	3,085	3,085	3,085	3,085	3,085	3,085	3,085
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

TABLE 4.4 **Formula = MFR Billed Water Consumption (Monthly) / MFR Population (Monthly)**

MFR GPCD CALCULATION (Monthly)

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2013	39.19	36.41	134.63	106.46	73.11	70.58	107.93	67.11	100.28	84.59	50.96	18.92
2012	33.23	46.44	43.53	67.09	70.47	161.44	95.42	133.76	120.41	78.77	60.94	42.84
2011	48.98	61.22	56.61	75.87	99.48	102.25	70.70	96.00	96.69	83.14	60.06	23.23
2010	35.27	34.62	29.81	63.49	71.02	109.70	128.31	111.88	116.30	87.16	53.11	42.66
2009	47.29	54.68	65.50	105.05	91.38	111.83	77.90	124.95	99.15	79.93	53.69	37.75
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

COMMENTS:

MFR housing consists of in-City units and ENMU student housing. The number of in-City MFR units is increasing assuming same growth rate as SFR units. The total number of ENMU student housing units has not changed since 2009.

ANNUAL DATA

TABLE 4.5

ANNUAL CONSUMPTION

TABLE 4.6

ANNUAL CALCULATION
85,469,000
91,447,000
83,341,000
83,940,000
89,130,000
N/A
N/A

TABLE 4.7

No. CURRENT UNITS

TABLE 4.8

ANNUAL UNIT CALCULATION
1,323
1,324
1,318
1,310
1,297
N/A
N/A

TABLE 4.9 Info

MFR POPULATION
3,147
3,149
3,135
3,116
3,085
N/A
N/A

TABLE 4.10

VACANT MFR CONNECTIONS
207
207
206
205
203
N/A
N/A

TABLE 4.11 Info

ANNUAL MFR GPCD
74.41
79.55
72.83
73.80
79.15
N/A
N/A

Figure B-5. NMOSE GPCD Calculator Industrial, Commercial, and Institutional Data Table 5

DATA INPUT SHEET

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

Info

Portales

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MONTHLY DATA

2013 TO 2007

TABLE 5.1

ICI WATER CONSUMPTION (Gallons (US))

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2013	24,911,000	20,135,000	28,694,000	37,264,000	35,692,000	23,392,000	37,366,000	32,016,000	32,557,000	23,565,000	20,959,000	21,800,000
2012	20,010,000	21,656,000	16,399,000	30,625,000	29,796,000	35,792,000	39,330,000	29,018,000	29,162,000	21,163,000	17,012,000	20,010,000
2011	24,027,000	38,161,000	37,231,000	39,123,000	34,091,000	44,485,000	32,379,000	40,858,000	48,389,000	46,236,000	39,695,000	47,991,000
2010	25,982,000	23,581,000	22,857,000	35,645,000	31,774,000	34,716,000	35,532,000	32,912,000	24,530,000	26,186,000	17,272,000	24,996,000
2009	31,071,000	25,960,000	30,212,000	43,637,000	38,143,000	39,179,000	33,962,000	43,846,000	31,735,000	25,256,000	20,120,000	21,292,000
2008												
2007												

TABLE 5.2

OTHER METERED (Gallons (US))

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2013	0	0	0	0	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0	0	0	0
2008												
2007												

COMMENTS:

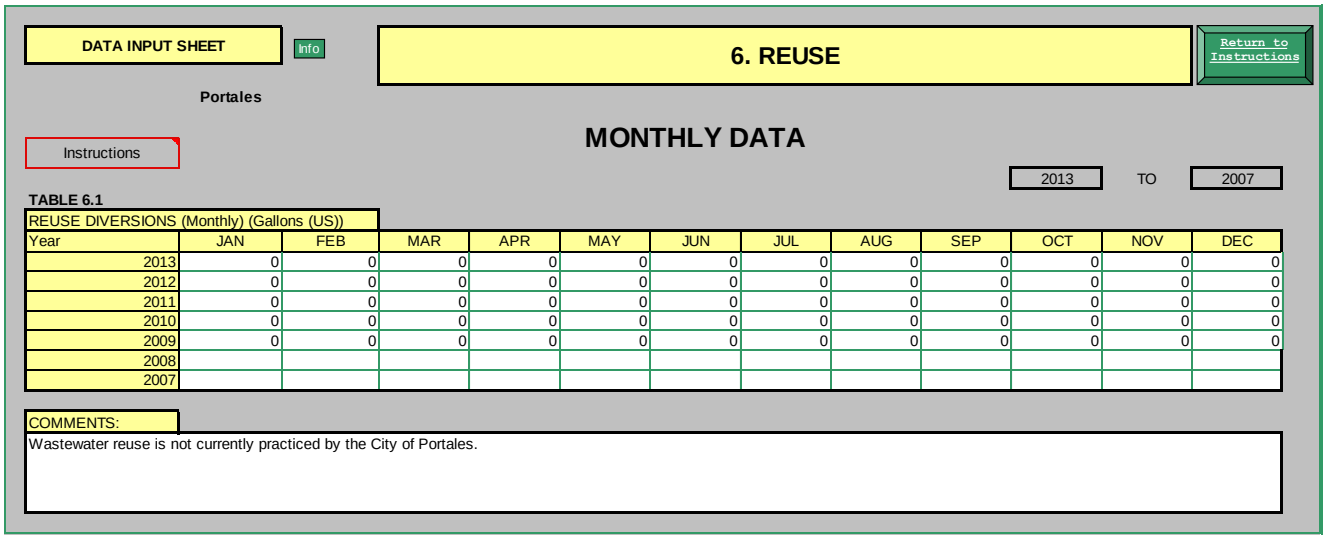
All metered water is included in the SFR, MFR, and ICI categories.

ANNUAL DATA

TABLE 5.3 ICI ANNUAL CONSUMPTION	TABLE 5.4 ICI GPCD	TABLE 5.5 ICI ANNUAL CALCULATED
	58.65	338,351,000
	53.73	309,973,000
	82.46	472,666,000
	59.21	335,983,000
	68.83	384,413,000
	N/A	N/A
	N/A	N/A

TABLE 5.6 OTHER ANNUAL CONSUMPTION	TABLE 5.7 OTHER METERED GPCD	TABLE 5.8 OTHER ANNUAL CALCULATED
	N/A	N/A
	N/A	N/A
	N/A	N/A
	N/A	N/A
	N/A	N/A
	N/A	N/A
	N/A	N/A

Figure B-6. NMOSE GPCD Calculator Wastewater Reuse Data Table 6



DATA INPUT SHEET | Info

6. REUSE

Return to Instructions

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MONTHLY DATA

2013 TO 2007

TABLE 6.1

REUSE DIVERSIONS (Monthly) (Gallons (US))

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2013	0	0	0	0	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0	0	0	0
2008												
2007												

COMMENTS:

Wastewater reuse is not currently practiced by the City of Portales.

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

Figure B-7. NMOSE GPCD Calculator Total Water Diverted and Supplied Data Table 7

DATA INPUT SHEET

Portales

7. TOTAL WATER DIVERTED AND SUPPLIED

Return to Instructions

MONTHLY DATA

TABLE 7.1 — 2013 TO 2007

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

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2013	44,470,000	73,981,000	50,021,000	93,585,000	105,502,000	84,252,000	112,989,000	143,618,000	149,841,000	81,678,000	81,276,000	78,350,000
2012	84,435,000	61,730,000	88,367,000	89,833,000	88,410,000	104,612,000	121,956,000	118,282,000	105,816,000	93,733,000	82,239,000	85,495,000
2011	79,370,000	93,930,000	128,580,000	106,048,000	110,771,000	138,543,000	137,346,000	84,428,000	114,637,000	85,798,000	72,509,000	96,086,000
2010	85,566,000	48,462,000	48,457,000	141,506,000	78,597,000	159,459,000	154,554,000	63,278,000	142,435,000	126,309,000	106,046,000	94,964,000
2009	71,790,000	68,460,000	66,198,000	74,548,000	110,991,000	121,910,000	126,788,000	137,721,000	128,889,000	119,257,000	113,299,000	99,058,000
2008												
2007												

TABLE 7.2

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

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2013	0	0	0	0	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0	0	0	0
2008												
2007												

TABLE 7.3

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

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2013	11,426,000	12,909,000	10,511,000	14,364,000	17,564,000	15,794,000	16,810,000	20,428,000	16,558,000	14,188,000	15,177,000	12,102,000
2012	12,118,000	10,639,000	12,514,000	18,527,000	17,341,000	21,253,000	19,759,000	18,060,000	16,854,000	12,971,000	11,090,000	12,552,000
2011	13,897,000	14,804,000	14,309,000	19,792,000	20,763,000	21,865,000	25,021,000	21,618,000	21,740,000	15,906,000	14,388,000	14,896,000
2010	13,291,000	11,396,000	10,700,000	15,434,000	15,274,000	24,767,000	17,918,000	18,398,000	20,986,000	15,504,000	12,092,000	12,345,000
2009	12,964,000	11,996,000	13,507,000	14,171,000	19,537,000	19,462,000	18,744,000	21,008,000	19,748,000	14,526,000	12,510,000	11,007,000
2008												
2007												

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
2013	33,044,000	61,072,000	39,510,000	79,221,000	87,938,000	68,458,000	96,179,000	123,190,000	133,283,000	67,490,000	66,099,000	66,248,000
2012	72,317,000	51,091,000	75,853,000	71,306,000	71,069,000	83,359,000	102,197,000	100,222,000	88,962,000	80,762,000	71,149,000	72,943,000
2011	65,473,000	79,126,000	114,271,000	86,256,000	90,008,000	116,678,000	112,325,000	62,810,000	92,897,000	69,892,000	58,121,000	81,190,000
2010	72,275,000	37,066,000	37,757,000	126,072,000	63,323,000	134,692,000	136,636,000	44,880,000	121,449,000	110,805,000	93,954,000	82,619,000
2009	58,826,000	56,464,000	52,691,000	60,377,000	91,454,000	102,448,000	108,044,000	116,713,000	109,141,000	104,731,000	100,789,000	88,051,000
2008	0	0	0	0	0	0	0	0	0	0	0	0
2007	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

1,099,563,000
1,124,908,000
1,248,046,000
1,249,633,000
1,238,909,000
N/A
N/A

TABLE 7.8 — ANNUAL TOTAL IMPORTED

TABLE 7.9 — ANNUAL TOTAL IMPORT CALC

N/A
N/A
N/A
N/A
N/A
N/A
N/A

TABLE 7.10 — ANNUAL TOTAL EXPORTED

TABLE 7.11 — ANNUAL TOTAL EXPORT CALC

177,831,000
183,678,000
218,999,000
188,105,000
189,180,000
N/A
N/A

TABLE 7.12 — ANNUAL TOTAL WATER SUPPLY

921,732,000
941,230,000
1,029,047,000
1,061,528,000
1,049,729,000
0
0

Info

TABLE 7.13 — TOTAL POP. EST.

15,805
15,807
15,705
15,545
15,302
N/A
N/A

Table 7.5

SYSTEM TOTAL GPCD (Monthly)

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2013	67	138	81	167	179	144	196	251	281	138	139	135
2012	148	115	155	150	145	176	209	205	188	165	150	149
2011	134	180	235	183	185	248	231	129	197	144	123	167
2010	150	85	78	270	131	289	284	93	260	230	201	171
2009	124	132	111	132	193	223	228	246	238	221	220	186
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

COMMENTS:

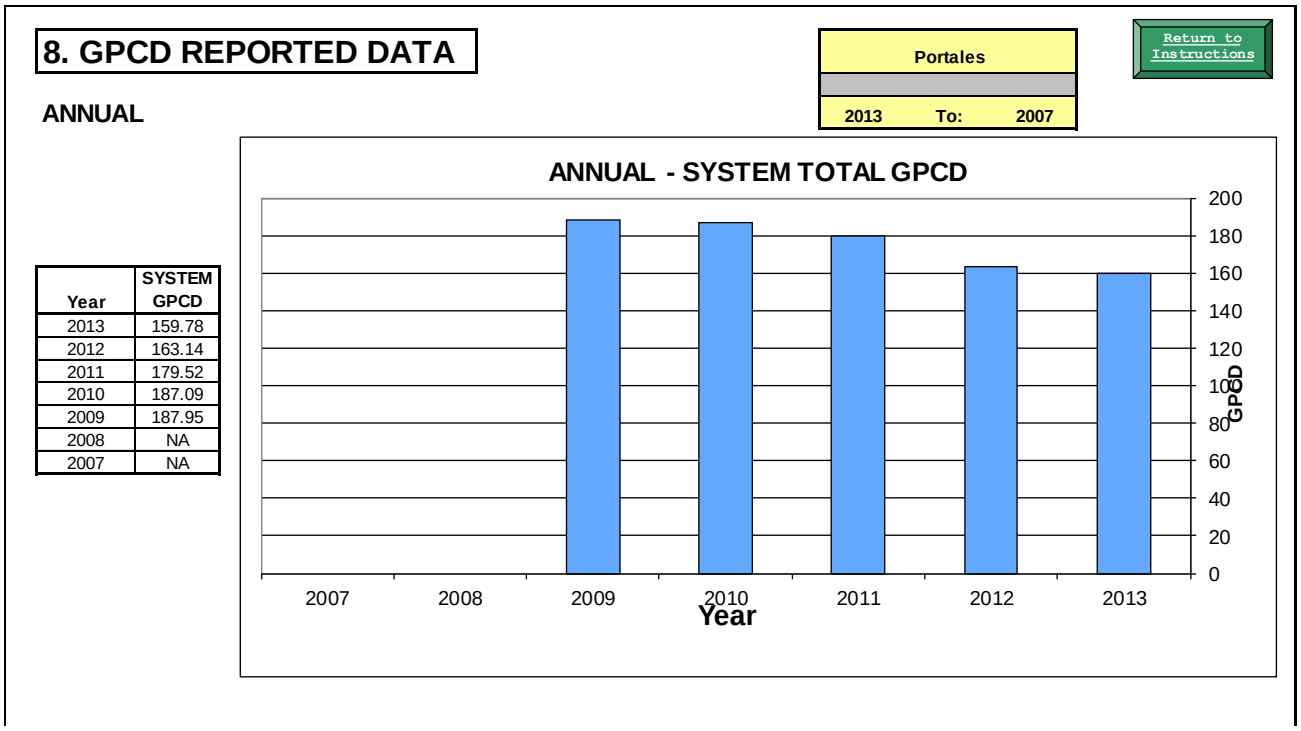
The City of Portales exports water to the Roosevelt County Water Coop.

TABLE 7.14

Info

Year	SYSTEM TOTAL GPCD
2013	**159.78**
2012	**163.14**
2011	**179.52**
2010	**187.09**
2009	**187.95**
2008	**NA**
2007	**NA**

Figure B-8. NMOSE GPCD Calculator System Total Annual Water Diverted GPCD Table 8.1



Year	SYSTEM GPCD
2013	159.78
2012	163.14
2011	179.52
2010	187.09
2009	187.95
2008	NA
2007	NA

Figure B-9. NMOSE GPCD Calculator Annual Reporting Performance Data Table 9

9. Annual Reporting Performance

Return to Instructions

Overall Annual GPCD (based on Total Population)

	SFR - System Total	MFR - System Total	ICI	Other Metered	Non-Revenue Water (Info)	Total Supplied	Non-Revenue Volume Million Gallons (US)
Year							
On Graph?	Yes	Yes	Yes	Yes	Yes		
2013	64.20	14.82	58.65	N/A	22.12	159.78	127.58
2012	73.50	15.85	53.73	N/A	20.06	163.14	115.76
2011	78.53	14.54	82.46	N/A	3.99	179.52	22.90
2010	65.83	14.79	59.21	N/A	47.25	187.09	268.08
2009	68.31	15.96	68.83	N/A	34.86	187.95	194.67
2008	N/A	N/A	N/A	N/A	#VALUE!	#VALUE!	-
2007	N/A	N/A	N/A	N/A	#VALUE!	#VALUE!	-

Portales		
2013	to	2007

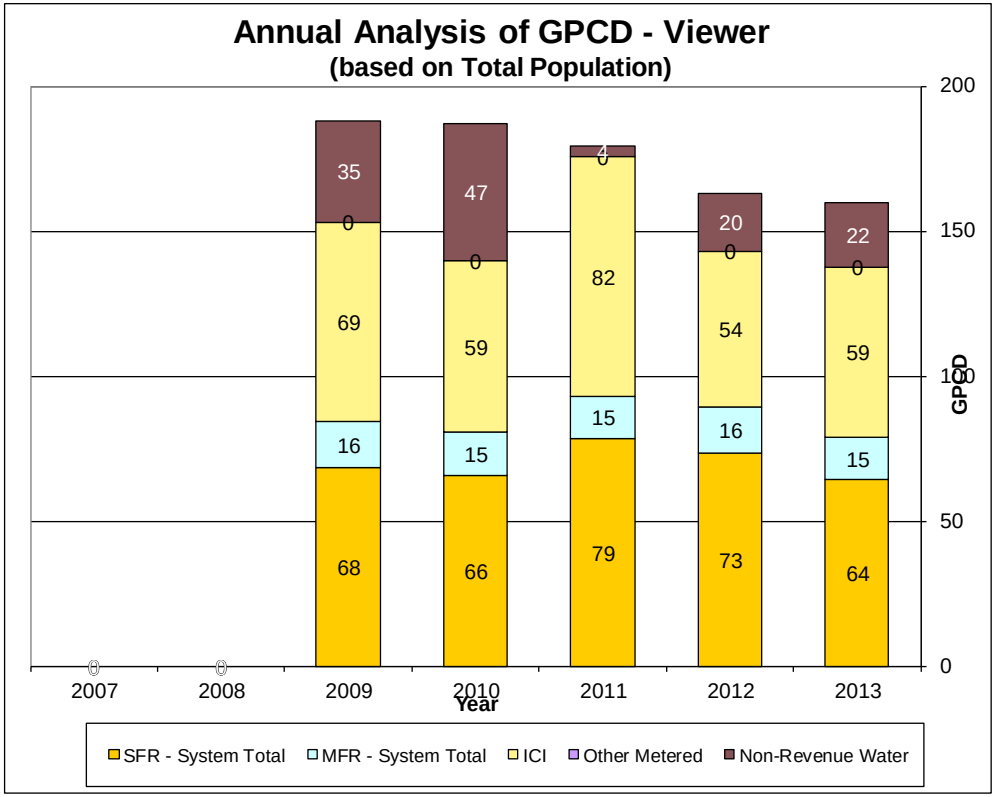


Figure B-10.1. NMOSE GPCD Calculator 2009 SFR GPCD Monthly Reporting Performance Data Table 10.1

10. Monthly Reporting Performance

Return to Instructions

Choose Year for Monthly Analysis 2009

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	57.61	47.29	65.50	0.00	3.72
FEB	55.78	54.68	60.59	0.00	16.08
MAR	59.70	65.50	63.69	0.00	-13.15
APR	96.92	105.05	95.06	0.00	-61.99
MAY	124.06	91.38	80.41	0.00	-4.81
JUN	114.28	111.83	85.35	0.00	23.94
JUL	98.63	77.90	71.60	0.00	61.60
AUG	127.39	124.95	92.43	0.00	25.52
SEP	100.92	99.15	69.13	0.00	67.38
OCT	76.49	79.93	53.24	0.00	89.98
NOV	63.35	53.69	43.83	0.00	113.97
DEC	48.58	37.75	44.89	0.00	94.31

Portales		
2013	to	2007

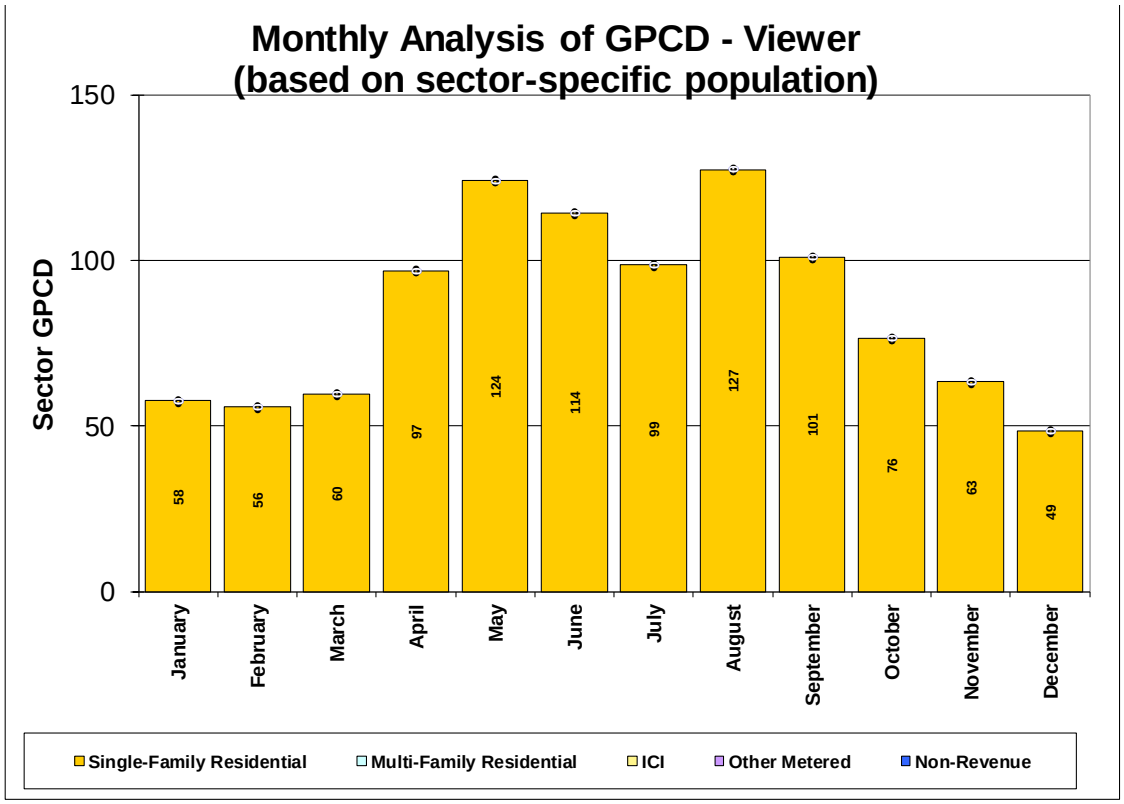


Figure B-10.2. NMOSE GPCD Calculator 2010 SFR GPCD Monthly Reporting Performance Data Table 10.2

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	61.01	35.27	53.92	0.00	41.06
FEB	56.07	34.62	54.18	0.00	-20.40
MAR	42.83	29.81	47.43	0.00	-8.97
APR	82.54	63.49	76.43	0.00	115.52
MAY	85.38	71.02	65.94	0.00	-17.23
JUN	123.01	109.70	74.44	0.00	93.82
JUL	117.28	128.31	73.73	0.00	90.32
AUG	112.12	111.88	68.30	0.00	-88.22
SEP	96.68	116.30	52.60	0.00	106.55
OCT	86.10	87.16	54.34	0.00	88.94
NOV	60.25	53.11	37.04	0.00	105.20
DEC	61.99	42.66	51.87	0.00	61.32

Portales		
2013	to	2007

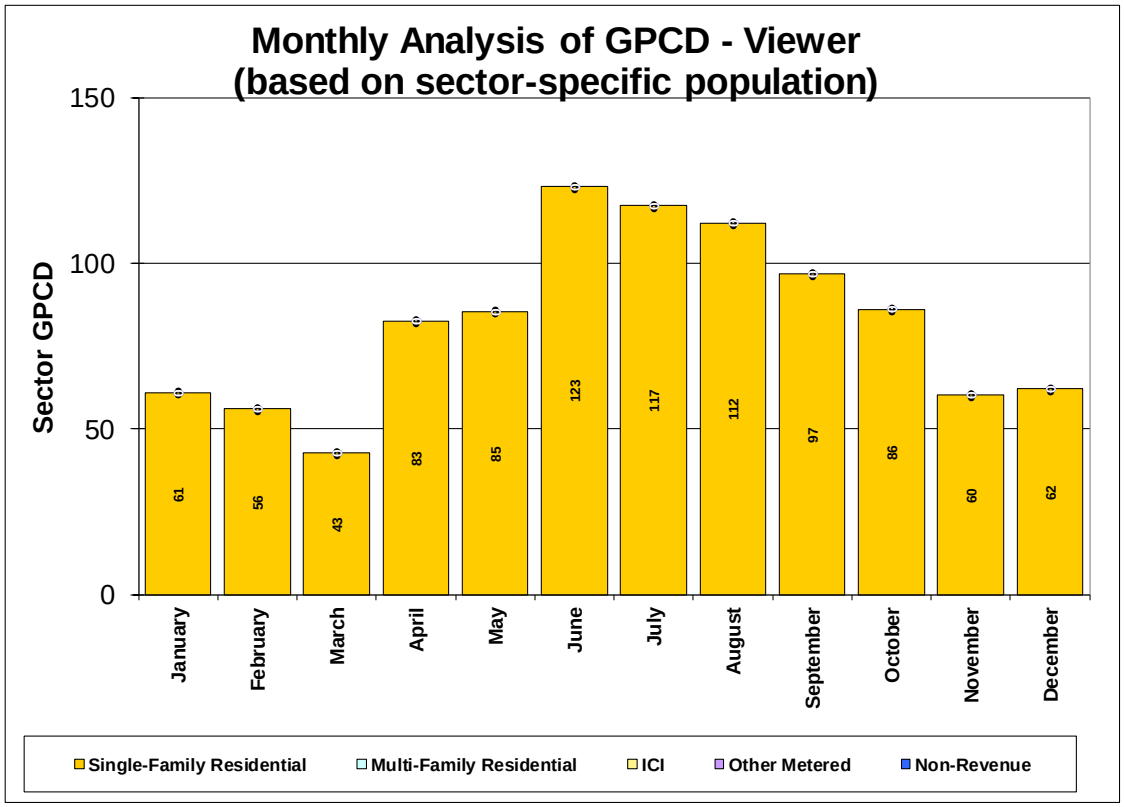


Figure B-10.3. NMOSE GPCD Calculator 2011 SFR GPCD Monthly Reporting Performance Data Table 10.3

10. Monthly Reporting Performance

Return to Instructions

Choose Year for Monthly Analysis 2011

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	53.99	48.98	49.35	0.00	32.49
FEB	72.31	61.22	86.78	0.00	23.56
MAR	78.72	56.61	76.47	0.00	84.42
APR	100.71	75.87	83.04	0.00	4.86
MAY	111.66	99.48	70.02	0.00	5.61
JUN	174.46	102.25	94.42	0.00	-7.90
JUL	129.08	70.70	66.51	0.00	46.98
AUG	122.82	96.00	83.92	0.00	-73.49
SEP	113.72	96.69	102.71	0.00	-16.27
OCT	88.25	83.14	94.97	0.00	-39.11
NOV	66.95	60.06	84.25	0.00	-26.77
DEC	62.79	23.23	98.58	0.00	13.46

Portales		
2013	to	2007

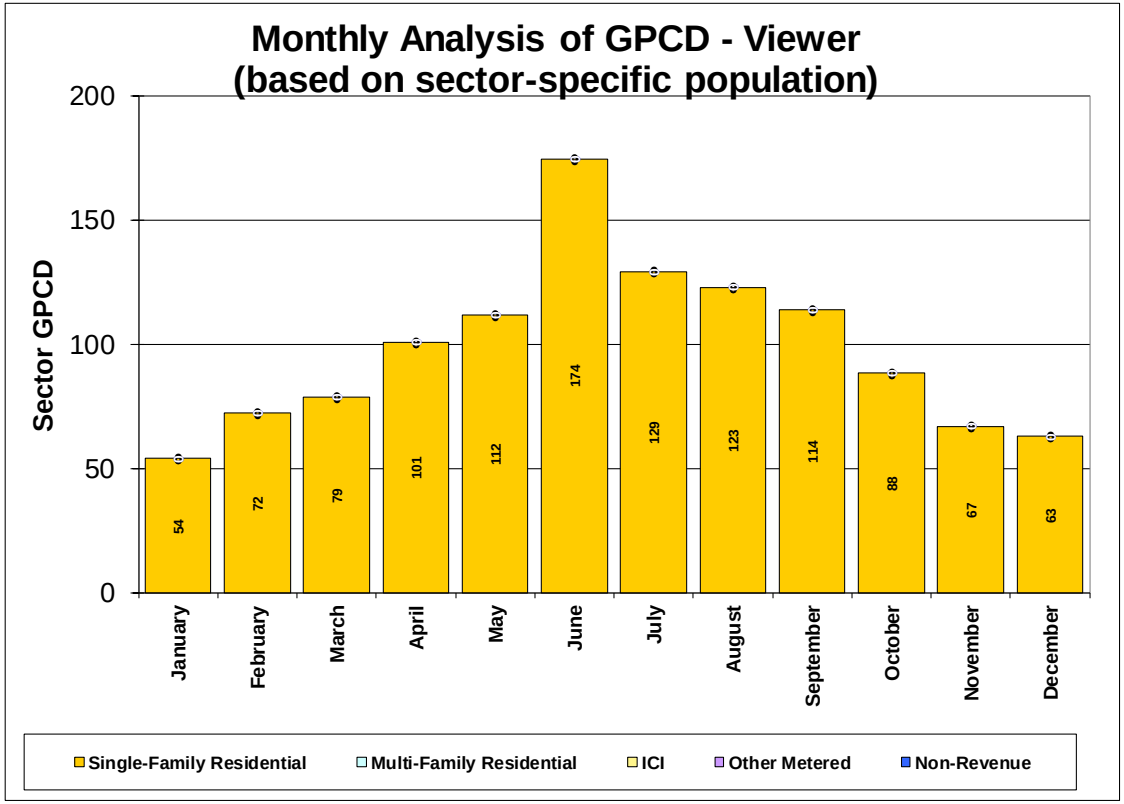


Figure B-10.4. NMOSE GPCD Calculator 2012 SFR GPCD Monthly Reporting Performance Data Table 10.4

10. Monthly Reporting Performance

Return to Instructions

Choose Year for Monthly Analysis 2012

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	58.97	33.23	40.84	0.00	53.29
FEB	55.20	46.44	48.93	0.00	13.42
MAR	53.12	43.53	33.47	0.00	70.43
APR	122.62	67.09	64.58	0.00	-25.72
MAY	104.76	70.47	60.81	0.00	-13.65
JUN	130.92	161.44	75.48	0.00	-35.75
JUL	140.09	95.42	80.26	0.00	-2.51
AUG	119.94	133.76	59.22	0.00	19.20
SEP	120.40	120.41	61.50	0.00	5.11
OCT	72.39	78.77	43.19	0.00	47.88
NOV	62.26	60.94	35.87	0.00	52.35
DEC	57.74	42.84	40.84	0.00	53.35

Portales		
2013	to	2007

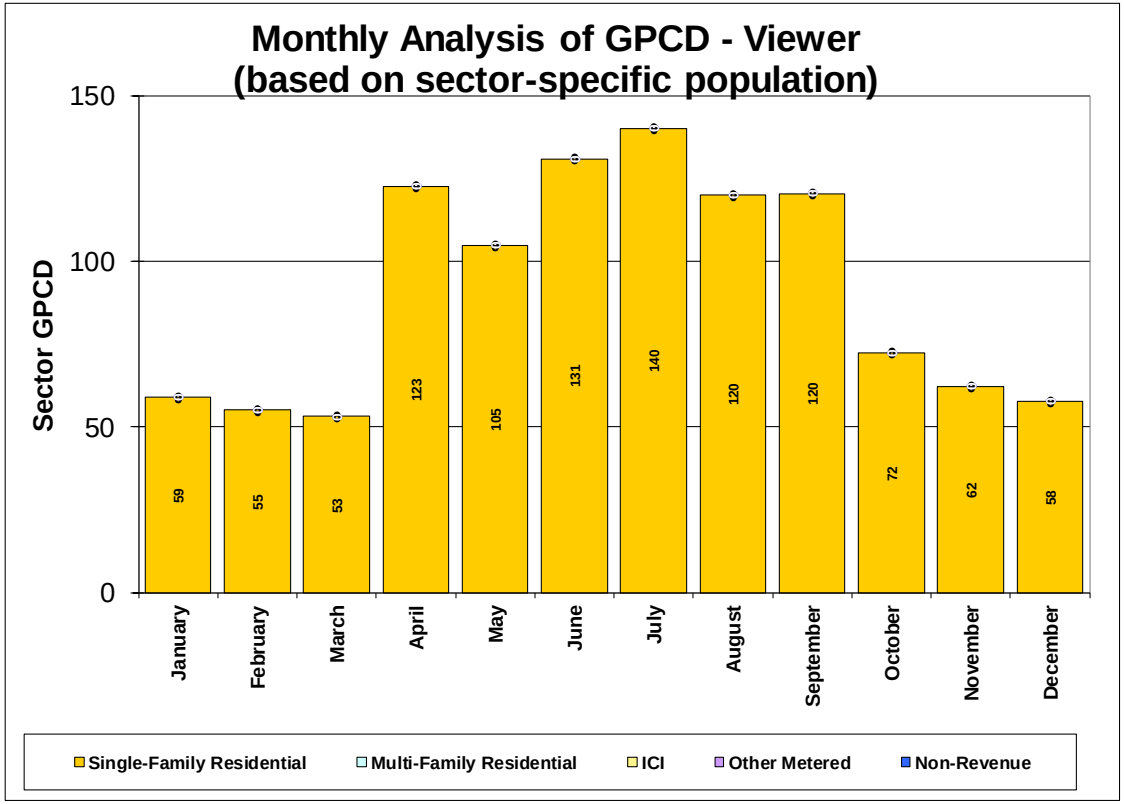


Figure B-10.5. NMOSE GPCD Calculator 2013 SFR GPCD Monthly Reporting Performance Data Table 10.5

10. Monthly Reporting Performance

Return to Instructions

Choose Year for Monthly Analysis 2013

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	59.92	39.19	50.84	0.00	-38.80
FEB	58.60	36.41	45.50	0.00	38.72
MAR	62.04	134.63	58.57	0.00	-54.06
APR	108.11	106.46	78.59	0.00	-19.25
MAY	90.18	73.11	72.85	0.00	19.90
JUN	83.31	70.58	49.34	0.00	14.88
JUL	113.51	107.93	76.27	0.00	7.95
AUG	91.56	67.11	65.35	0.00	96.80
SEP	113.84	100.28	68.67	0.00	100.74
OCT	72.38	84.59	48.10	0.00	14.76
NOV	58.29	50.96	44.20	0.00	38.55
DEC	48.35	18.92	44.49	0.00	48.32

Portales		
2013	to	2007

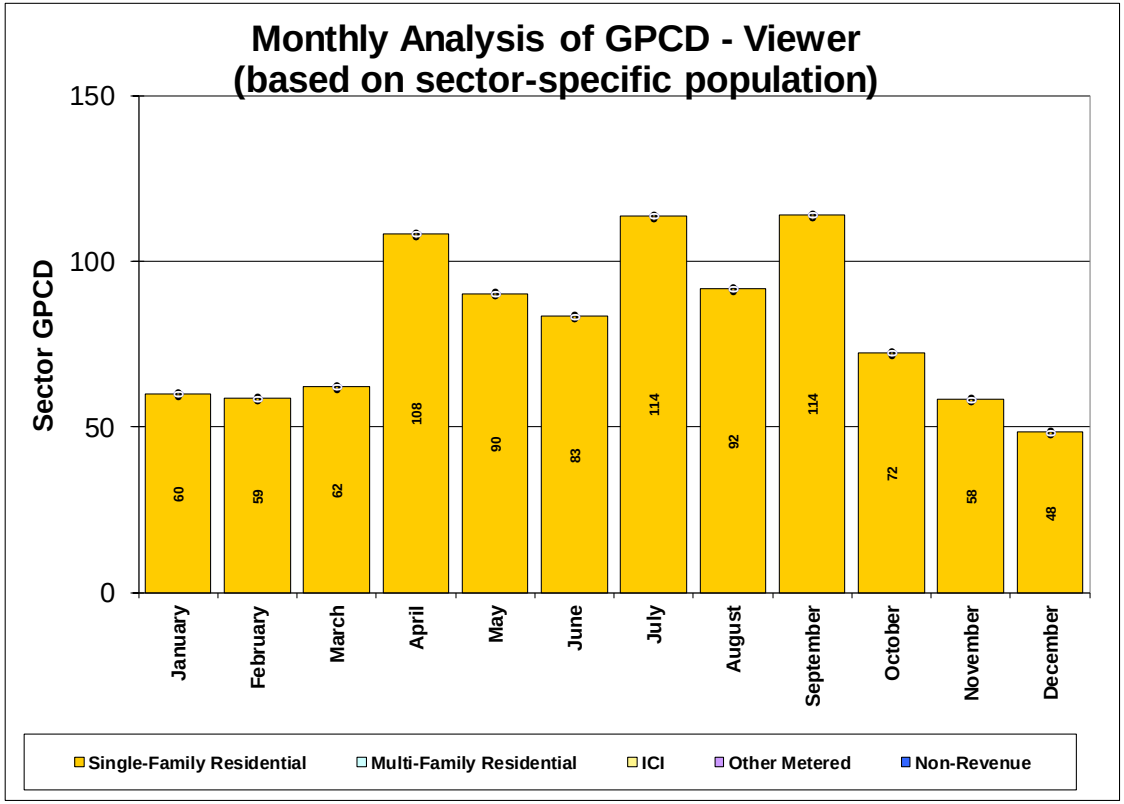


Figure B-10.6. NMOSE GPCD Calculator 2009 MFR GPCD Monthly Reporting Performance Data Table 10.6

10. Monthly Reporting Performance

Return to Instructions

Choose Year for Monthly Analysis **2009**

Choose Sector **Multi-Family Residential**

Monthly GPCD

Month	Single-Family Residential GPCD	Multi-Family Residential GPCD	ICI GPCD	Other Metered GPCD	Non-Revenue GPCD
JAN	57.61	47.29	65.50	0.00	3.72
FEB	55.78	54.68	60.59	0.00	16.08
MAR	59.70	65.50	63.69	0.00	-13.15
APR	96.92	105.05	95.06	0.00	-61.99
MAY	124.06	91.38	80.41	0.00	-4.81
JUN	114.28	111.83	85.35	0.00	23.94
JUL	98.63	77.90	71.60	0.00	61.60
AUG	127.39	124.95	92.43	0.00	25.52
SEP	100.92	99.15	69.13	0.00	67.38
OCT	76.49	79.93	53.24	0.00	89.98
NOV	63.35	53.69	43.83	0.00	113.97
DEC	48.58	37.75	44.89	0.00	94.31

Portales		
2013	to	2007

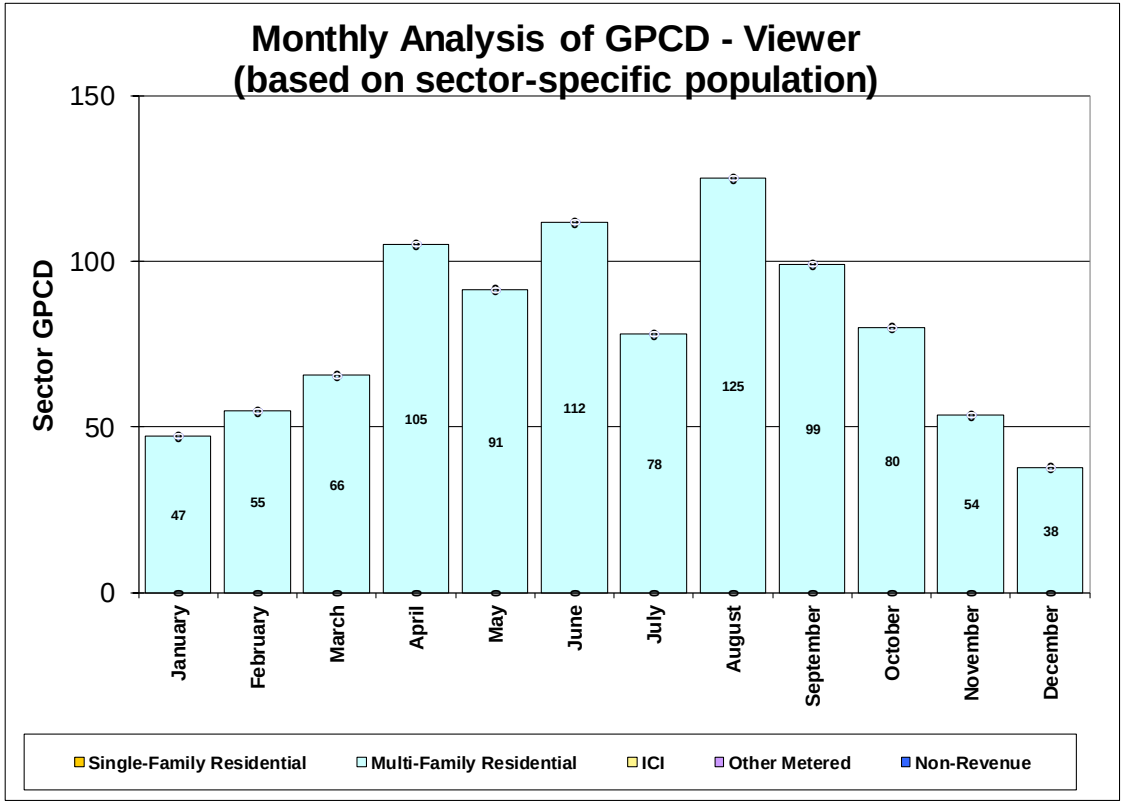


Figure B-10.7. NMOSE GPCD Calculator 2010 MFR GPCD Monthly Reporting Performance Data Table 10.7

10. Monthly Reporting Performance

Return to Instructions

Choose Year for Monthly Analysis 2010

Choose Sector Multi-Family Residential

Monthly GPCD

Month	Single-Family Residential GPCD	Multi-Family Residential GPCD	ICI GPCD	Other Metered GPCD	Non-Revenue GPCD
JAN	61.01	35.27	53.92	0.00	41.06
FEB	56.07	34.62	54.18	0.00	-20.40
MAR	42.83	29.81	47.43	0.00	-8.97
APR	82.54	63.49	76.43	0.00	115.52
MAY	85.38	71.02	65.94	0.00	-17.23
JUN	123.01	109.70	74.44	0.00	93.82
JUL	117.28	128.31	73.73	0.00	90.32
AUG	112.12	111.88	68.30	0.00	-88.22
SEP	96.68	116.30	52.60	0.00	106.55
OCT	86.10	87.16	54.34	0.00	88.94
NOV	60.25	53.11	37.04	0.00	105.20
DEC	61.99	42.66	51.87	0.00	61.32

Portales		
2013	to	2007

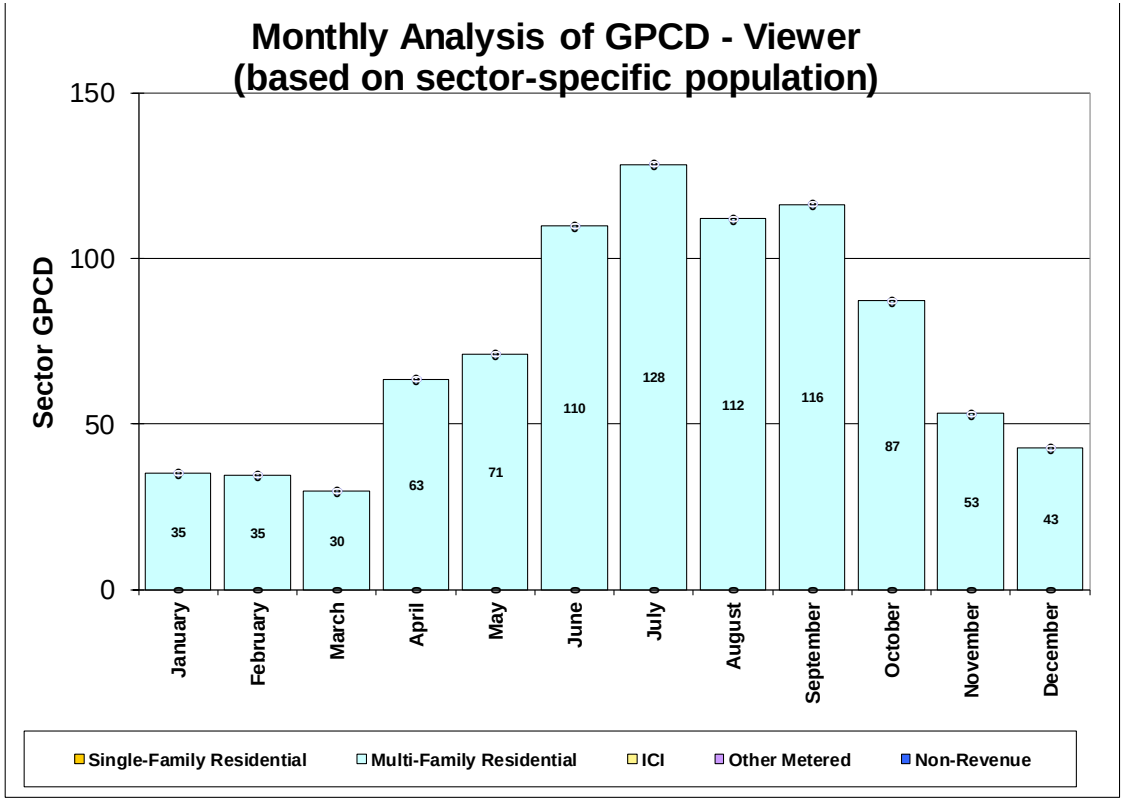


Figure B-10.8. NMOSE GPCD Calculator 2011 MFR GPCD Monthly Reporting Performance Data Table 10.8

10. Monthly Reporting Performance

Return to Instructions

Choose Year for Monthly Analysis 2011

Choose Sector Multi-Family Residential

Monthly GPCD

Month	Single-Family Residential GPCD	Multi-Family Residential GPCD	ICI GPCD	Other Metered GPCD	Non-Revenue GPCD
JAN	53.99	48.98	49.35	0.00	32.49
FEB	72.31	61.22	86.78	0.00	23.56
MAR	78.72	56.61	76.47	0.00	84.42
APR	100.71	75.87	83.04	0.00	4.86
MAY	111.66	99.48	70.02	0.00	5.61
JUN	174.46	102.25	94.42	0.00	-7.90
JUL	129.08	70.70	66.51	0.00	46.98
AUG	122.82	96.00	83.92	0.00	-73.49
SEP	113.72	96.69	102.71	0.00	-16.27
OCT	88.25	83.14	94.97	0.00	-39.11
NOV	66.95	60.06	84.25	0.00	-26.77
DEC	62.79	23.23	98.58	0.00	13.46

Portales		
2013	to	2007

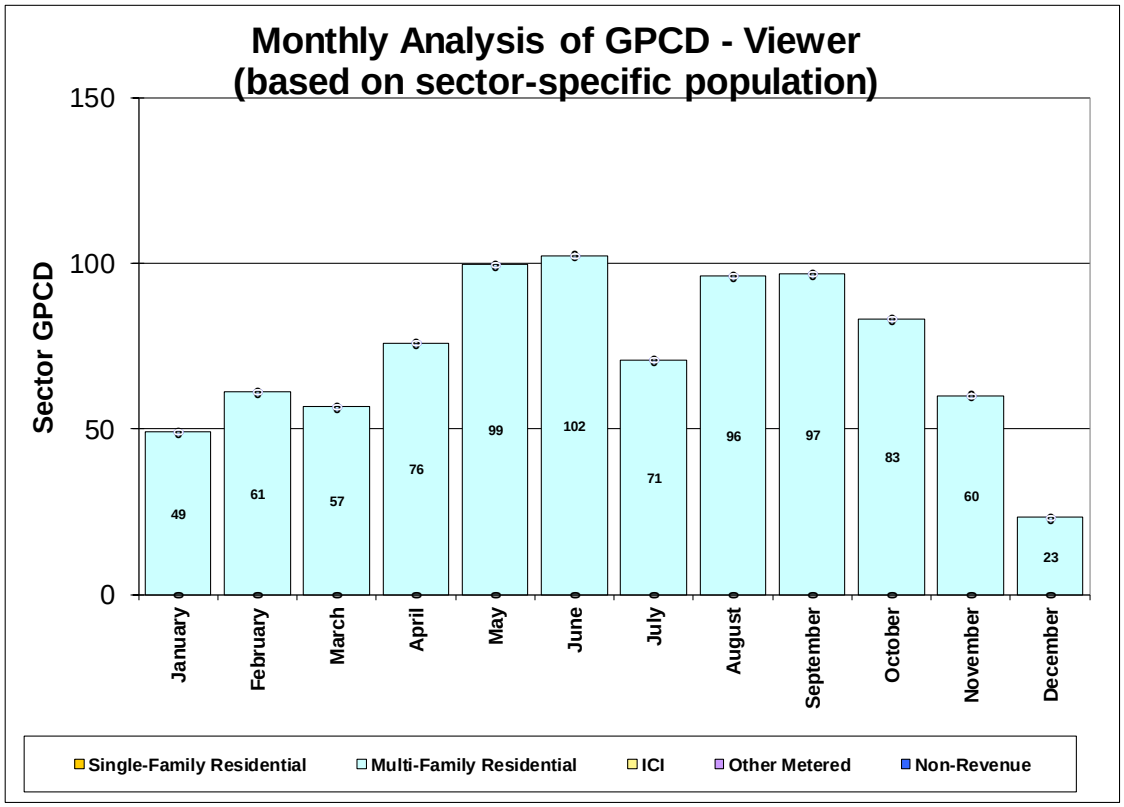


Figure B-10.9. NMOSE GPCD Calculator 2012 MFR GPCD Monthly Reporting Performance Data Table 10.9

10. Monthly Reporting Performance

Return to Instructions

Choose Year for Monthly Analysis 2012

Choose Sector Multi-Family Residential

Monthly GPCD

Month	Single-Family Residential GPCD	Multi-Family Residential GPCD	ICI GPCD	Other Metered GPCD	Non-Revenue GPCD
JAN	58.97	33.23	40.84	0.00	53.29
FEB	55.20	46.44	48.93	0.00	13.42
MAR	53.12	43.53	33.47	0.00	70.43
APR	122.62	67.09	64.58	0.00	-25.72
MAY	104.76	70.47	60.81	0.00	-13.65
JUN	130.92	161.44	75.48	0.00	-35.75
JUL	140.09	95.42	80.26	0.00	-2.51
AUG	119.94	133.76	59.22	0.00	19.20
SEP	120.40	120.41	61.50	0.00	5.11
OCT	72.39	78.77	43.19	0.00	47.88
NOV	62.26	60.94	35.87	0.00	52.35
DEC	57.74	42.84	40.84	0.00	53.35

Portales		
2013	to	2007

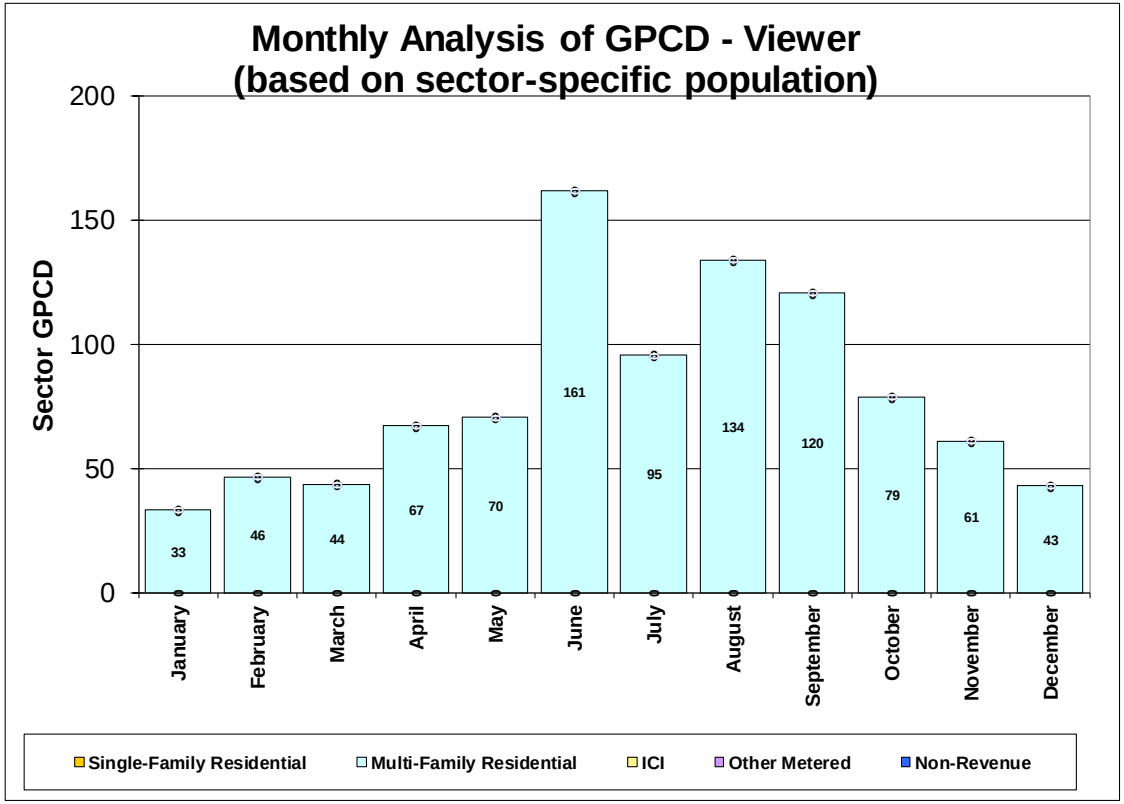


Figure B-10.10. NMOSE GPCD Calculator 2013 MFR GPCD Monthly Reporting Performance Data Table 10.10

10. Monthly Reporting Performance

Return to Instructions

Choose Year for Monthly Analysis 2013

Choose Sector Multi-Family Residential

Monthly GPCD

Month	Single-Family Residential GPCD	Multi-Family Residential GPCD	ICI GPCD	Other Metered GPCD	Non-Revenue GPCD
JAN	59.92	39.19	50.84	0.00	-38.80
FEB	58.60	36.41	45.50	0.00	38.72
MAR	62.04	134.63	58.57	0.00	-54.06
APR	108.11	106.46	78.59	0.00	-19.25
MAY	90.18	73.11	72.85	0.00	19.90
JUN	83.31	70.58	49.34	0.00	14.88
JUL	113.51	107.93	76.27	0.00	7.95
AUG	91.56	67.11	65.35	0.00	96.80
SEP	113.84	100.28	68.67	0.00	100.74
OCT	72.38	84.59	48.10	0.00	14.76
NOV	58.29	50.96	44.20	0.00	38.55
DEC	48.35	18.92	44.49	0.00	48.32

Portales		
2013	to	2007

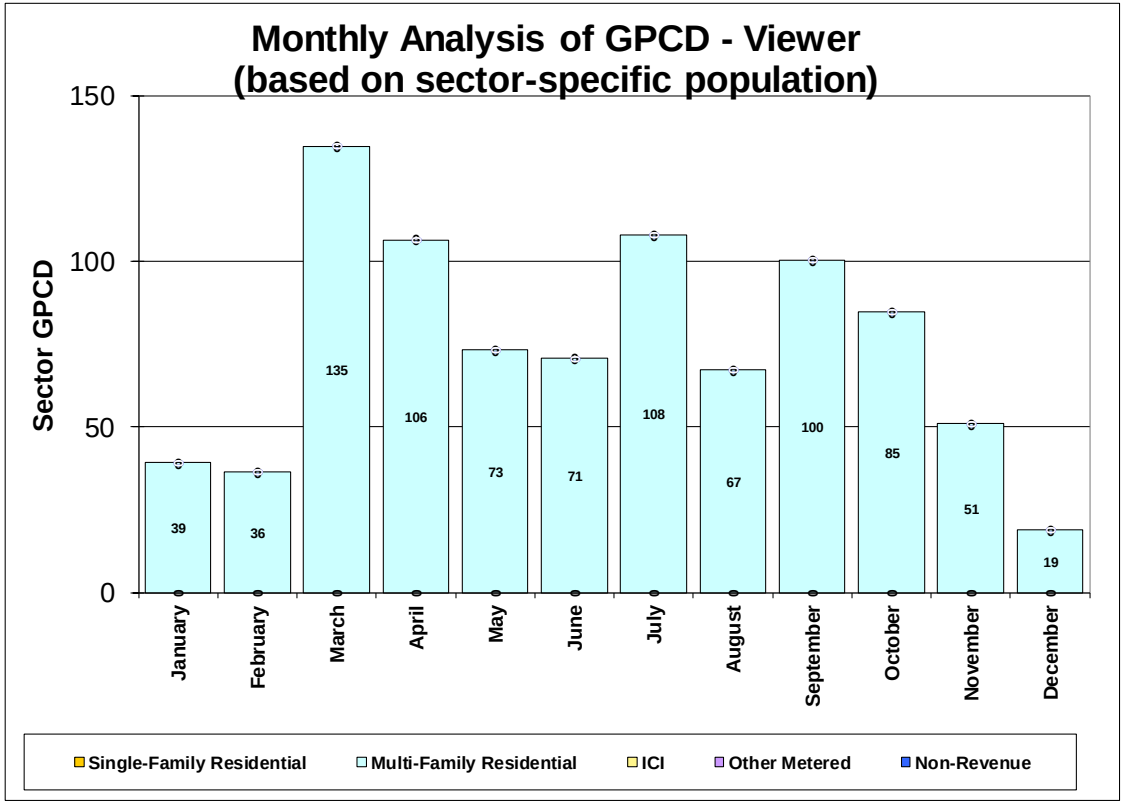


Figure B-10.11. NMOSE GPCD Calculator 2009 ICI GPCD Monthly Reporting Performance Data Table 10.11

10. Monthly Reporting Performance

Return to Instructions

Choose Year for Monthly Analysis 2009

Choose Sector ICI

Monthly GPCD

Month	Single-Family Residential GPCD	Multi-Family Residential GPCD	ICI GPCD	Other Metered GPCD	Non-Revenue GPCD
JAN	57.61	47.29	65.50	0.00	3.72
FEB	55.78	54.68	60.59	0.00	16.08
MAR	59.70	65.50	63.69	0.00	-13.15
APR	96.92	105.05	95.06	0.00	-61.99
MAY	124.06	91.38	80.41	0.00	-4.81
JUN	114.28	111.83	85.35	0.00	23.94
JUL	98.63	77.90	71.60	0.00	61.60
AUG	127.39	124.95	92.43	0.00	25.52
SEP	100.92	99.15	69.13	0.00	67.38
OCT	76.49	79.93	53.24	0.00	89.98
NOV	63.35	53.69	43.83	0.00	113.97
DEC	48.58	37.75	44.89	0.00	94.31

Portales		
2013	to	2007

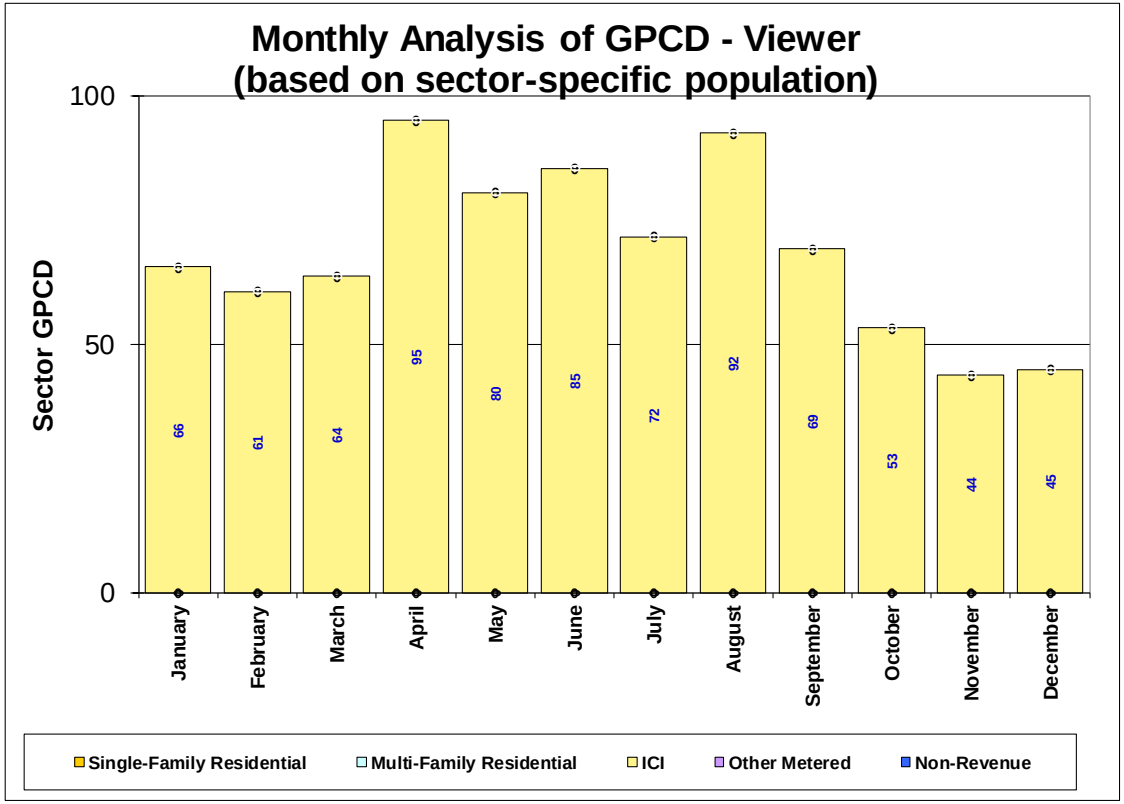


Figure B-10.12. NMOSE GPCD Calculator 2010 ICI GPCD Monthly Reporting Performance Data Table 10.12

10. Monthly Reporting Performance

Return to Instructions

Choose Year for Monthly Analysis 2010

Choose Sector ICI

Monthly GPCD

Month	Single-Family Residential GPCD	Multi-Family Residential GPCD	ICI GPCD	Other Metered GPCD	Non-Revenue GPCD
JAN	61.01	35.27	53.92	0.00	41.06
FEB	56.07	34.62	54.18	0.00	-20.40
MAR	42.83	29.81	47.43	0.00	-8.97
APR	82.54	63.49	76.43	0.00	115.52
MAY	85.38	71.02	65.94	0.00	-17.23
JUN	123.01	109.70	74.44	0.00	93.82
JUL	117.28	128.31	73.73	0.00	90.32
AUG	112.12	111.88	68.30	0.00	-88.22
SEP	96.68	116.30	52.60	0.00	106.55
OCT	86.10	87.16	54.34	0.00	88.94
NOV	60.25	53.11	37.04	0.00	105.20
DEC	61.99	42.66	51.87	0.00	61.32

Portales		
2013	to	2007

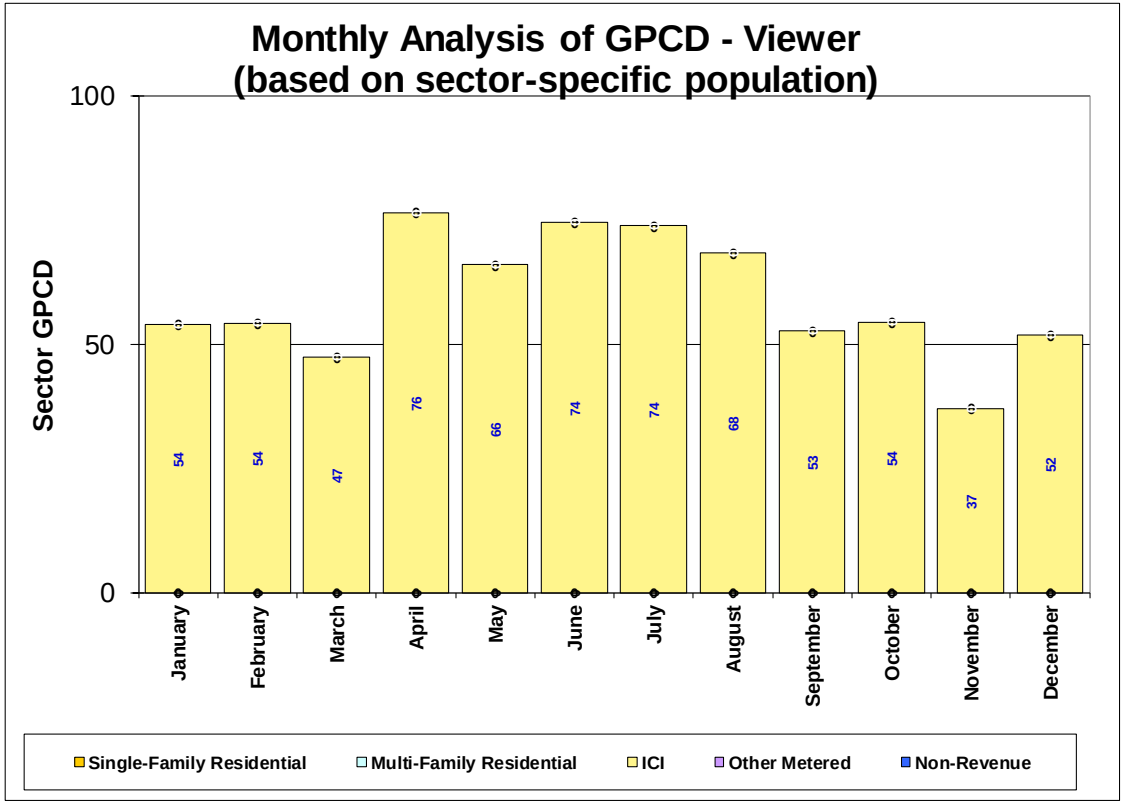


Figure B-10.13. NMOSE GPCD Calculator 2011 ICI GPCD Monthly Reporting Performance Data Table 10.13

10. Monthly Reporting Performance

Return to Instructions

Choose Year for Monthly Analysis 2011

Choose Sector ICI

Monthly GPCD

Month	Single-Family Residential GPCD	Multi-Family Residential GPCD	ICI GPCD	Other Metered GPCD	Non-Revenue GPCD
JAN	53.99	48.98	49.35	0.00	32.49
FEB	72.31	61.22	86.78	0.00	23.56
MAR	78.72	56.61	76.47	0.00	84.42
APR	100.71	75.87	83.04	0.00	4.86
MAY	111.66	99.48	70.02	0.00	5.61
JUN	174.46	102.25	94.42	0.00	-7.90
JUL	129.08	70.70	66.51	0.00	46.98
AUG	122.82	96.00	83.92	0.00	-73.49
SEP	113.72	96.69	102.71	0.00	-16.27
OCT	88.25	83.14	94.97	0.00	-39.11
NOV	66.95	60.06	84.25	0.00	-26.77
DEC	62.79	23.23	98.58	0.00	13.46

Portales		
2013	to	2007

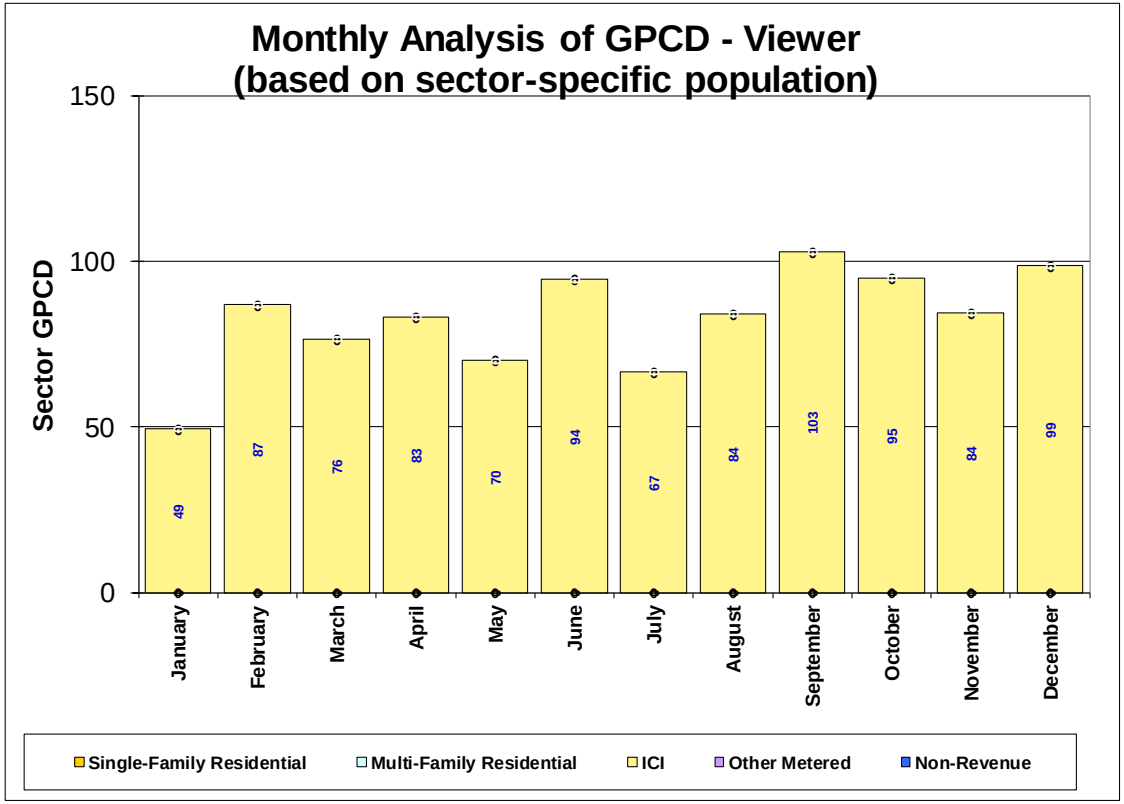


Figure B-10.14. NMOSE GPCD Calculator 2012 ICI GPCD Monthly Reporting Performance Data Table 10.14

10. Monthly Reporting Performance

Return to Instructions

Choose Year for Monthly Analysis 2012

Choose Sector ICI

Monthly GPCD

Month	Single-Family Residential GPCD	Multi-Family Residential GPCD	ICI GPCD	Other Metered GPCD	Non-Revenue GPCD
JAN	58.97	33.23	40.84	0.00	53.29
FEB	55.20	46.44	48.93	0.00	13.42
MAR	53.12	43.53	33.47	0.00	70.43
APR	122.62	67.09	64.58	0.00	-25.72
MAY	104.76	70.47	60.81	0.00	-13.65
JUN	130.92	161.44	75.48	0.00	-35.75
JUL	140.09	95.42	80.26	0.00	-2.51
AUG	119.94	133.76	59.22	0.00	19.20
SEP	120.40	120.41	61.50	0.00	5.11
OCT	72.39	78.77	43.19	0.00	47.88
NOV	62.26	60.94	35.87	0.00	52.35
DEC	57.74	42.84	40.84	0.00	53.35

Portales		
2013	to	2007

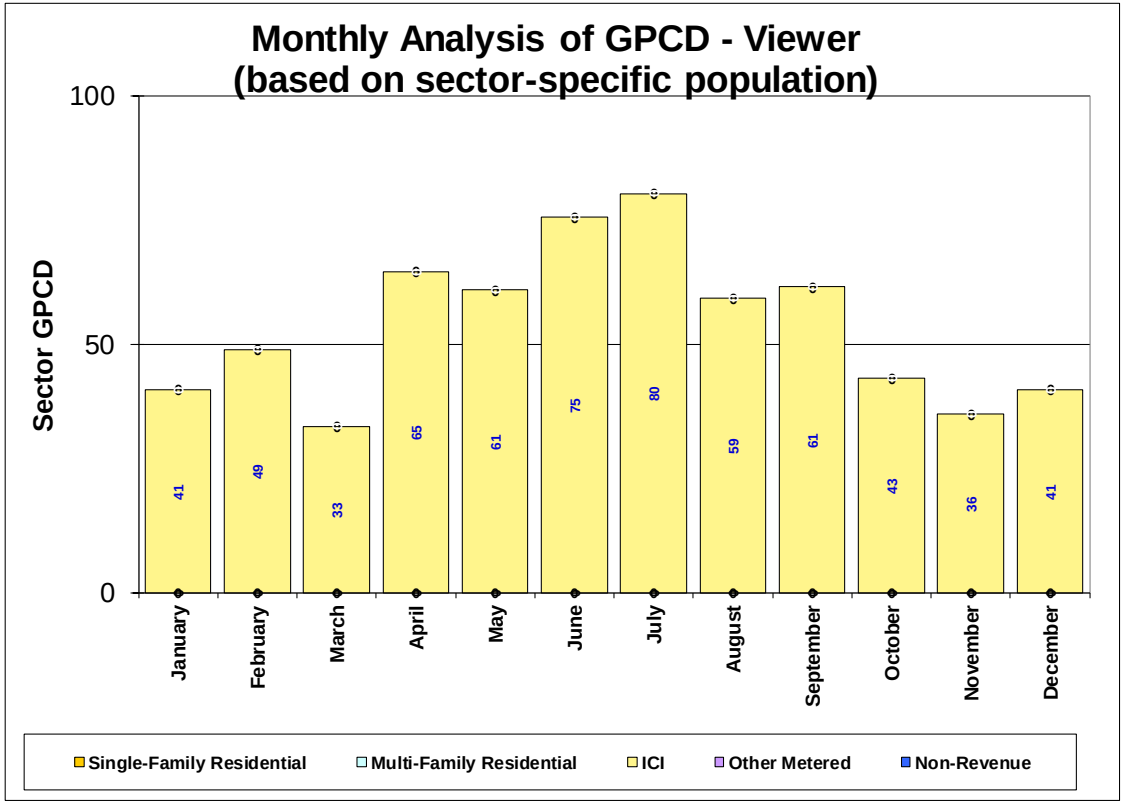


Figure B-10.15. NMOSE GPCD Calculator 2013 ICI GPCD Monthly Reporting Performance Data Table 10.15

10. Monthly Reporting Performance

Return to Instructions

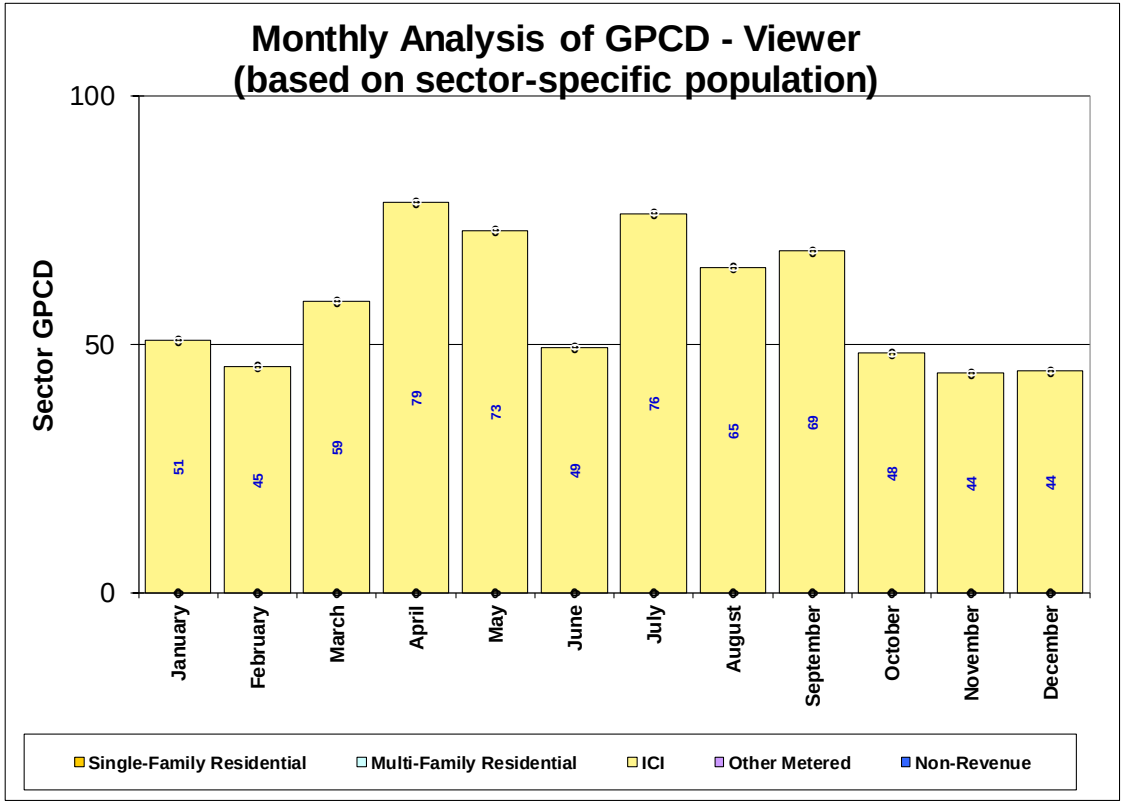
Choose Year for Monthly Analysis 2013

Choose Sector ICI

Monthly GPCD

Month	Single-Family Residential GPCD	Multi-Family Residential GPCD	ICI GPCD	Other Metered GPCD	Non-Revenue GPCD
JAN	59.92	39.19	50.84	0.00	-38.80
FEB	58.60	36.41	45.50	0.00	38.72
MAR	62.04	134.63	58.57	0.00	-54.06
APR	108.11	106.46	78.59	0.00	-19.25
MAY	90.18	73.11	72.85	0.00	19.90
JUN	83.31	70.58	49.34	0.00	14.88
JUL	113.51	107.93	76.27	0.00	7.95
AUG	91.56	67.11	65.35	0.00	96.80
SEP	113.84	100.28	68.67	0.00	100.74
OCT	72.38	84.59	48.10	0.00	14.76
NOV	58.29	50.96	44.20	0.00	38.55
DEC	48.35	18.92	44.49	0.00	48.32

Portales		
2013	to	2007



Appendix C

New Mexico Statutes Annotated (NMSA) 1978

72-14-3.2 Water conservation plans; municipalities, counties and water suppliers.

A. As used in this section, "covered entity" means municipalities, counties and any other person that supplies, distributes or otherwise provides at least five hundred acre-feet of water annually for domestic, commercial, industrial or government customers for other than agricultural purposes, but does not include Indian tribes, pueblos, nations, chapters or any entity of a tribe, pueblo, nation or chapter.

B. A covered entity may develop, adopt and submit to the state engineer by December 31, 2005 a comprehensive water conservation plan, including a drought management plan.

C. The manner in which the covered entity develops, adopts and implements a comprehensive water conservation plan shall be determined by the covered entity. The plan shall be accompanied by a program for its implementation.

D. In developing a water conservation plan pursuant to this section:

(1) municipalities and counties shall consider ordinances and codes to encourage conservation measures; covered entities without ordinance or code enforcement ability shall consider incentives to encourage voluntary compliance with a set of conservation guidelines. Covered entities shall identify and implement best practices in their operations to improve conservation of the resources; and

(2) the covered entity shall consider, and incorporate into its plan if appropriate, at least the following:

(a) water-efficient fixtures and appliances, including toilets, urinals, showerheads and faucets;

(b) low-water-use landscaping and efficient irrigation;

(c) water-efficient commercial and industrial water-use processes;

(d) water reuse systems for both potable and nonpotable water;

(e) distribution system leak repair;

(f) dissemination of information regarding water-use efficiency measures, including public education programs and demonstrations of water-saving techniques;

(g) water rate structures designed to encourage water-use efficiency and reuse in a fiscally responsible manner; and

(h) incentives to implement water-use efficiency techniques, including rebates to customers or others, to encourage the installation of water-use efficiency and reuse measures.

E. The water conservation plan shall contain a section that references the regional water plans in the area that have been accepted by the interstate stream commission. The section shall cite conservation guidelines mentioned in the regional plan that have been adopted into the covered entity's water conservation plan.

F. A covered entity may at any time adopt changes to its water conservation plan and shall submit changes to the state engineer.

G. After December 31, 2005, neither the water trust board nor the New Mexico finance authority shall accept an application from a covered entity for financial assistance in the construction of any water diversion, storage, conveyance, water treatment or wastewater treatment facility unless the covered entity includes a copy of its water conservation plan.

History: Laws 2003, ch. 138, § 3.

Appendix D

Water Conservation Survey Checklist

Portales Water Utility Department

Water Conservation Survey Program

For more information on Water Conservation, call 575-356-6662

Survey Record For: Name		Address		Telephone
Appointment: Day	Date	Time	Surveyor	Surveyor
Account No.	Average Indoor Use (gal/month)	Average Outdoor Use (gal/month)	Residential ☐ Commercial ☐	Number of Residents or Employees

Indoor Areas

Bathrooms	No. 1	No. 2	No. 3	No. 4
Toilet leak?	____	____	____	____
Sink faucet leak?	____	____	____	____
Tub faucet leak?	____	____	____	____
Showerhead leak?	____	____	____	____
Toilet flush volume (gal)	____	____	____	____
Sink discharge (gpm)	____	____	____	____
Shower discharge (gpm)	____	____	____	____
Kitchen, Laundry, and Other Rooms (identify)	____	____	____	____
Sink faucet leak?	____	____	____	____
Sink discharge (gpm)	____	____	____	____

Appliances	Age	Water Saving Cycle?
Dishwasher	____	_____
Washing Machine	____	_____
Swamp Cooler	____	_____
Other _____	____	_____
Other _____	____	_____
Other _____	____	_____
Other _____	____	_____
Other _____	____	_____
Other _____	____	_____

Outdoor Areas - Service Meter

Calibration Test? ☐	Leak Test? ☐	Comments _____ _____

Outdoor Areas - Landscaping

	No. 1	No. 2	No. 3	No. 4
Hose faucet leak?	____	____	____	____

In-ground sprinkler system? ☐	Clock Controller? ☐	Hours of Use _____

Sprinkler system leak? ☐	Uniform water distribution? ☐	Excessive irrigation of non-landscaped area? ☐

Landscaped Area (sq ft)	Lawn _____	Other _____	Total _____

Drought-resistant plants? _____	Area of drought-resistant plants ____	Plants grouped by water need? ____

Water Use Notes

_____
_____
_____
_____

Water Savings Potential

Possible Modifications	Potential Savings (gallons/year)
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
Potential Total Savings	_____

March 2014

Appendix E

Procedure for Water Conservation Surveys

Preparing for the Survey

General Information

- Surveys will be made by scheduled appointment.
- Surveys will be conducted by teams of two or more.
- Surveyors will identify themselves to customers with identification cards.
- Surveyors will always explain the tasks they will be performing before they begin and explain why they are performing those tasks.
- Surveyors will ask the customer's permission to perform the tasks they have described.
- Record the results of the surveys on the checklists.
- Review the customer's approximate indoor (winter), outdoor (summer minus winter), and total annual water use from Water Utility Department records before the survey.
- This survey procedure is applicable to many commercial as well as residential water customers; however, for commercial customers, the potential water savings will have to be calculated from the specific water use information for the various fixtures and appliances given in the Water Utility Department's *Residential Water Savings Ideas* sheet.

Equipment List

- Surveying checklists and clipboard
- Water Utility Department's *Residential Water Shavings Ideas* sheets
- Water conservation and landscaping brochures
- Water meter calibration/flow testing equipment
- Watch with second hand or stop watch
- 1-gallon jug
- Funnel
- Calculator

Service Meter Check

- Perform a calibration/flow test (optional if the meter has been recently checked).
- Perform a leak test.
    A. Ask customer to turn off all water-using appliances and fixtures.
    B. Check the meter dial. If it is still moving, there is a leak in the service line that should be repaired.

Indoor Water Use

1. Faucets in Sinks, Showers and Tubs

- Check each faucet for leaks.
- Check the flow rate of each sink and shower faucet.
    A. Turn the faucet fully open.
    B. Using a watch, time how many seconds (s) it takes to fill a 1-gallon jug.
    C. Calculate the flow rate (F) in gallons per minute: F = 60/s.

2. Toilets

- Check each toilet for leaks
    A. Place a dye tablet or a few drops of food coloring in the toilet tank and stir. Don't flush the toilet.
    B. After 10 minutes, look in the toilet bowl. If colored water is present, there is a leak.
- Estimate flush volume based on size of tank or type of toilet.

3. Water-Consuming Appliances

- Ask customer the approximate the age of each appliance.
    A. Dishwasher
    B. Washing Machine
    C. Swamp Cooler
    D. Other
- Determine if the swamp cooler is a recirculating type.
- Determine if any appliances have water savings capabilities.

4. Ask the customer how many people (or employees) regularly occupy the property.

Outdoor Water Use
(Optional if the survey is performed in winter)

1. Hose Faucets

- Check each faucet for leaks

2. Sprinkler System

- For in-ground sprinkler systems, turn the system on.
- For moveable sprinklers, ask the customer to position the sprinklers and turn the system on in the normal manner. Repeat for other sprinkler locations as required.
- Check for leaks in the sprinkler, hose, or sprinkler system.
- Observe the uniformity of water distribution.

- Observe whether the sprinklers need adjustment to prevent water from falling on homes, sidewalks, driveways, streets, and other non-landscaped areas.
- Optional for irrigated areas exceeding 5,000 square feet: perform a comprehensive landscape irrigation survey as described in *A Water Conservation Guide for Public Utilities*, New Mexico Office of the State Engineer, March 2001, Section 11.

3. Determine the approximate area of irrigated landscaping and estimate the extent and grouping of drought-resistant plants.

Survey Results and Customer Feedback

Service Meter

- Inform customer of the results of the service meter check.
- If the meter is out of calibration, inform customer of the Water Utility Department's meter maintenance program and provide the customer with a schedule for correcting the meter.
- If leaks were indicated in the customer's system, inform customer of the magnitude of water loss and of the corrective actions that can be taken.

Indoor Water Use

1. Faucets in Sinks, Showers and Tubs

- Inform customer of any identified leaks.
- Inform customer of the results of the flow rate measurements. Consideration should be given to installing aerators, flow restrictors, or low flow heads in faucets exceeding today's standard of 2.5 gallons per minute.

2. Toilets

- Inform customer of any identified leaks.
- Inform customer of the estimated flush volume. Consideration should be given to installing today's standard fixture if the flush volume exceeds 1.6 gallons.

3. Water-Consuming Appliances

- Identify water savings potential for each appliance based on its age using information from the Water Utility Department's *Residential Water Savings Ideas* sheet. Generally, appliances dating to the 1970s or earlier will have the highest water use rate listed on the sheet. For commercial customers, the potential water savings will have to be calculated from the specific water use information for the various appliances given in the Water Utility Department's *Residential Water Savings Ideas* sheet.

Outdoor Water Use

1. Hose Faucets

- Inform customer of any identified leaks.

2. Sprinkler System

- Inform customer of any identified leaks.
- Inform customer of overwatered and underwatered areas.
- Inform customer of sprinkler adjustment or relocation options to minimize irrigation of non-landscaped areas.
- Request customer to look for water ponding or unused runoff from sloped surfaces. Sprinkler flow rates and/or sprinkling time should be reduced to eliminate ponding and runoff.

3. Irrigated Area and Landscaping.

- If customer has not converted to drought-resistant landscaping, inform customer of the benefits of such landscaping. Provide color brochure illustrating drought-resisting plants.
- Use the Water Utility Department's *Residential Water Savings Ideas* sheet to estimate the water savings resulting from converting to lower water use plants based on the size of the customer's landscaped area.
- Inform customer of the importance of grouping the drought-resistant plants so that low water use plants are not located next to high water use plants.

Summarize Water and Cost Savings

- Inform the customers of their current indoor and outdoor use rates and water costs.
- Add up the potential annual water savings from each of the identified indoor and outdoor water uses, multiplied as appropriate by the number of people occupying the property. For commercial customers, the potential water savings will have to be calculated from the specific water use information for the various fixtures and appliances given in the Water Utility Department's *Residential Water Savings Ideas* sheet.
- Estimate the annual dollar savings based on the current water and sewer rates.
- Be prepared to discuss the approximate costs of repairing, retrofitting or replacing water-using fixtures and appliances, and converting to drought-resistant landscaping.
- Provide the customer with suggestions on the most appropriate ways they can save water, based on their priorities and economics.
- Inform customers that the Water Utility Department may contact them to evaluate the effectiveness of the survey program.
- Emphasize that the survey program is conducted at no additional cost to the customer, that the survey is only meant to inform the customer, and that the customer is under no obligation to respond to the survey results.

- Leave a copy of the survey checklist with the customer.
- Record the time and other direct costs of the survey for future evaluations of program effectiveness.