Summary of Evaluations of Best Management Practices in Certain Water Conservation Plans

January 1, 2015

Texas Water Development Board

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January 1, 2015

To: The Honorable Rick Perry, Governor of Texas
The Honorable David Dewhurst, Lieutenant Governor of Texas
The Honorable Joe Straus, Speaker of the Texas House of Representatives

The Texas Water Development Board is pleased to present the 2014 Summary of Evaluations of Best Management Practices in Certain Water Conservation Plans, submitted to you in compliance with House Bill 3605 passed by the 83rd Texas Legislature (2013). This is a summary of the evaluations of 14 utilities' required water conservation plans for compliance with the Texas Water Development Board's best management practices when considering an application for financial assistance.

On behalf of the citizens of Texas, the Texas Water Development Board respectfully submits to the Governor, the Lieutenant Governor, the Speaker of the House, and members of the 84th Texas Legislature this summary.

Carlos Rubinstein
Chairman

Kevin Patteson
Executive Administrator

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EXECUTIVE SUMMARY

The 83rd Texas Legislature (2013) passed House Bill 3605 which requires the Texas Water Development Board (TWDB), when considering an application for financial assistance from a retail public utility that provides potable water service to 3,300 or more connections, to evaluate the utility's water conservation plan for compliance with the TWDB's best management practices. The TWDB is required to issue a report to the utility detailing the results of the evaluation and, no later than January 1 of each odd-numbered year, submit a written summary of the results of evaluations to the legislature.

At the Board meeting on July 10, 2014, when presenting on another section of House Bill 3605 dealing with water loss thresholds, the Executive Administrator mentioned the required evaluations with the intention of fully implementing them starting January 1, 2015. Nevertheless, an evaluation of financial assistance applications that the Board considered in Fiscal Year 2014 was completed. This Summary of Evaluations of Best Management Practices in Certain Water Conservation Plans is intended to meet the first reporting requirement of House Bill 3605.

In Fiscal Year 2014, the Texas Water Development Board considered applications for financial assistance from 14 entities with more than 3,300 connections. They included the cities of Amarillo, Anthony, Arlington, Breckenridge, Cleburne, Edinburg, Grand Prairie, Houston, Laredo, McAllen, Port Arthur, and Sweetwater, as well as the East Rio Hondo Water Supply and the San Antonio Water System.

The evaluations showed the use of best management practices varied from utility to utility. In discussion with utilities regarding water conservation plans, the TWDB conservation staff has noted that many utilities, while having an active conservation program, do not think of their conservation activities in terms of best management practices. In reviewing the submitted water conservation plans for compliance with the TWDB's best management practices, the TWDB conservation staff was often hard-pressed to identify best management practices. And although conservation plans are required to have five- and ten-year targets and goals for water savings, water conservation plans often do not include any estimation of potential water savings from a particular conservation activity.

The TWDB staff will continue to refine the evaluation process and encourage utilities to use the TWDB's Best Management Practices Guide when developing and implementing their water conservation plans.

INTRODUCTION

The 83rd Texas Legislature (2013) passed House Bill 3605 which requires the Texas Water Development Board (TWDB) to establish thresholds for water loss to use in considering applications for financial assistance. Section 17.1245 of that bill also states the following:

EVALUATION. (a) In passing on an application for financial assistance from a retail public utility that provides potable water service to 3,300 or more connections, the board shall:

> *(1) evaluate for compliance with the board's best management practices the utility's water conservation plan required under Section 13.146; and*
> *(2) issue a report to a utility detailing the results of the evaluation conducted under Subdivision (1).*
> *(b) Not later than January 1 of each odd-numbered year, the board shall submit to the legislature a written summary of the results of evaluations conducted under Subsection (a)(1).*

At the Board meeting on July 10, 2014, the Board authorized the publication of proposed amendments to § 358.6 of the TWDB rules relating to Water Loss Audits. The amendments were required in response to House Bill 3605 passed by the 83rd Texas Legislature amending Texas Water Code § 16.0121. TWDB staff will be fully implementing the review for best management practices starting January 1, 2015.

BACKGROUND

For the purpose of this report, "connection" was determined be the same as defined in Texas Administrative Code, Title 30, Chapter §290.38(15):

Connection: A single family residential unit or each commercial or industrial establishment to which drinking water is supplied from the system. As an example, the number of service connections in an apartment complex would be equal to the number of individual apartment units. When enough data is not available to accurately determine the number of connections to be served or being served, the population served divided by three will be used as the number of connections for calculating system capacity requirements. Conversely, if only the number of connections is known, the connection total multiplied by three will be the number used for population served. For the purposes of this definition, a dwelling or business which is connected to a system that delivers water by a constructed conveyance other than a pipe shall not be considered a connection if:

> *(A) the water is used exclusively for purposes other than those defined as human consumption (see human consumption);*
> *(B) the executive director determines that alternative water to achieve the equivalent level of public health protection provided by the drinking water standards is provided for residential or similar human consumption, including, but not limited to, drinking and cooking; or*

(C) the executive director determines that the water provided for residential or similar human consumption is centrally treated or is treated at the point of entry by a provider, a pass through entity, or the user to achieve the equivalent level of protection provided by the drinking water standards.

Best Management Practices

Best management practices are defined as voluntary efficiency measures that are intended to save a quantifiable amount of water, either directly or indirectly, and can be implemented within a specified timeframe.

One of the responsibilities of the Water Conservation Implementation Task Force, created by the 78th Texas Legislature under Senate Bill 1094, was to review, evaluate, and recommend optimum levels of water use efficiency and conservation for the state. This was done by identifying, evaluating, and selecting best management practices for municipal, industrial, and agricultural water uses and evaluating the costs and benefits for the selected best management practices.

The Task Force developed a Best Management Practices Guide in 2004 consisting of 21 municipal, 14 industrial, and 20 agricultural best management practices. Each best management practice has several elements that describe the efficiency measures, implementation techniques, implementation schedules, scope, procedures to estimate water savings, and cost-effectiveness considerations.

The successor to the Water Conservation Implementation Task Force is the Water Conservation Advisory Council. Created by the 80th Texas Legislature (regular session) with the passage of Senate Bill 3 and House Bill 4, the Council is charged with monitoring trends in water conservation implementation and new technologies for possible inclusion as best management practices. Since that time, the Council has reviewed the existing list of best management practices and has either developed additional best management practices or updated existing best management practices as needed.

Working with the TWDB and the Texas Commission on Environmental Quality (TCEQ), the Water Conservation Advisory Council established a stakeholder process to review and revise best management practices. Changes to the Water Conservation Best Management Practices Guide are vetted by appropriate subject matter experts, interest groups, and state agencies. The intention is that the guide remains a living document that incorporates changes or additions on an ongoing basis. Periodic solicitations will be made to encourage reviews by the user community. As appropriate, the Water Conservation Advisory Council will make recommendations for revisions to the guide.

After reviewing the recommendations from the Water Conservation Advisory Council, and in consultation with the TCEQ, the TWDB staff will develop appropriate changes to the Best Management Practices Guide for consideration by the Board. Updated versions of the guide result from these efforts. The guide now includes 26 municipal, 15 industrial, 21 agricultural, and

4 wholesale best management practices. The Municipal Best Management Practices Guide can be found at www.twdb.texas.gov/conservation/BMPs/Mun/doc/MunMiniGuide.pdf

Water Conservation Plans and Minimum Requirements

The water conservation plan is a strategy or combination of strategies to reduce the consumption of water, reduce the loss or waste of water, improve or maintain the efficiency in the use of water, or increase recycling and reuse of water. It contains measures intended to meet the targets and goals identified in the plan.

A utility's water conservation plan must meet the minimum requirements as stated below, and should be no older than five years. To identify water conservation opportunities a water conservation plan should also include a utility profile, which is an evaluation of the applicant's water and wastewater system and customer water use characteristics, and set goals to be accomplished by water conservation measures. The plan should provide information in response to the following minimum requirements. If the plan does not provide information for each minimum requirement, the applicant should include in the plan an explanation of why the requirement is not applicable.

The current water conservation plan requirements can be found in Texas Administrative Code Chapter §363.15(b)(1) and include:

- A utility profile that includes the water sales and use for the following classifications: residential (both for single-family and multi-family), commercial, institutional, industrial, agricultural, and wholesale, as appropriate.
- Five-year and ten-year targets that are specific and quantified for water savings and include goals for water loss programs in gallons per capita per day and goals for municipal use and residential use in gallons per capita per day. A base use figure should be included to be able to calculate savings.
- A schedule for implementing the plan to achieve the applicant's targets and goals.
- A method for tracking the implementation and effectiveness of the plan. The plan should measure progress annually, and evaluate the progress toward meeting the goals.
- A master meter to measure and account for the amount of water diverted from the source of supply.
- A program of universal metering of both customer and public uses of water for meter testing, repair, and periodic replacement.
- Measures to determine and control water loss.
- A continuous program of leak detection, repair, and water loss accounting for the transmission, delivery, and distribution system in order to control water loss.
- A program of continuing education and information regarding water conservation.
- A water rate structure which is not "promotional" and does not encourage the excessive use of water.
- A means of implementation and enforcement, evidenced by adoption of the plan.

- If the applicant will utilize the project financed by the TWDB to furnish water or wastewater services to another supplying entity that in turn will furnish the water or wastewater services to the ultimate consumer, the requirements for the water conservation plan also pertain to these supplier entities.
- Documentation that the regional water planning group for the service area of the applicant has been notified of the applicant's water conservation plan.
- Adoption of the water conservation plan through a formal adoption by the governing body of the entity.
- Report annually on the progress in implementing each of the minimum requirements in the water conservation plan.

The water conservation plan may also include other conservation methods or techniques that the applicant deems appropriate.

Current Review Process

Currently, any entity requesting financial assistance greater than $500,000 from the TWDB is required to develop, submit, and implement a water conservation plan. Upon submittal, the water conservation plan is reviewed by the TWDB conservation staff for administrative completeness and minimum requirements. Staff also reviews the most current water loss audit. Data and information from this review are included in the Water Conservation Review sheet, which is included in the entity's application write-up

Appendix A shows the current water conservation reviews that were provided to the Board when considering the applications for financial assistance. TWDB staff intends to modify this form to meet the requirements of House Bill 3605 regarding water loss thresholds, as well as to assist in the evaluation and reporting on the use of best management practices.

In reviewing the applicant's water conservation plan, the TWDB conservation staff also reviews the applicant's utility profile, which is submitted with the water conservation plan. Certain data, such as historical water use and water use goals, are reviewed to determine application and appropriate use in the water conservation plan and determination of the utility's water use goals. If necessary, the entity is contacted for clarification and the TWDB conservation staff may ask for additional information.

Changes made to the utility profile because of new reporting requirements based on water use by customer classification, as required by Senate Bill 181 passed by the 83rd Texas Legislature, will not only provide additional data of percentage of water use by customer classification but a breakdown of percentage of customers by classification.

Identifying Best Management Practices

The best management practices contained in the Best Management Practices Guide are voluntary efficiency measures that save a quantifiable amount of water, either directly or indirectly, and can be implemented within a specified timeframe. They are not exclusive of other meaningful conservation techniques that an entity might use in formulating a State-required water

conservation plan. At the discretion of each user, a best management practice can be implemented individually, in whole or in part, or be combined with other best management practices or water conservation techniques to form a comprehensive water conservation program. The adoption of any best management practice is entirely voluntary, although it is recognized that once adopted, certain practices may require implementation with local laws such as a city ordinance.

In Texas, the best management practices are designed to fit into the State's water resources planning process as one alternative to meet future water needs. As a result, each best management practice should be clearly defined in its schedule of implementation, expected water savings, and costs of implementation.

ANAYLSIS

In Fiscal Year 2014, the Board considered applications for financial assistance from 14 entities with more than 3,300 connections. They included the cities of Amarillo, Anthony, Arlington, Breckenridge, Cleburne, Edinburg, Grand Prairie, Houston, Laredo, McAllen, Port Arthur, and Sweetwater, as well as the East Rio Hondo Water Supply and the San Antonio Water System. The number of connections of those entities ranged from 3,319 to 365,000.

The 14 entities with more than 3,300 connections that had financial applications with the Texas Water Development Board in Fiscal Year 2014 were reviewed using the 23 municipal best management practices shown on Table 1.

Table 1. Best management practices used to review the water conservation plans of entities that submitted financial assistance applications with the TWDB in Fiscal Year 2014.

Conservation Coordinator
Cost-Effectiveness Analysis
Water Survey for Single-Family and Multi-Family Customers
Water Conservation Pricing
Wholesale Agency Assistance Programs
Metering of All New Connections and Retrofit of Existing Connections
System Water Audit and Water Loss Control
Athletic Field Conservation
Golf Course Conservation
Landscape Irrigation Conservation and Incentives
Park Conservation
Public Information
School Education
Conservation Programs for Industrial, Commercial, and Institutional Accounts
Residential Clothes Washer Incentive Program
Water Efficient Plumbing Programs
Toilet Replacement Program
Water Wise Landscape Design and Conversion Programs
New Construction Graywater
Institutional Plumbing Conversion
Rainwater Harvesting and Condensate Reuse
Water Reuse
Prohibition on Wasting Water

RESULTS

In discussion with utilities regarding water conservation plans TWDB conservation staff has noted that many utilities, while having an active conservation program, do not think of their conservation activities in terms of best management practices. And although conservation plans are required to have five and ten-year targets and goals for water savings, water conservation plans often do not include any estimation of potential water savings from a particular conservation activity.

In reviewing the submitted water conservation plans for compliance with the TWDB's best management practices, TWDB conservation staff was often hard-pressed to identify best management practices.

Use of Best Management Practices

The use of best management practices varied from utility to utility, as shown on Table 2. The San Antonio Water System water conservation plan included 17 best management practices while the cities of Breckenridge and Grand Prairie and the East Rio Hondo Water Supply Corporation each included four best management practices.

Table 2. Entities and identified best management practices.

Authority Name	Amarillo	Anthony	Arlington	Breckenridge	Cleburne	East Rio Hondo WSC	Edinburg	Grand Prairie	Houston	Laredo	McAllen	Port Arthur	SAWS	Sweetwater
Conservation Coordinator	☐	✓	☐	☐	✓	☐	☐	✓	☐	☐	✓	☐	✓	☐
Cost-Effective Analysis	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	✓	☐
Water Survey for Single-Family and Multi-family Customers	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Water Conservation Pricing	☐	✓	✓	✓	✓	☐	☐	☐	✓	✓	☐	☐	✓	✓
Wholesale Agency Assistance Programs	✓	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	✓	✓
Metering of All New Connections and Retrofit of Existing Connections	☐	✓	☐	✓	✓	☐	✓	✓	✓	✓	☐	☐	✓	☐
System Water Audit and Water Loss Control	✓	✓	✓	☐	✓	✓	☐	☐	✓	✓	☐	✓	✓	✓
Athletic Field Conservation	☐	☐	☐	☐	✓	☐	☐	☐	☐	☐	☐	☐	✓	☐
Golf Course Conservation	☐	☐	☐	☐	☐	☐	✓	☐	☐	✓	✓	✓	✓	☐
Landscape Irrigation Conservation and Incentives	☐	☐	✓	☐	✓	☐	✓	☐	☐	☐	✓	☐	✓	☐
Park Conservation	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Public Information	✓	☐	✓	☐	✓	☐	✓	✓	✓	✓	☐	☐	✓	☐
School Education	☐	☐	✓	☐	✓	☐	☐	✓	✓	☐	☐	☐	☐	☐
Conservation Programs for Industrial, Commercial and Institutional Accounts	✓	✓	☐	☐	✓	☐	☐	☐	☐	☐	☐	☐	✓	☐
Residential Clothes Washer Incentive Program	☐	☐	✓	☐	☐	☐	☐	☐	☐	✓	☐	☐	✓	☐
Water Efficient Plumbing Programs	✓	✓	☐	✓	✓	✓	✓	☐	✓	☐	☐	☐	✓	✓
Toilet Replacement Program	☐	☐	✓	☐	☐	☐	☐	☐	☐	✓	☐	☐	✓	☐
Water Wise Landscape Design and Conversion Programs	✓	✓	☐	✓	☐	✓	✓	☐	☐	✓	✓	✓	✓	✓
New Construction Graywater	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Industrial, Commercial and Institutional Plumbing Conversion	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Rainwater Harvesting and Condensate Reuse	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	✓	☐
Water Reuse	✓	☐	✓	☐	✓	✓	✓	☐	☐	✓	✓	✓	✓	✓
Prohibition on Wasting Water	✓	☐	✓	☐	☐	☐	☐	☐	☐	☐	☐	✓	✓	☐

Eighteen of the 23 municipal best management practices were used by 14 utilities evaluated in this report. The System Water Audit and Water Loss Control, Landscape Irrigation Conservation and Incentives, and Water Reuse best management practices were the most used, with 10 utilities

identified as including them in their water conservation plans. No utility used the Park Conservation; the Industrial, Commercial and Institutional Plumbing Conversion; the Residential Clothes Washers Incentive Program; or the New Construction Graywater best management practices in its water conservation plan.

Examples of Best Management Practices Used in the Water Conservation Plans

This section shows how some of elements of the best management practices are being used by the different entities.

Conservation Coordinator: The San Antonio Water System has approximately 20 full-time staff in its water conservation department, and more during the summer peakseason. This staff develops new programs, maintains existing programs, conducts research, prepares reports, and performs community outreach.

Metering: The City of Grand Prairie has an implemented Automated Metering Infrastructure Program that will replace all older meters in the system and upgrade all meters to remote read as well as provide hourly meter reading to improve metering accuracy, help customers track and control usage, and detect leaks.

The City of Houston has developed a Consumption Awareness Program to convert 75 percent of their meters to an automatic meter infrastructure network which uses a web-based portal for single-family residential customers to access real-time water usage. The City is planning to develop an application for smart phone use, develop a web-based portal for commercial customer with an information dissemination goal of 80 percent participation.

Water Audit and Water Loss Control: The City of Cleburne has leak detection equipment that has been placed into regular use, including loggers that allow for overnight low-flow monitoring. In 2013, the City started installing line-flushing devices that are metered and recorded. Fire hydrant locks are being used to reduce the incidence of theft in the system.

Public Information: The City of Laredo's customer service division has changed its billing system to provide customers a graphical representation of their water consumption in a one-year history of water usage bar graph and provides text for important conservation messages.

Conservation for Industrial, Commercial, and Institutional Accounts: The San Antonio Water System lists water restrictions in the City's Code of Ordinances for commercial dining facilities, vehicle washing facilities, vacuum systems, coin-operated washing machines, and commercial building hot water lines. New commercial buildings installing air conditioning systems are required to have a single independent condensate wastewater line for collection and reuse.

Water Wise Landscape Design and Conversion Programs: The City of Laredo recommends the use of xeriscaping in all new residential construction and development. Turf grasses are restricted and only allowed with a limited percentage of the development.

Toilet Replacement Program: The City of Arlington has adopted a residential, high-efficiency toilet replacement program identifying established neighborhoods with older toilets to offer qualified residents high-efficiency toilets.

Water Reuse: The City of McAllen has contracts to sell treated wastewater effluent to two energy companies for reuse. Construction of a reuse line that began in 2011 will eventually supply the convention center district and a nearby park with treated wastewater effluent for irrigation and landscape feature uses.

APPENDIX

Water Conservation Reviews

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WATER CONSERVATION REVIEW

Entity: Amarillo Municipal Water System Review date: June 2013

WATER CONSERVATION PLAN DATE: October 2012 ☐ **Approvable** ☑ **Adopted**

	Total GPCD	Residential GPCD	Water Loss GPCD	Water Loss Percent
Baseline	227	115	15	7
5-year Goal	175	NA	9	5
10-year Goal	170	NA	8.5	5

WATER LOSS AUDIT YEAR: 2012

Apparent loss (gallons): 211,209,332
Produced water (gallons): 17,146,997,253
Connections per mile: 63

Real loss (gallons): 65,508,455
Total water loss (percent): 2
Total water loss (GPCD): 4

If < 32 connections per mile, real loss (gallons) per mile per day: NA
(Average real loss for less than 32 connections is 1,154 gal/mile/day)

If > 32 connections per mile, real loss (gallons) per connection per day: 3
(Average real loss for greater than 32 connections is 47 gal/connection/day)

If > 16 connections per mile and > 3,000 connections
Infrastructure Leakage Index (*ILI*): .2

ADDITIONAL INFORMATION:

The System's water conservation plan includes activities in public information and education, a non-promotional rate structure, and a universal metering testing, repair, and replacement program. Their conservation program for 2012 included (citizen) water waste reporting, ongoing record management, and retrofitting. Their utility billing works to track misplaced meters and unauthorized connections. The System's water loss program includes regular onsite testing using sonic leak-detection equipment and other methods for mains, valves, and meters. Their reclaimed water program includes the recycling and reuse of treated wastewater effluent. The System's Total GPCD is attributed to water use by their institutional, commercial and industrial customers.

STAFF NOTES AND RECOMMENDATIONS:

None.

DEFINITIONS

Adopted refers to a water conservation plan that meets the minimum requirements of the water conservation plan rules and has been formerly approved and adopted by the applicant's governing body.

Apparent loss refers to unauthorized consumption, meter inaccuracy, billing adjustments, and waivers.

Approvable refers to a water conservation plan that substantially meets the minimum requirements of the water conservation plan rules but has not yet been adopted by the applicant's governing body.

GPCD means gallons per capita per day.

Infrastructure Leakage Index (ILI) is the current annual real loss divided by the unavoidable annual real loss (theoretical minimum real loss) and only applies to utilities with more than 5,000 connections, average pressure greater than 35 psi, and a connection density of more than 32 connections per mile. The **ILI** is recommended to be less than 3 if water resources are greatly limited and difficult to develop, between 3 and 5 if water resources are adequate to meet long-term needs but water conservation is included in long-term water planning, and between 5 and 8 if water resources are plentiful, reliable, and easily extracted. The **ILI** is recommended as a bench marking tool, but until there is increased data validity of the variables used in the calculation, the **ILI** should be viewed with care.

NA means not applicable.

Produced water is the total amount of water purchased or produced by the utility.

Real loss comes from main breaks and leaks, storage tank overflows, customer service line breaks, and leaks.

Residential GPCD is the amount of water per capita used solely for residential use and ideally includes both single and multi-family customer use.

Total baseline GPCD is the amount of all water purchased or produced by the utility divided by the service area population and then divided by 365.

Total water loss is the sum of the apparent and real water losses.

WATER CONSERVATION REVIEW

Entity: Town of Anthony Review date: September 2013

WATER CONSERVATION PLAN DATE: February 2012 ☐ **Approvable** ☑ **Adopted**

	Total GPCD	Residential GPCD	Water Loss GPCD	Water Loss Percent
Baseline	176	81	40	23
5-year Goal	151	NA	35	23
10-year Goal	146	NA	30	21

WATER LOSS AUDIT YEAR: 2010

Apparent loss (gallons): 15,947,530
Produced water (gallons): 170,370,000
Connections per mile: 43

Real loss (gallons): 19,905,702
Total water loss (percent): 18
Total water loss (GPCD): 31

If < 32 connections per mile, real loss (gallons) per mile per day: NA
(Average real loss for less than 32 connections is 1,154 gal/mile/day)

If > 32 connections per mile, real loss (gallons) per connection per day: 52
(Average real loss for greater than 32 connections is 47 gal/mile/day)

If > 16 connections per mile and > 3,000 connections
Infrastructure Leakage Index (*ILI*): 5.3

ADDITIONAL INFORMATION:

The Town plans to designate a city staff member to assist in carrying out the Town's conservation program. The Town has a detailed public education program and a retrofit program and plans to monitor meters annually and replace all meters with automatic readers within 5 years. An effort is being made to meter all town-owned facilities. Flow meters are installed on all pump stations to record the total amount of water that enters the system and are read and recorded daily. Customer meters are read, recorded, and billed once per month for residential and commercial customers. The Town's leak detection program includes timely repairs and regular auditing/monitoring to determine illegal connections and other unaccounted for use.

STAFF NOTES AND RECOMMENDATIONS:

The difference between the Town's water loss in their 2012 Utility Profile and their 2010 Water Loss Audit is in how the two are calculated. The water loss audit is the more detailed of the two. The Town is currently working with a consultant to improve water loss accounting including more accurate metering. Past accounting has affected their total water use and their residential GPCD. TWDB conservation staff recommends that the Town conduct a 2011and 2012 water loss audit to track the effectiveness of their water loss program.

DEFINITIONS

Adopted refers to a water conservation plan that meets the minimum requirements of the water conservation plan rules and has been formerly approved and adopted by the applicant's governing body.

Apparent loss refers to unauthorized consumption, meter inaccuracy, billing adjustments, and waivers.

Approvable refers to a water conservation plan that substantially meets the minimum requirements of the water conservation plan rules but has not yet been adopted by the applicant's governing body.

GPCD means gallons per capita per day.

Infrastructure Leakage Index (ILI) is the current annual real loss divided by the unavoidable annual real loss (theoretical minimum real loss) and only applies to utilities with more than 5,000 connections, average pressure greater than 35 psi, and a connection density of more than 32 connections per mile. The **ILI** is recommended to be less than 3 if water resources are greatly limited and difficult to develop, between 3 and 5 if water resources are adequate to meet long-term needs but water conservation is included in long-term water planning, and between 5 and 8 if water resources are plentiful, reliable, and easily extracted. The **ILI** is recommended as a bench marking tool, but until there is increased data validity of the variables used in the calculation, the **ILI** should be viewed with care.

NA means not applicable.

Produced water is the total amount of water purchased or produced by the utility.

Real loss comes from main breaks and leaks, storage tank overflows, customer service line breaks, and leaks.

Residential GPCD is the amount of water per capita used solely for residential use and ideally includes both single and multi-family customer use.

Total baseline GPCD is the amount of all water purchased or produced by the utility divided by the service area population and then divided by 365.

Total water loss is the sum of the apparent and real water losses.

WATER CONSERVATION REVIEW

Entity: City of Arlington Review date: September 2013

WATER CONSERVATION PLAN DATE: April 2009 ☐ **Approvable** ☑ **Adopted**

	Total GPCD	Residential GPCD	Water Loss GPCD	Water Loss Percent
Baseline	161	104	19	12
5-year Goal	153	NA	18	12
10-year Goal	146	NA	18	12

WATER LOSS AUDIT YEAR: 2012

Apparent loss (gallons): 715,919,255
Produced water (gallons): 21,843,928,788
Connections per mile: 76
Real loss (gallons): 1,566,573,967
Total water loss (percent): 10.5
Total water loss (GPCD): 17

If < 32 connections per mile, real loss (gallons) per mile per day: NA
(Average real loss for less than 32 connections is 1,154 gal/mile/day)

If > 32 connections per mile, real loss (gallons) per connection per day: 40
(Average real loss for greater than 32 connections is 47 gal/mile/day)

If > 16 connections per mile and > 3,000 connections
Infrastructure Leakage Index (*ILI*): 2.6

ADDITIONAL INFORMATION:

The City meters all water usage. In June 2011 the City signed a contract to convert to system-wide automated meter reading. This will allow for for faster leak detection and repair to minimize water loss and potential damage. Through its public education and information campaign, the City notifies local organization such as schools and civic groups that the Arlington Water Utilities staff is available to make presentations on the importance of water conservation. In addition, the City promotes the Environmental Protection Agency's WaterSense partnership program as well as promoting local conservation and education events and literature.

STAFF NOTES AND RECOMMENDATIONS:

After completing their utility profile and water conservation plan, the City determined that there was water not accounted for in past years, including additional hydrant flushing at the landfill, non-metered sewer line maintenance and non-metered new water line flushing. As an example, new water lines were being flushed six times before coming online and that water was not being accounted for. The City plans to track and account for all authorized use.

DEFINITIONS

Adopted refers to a water conservation plan that meets the minimum requirements of the water conservation plan rules and has been formerly approved and adopted by the applicant's governing body.

Apparent loss refers to unauthorized consumption, meter inaccuracy, billing adjustments, and waivers.

Approvable refers to a water conservation plan that substantially meets the minimum requirements of the water conservation plan rules but has not yet been adopted by the applicant's governing body.

GPCD means gallons per capita per day.

Infrastructure Leakage Index (ILI) is the current annual real loss divided by the unavoidable annual real loss (theoretical minimum real loss) and only applies to utilities with more than 5,000 connections, average pressure greater than 35 psi, and a connection density of more than 32 connections per mile. The **ILI** is recommended to be less than 3 if water resources are greatly limited and difficult to develop, between 3 and 5 if water resources are adequate to meet long-term needs but water conservation is included in long-term water planning, and between 5 and 8 if water resources are plentiful, reliable, and easily extracted. The **ILI** is recommended as a bench marking tool, but until there is increased data validity of the variables used in the calculation, the **ILI** should be viewed with care.

NA means not applicable.

Produced water is the total amount of water purchased or produced by the utility.

Real loss comes from main breaks and leaks, storage tank overflows, customer service line breaks, and leaks.

Residential GPCD is the amount of water per capita used solely for residential use and ideally includes both single and multi-family customer use.

Total baseline GPCD is the amount of all water purchased or produced by the utility divided by the service area population and then divided by 365.

Total water loss is the sum of the apparent and real water losses.

WATER CONSERVATION REVIEW

Entity: City of Breckenridge Review date: September 2013

WATER CONSERVATION PLAN DATE: April 2009 ☐ **Approvable** ☑ **Adopted**

	Total GPCD	Residential GPCD	Water Loss GPCD	Water Loss Percent
Baseline	181	78	20	13
5-year Goal	180	NA	16	9
10-year Goal	179	NA	14	8

WATER LOSS AUDIT YEAR: 2010/2012

Apparent loss (gallons): 6,119,988/5,992,590
Produced water (gallons): 312,884,187/353,614,16(
Connections per mile: 74

Real loss (gallons): 22,773,120/83,747,140
Total water loss (percent): 9/25
Total water loss (GPCD): 73

If < 32 connections per mile, real loss (gallons) per mile per day: NA
(Average real loss for less than 32 connections is 1,154 gal/mile/day)

If > 32 connections per mile, real loss (gallons) per connection per day: 26/98
(Average real loss for greater than 32 connections is 47 gal/connection/day)

If > 16 connections per mile and > 3,000 connections
Infrastructure Leakage Index (*ILI*): NA

ADDITIONAL INFORMATION:

The City's water conservation plan includes the required elements including a non-declining block rate structure, plumbing codes, ordinances for conserving devices in new construction, retrofit programs, water recycling and reuse, and water conserving landscape education. The City's leak detection program includes purchasing leak detection equipment and using it in areas where leaks are not readily detected such as at the meter, valve, or hydrant locations. A screening of the entire system is completed each year. Distribution lines found to have had significant leaks are then replaced.

STAFF NOTES AND RECOMMENDATIONS:

The City reported an increase in water loss from 2010 compared to 2012 due to:
a) High volume of water lost to breaks and leaks due to dry soil conditions during the drought. At one point during a particularly large break, boil-water notices were issued.
b) Theft.
c) Losses stemming from the draining of a clarifier during maintenance.

Part of this request will fund replacement of distribution lines and fund a water loss analysis study.

DEFINITIONS

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Apparent loss refers to unauthorized consumption, meter inaccuracy, billing adjustments, and waivers.

Approvable refers to a water conservation plan that substantially meets the minimum requirements of the water conservation plan rules but has not yet been adopted by the applicant's governing body.

GPCD means gallons per capita per day.

Infrastructure Leakage Index (ILI) is the current annual real loss divided by the unavoidable annual real loss (theoretical minimum real loss) and only applies to utilities with more than 5,000 connections, average pressure greater than 35 psi, and a connection density of more than 32 connections per mile. The **ILI** is recommended to be less than 3 if water resources are greatly limited and difficult to develop, between 3 and 5 if water resources are adequate to meet long-term needs but water conservation is included in long-term water planning, and between 5 and 8 if water resources are plentiful, reliable, and easily extracted. The **ILI** is recommended as a bench marking tool, but until there is increased data validity of the variables used in the calculation, the **ILI** should be viewed with care.

NA means not applicable.

Produced water is the total amount of water purchased or produced by the utility.

Real loss comes from main breaks and leaks, storage tank overflows, customer service line breaks, and leaks.

Residential GPCD is the amount of water per capita used solely for residential use and ideally includes both single and multi-family customer use.

Total baseline GPCD is the amount of all water purchased or produced by the utility divided by the service area population and then divided by 365.

Total water loss is the sum of the apparent and real water losses.

WATER CONSERVATION REVIEW

Entity: City of Cleburne Review date: June 2014

WATER CONSERVATION PLAN DATE: August 2014 ☐ **Approvable** ☑ **Adopted**

	Total GPCD	Residential GPCD	Water Loss GPCD	Water Loss Percent
Baseline	211	76	42	20
5-year Goal	186	75	28	15
10-year Goal	180	73	22	12

WATER LOSS AUDIT YEAR: 2012

Apparent loss (gallons): 192,924,990
Produced water (gallons): 2,317,277,778
Connections per mile: 61
Real loss (gallons): 311,541,558
Total water loss (percent): 22
Total water loss (GPCD): 47

If < 32 connections per mile, real loss (gallons) per mile per day: NA
(Average real loss for less than 32 connections is 1,154 gal/mile/day)

If > 32 connections per mile, real loss (gallons) per connection per day: 74
(Average real loss for greater than 32 connections is 47 gal/connection/day)

If > 16 connections per mile and > 3,000 connections
Infrastructure Leakage Index (*ILI*): 6.2

ADDITIONAL INFORMATION:

The City's water conservation plan includes the minimum rule requirements. The City monitors the water use at the treatment plan which assists with tracking water loss. In 2008 the City installed new metering devices, and as part of a wastewater effluent reclamation system, 155 million gallons of reclaimed water were used at the Brazos Electric generation facility, the City-owned 70 acres sports complex and for fracturing gas wells. Other conservation activities include improvements in billing statements, installation of automatic flushing valves on dead-end lines to reduce flushing required to maintain proper water quality, purchasing and use of leak detection equipment, including loggers to monitor low-flows, and investing in fire hydrant locks to reduce theft. The City is also working with several industrial users to use reuse water instead of potable.

STAFF NOTES AND RECOMMENDATIONS:

The City reported high losses due to data handling discrepancies and unreported losses. TWDB Conservation staff recommends the City meter all water usage, check for meter failure, and look for back-calculated meter readings caused by customer credits. A leak detection program could also help the City find unreported real losses.

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Apparent loss refers to unauthorized consumption, meter inaccuracy, billing adjustments, and waivers.

Approvable refers to a water conservation plan that substantially meets the minimum requirements of the water conservation plan rules but has not yet been adopted by the applicant's governing body.

GPCD means gallons per capita per day.

Infrastructure Leakage Index (ILI) is the current annual real loss divided by the unavoidable annual real loss (theoretical minimum real loss) and only applies to utilities with more than 5,000 connections, average pressure greater than 35 psi, and a connection density of more than 32 connections per mile. The **ILI** is recommended to be less than 3 if water resources are greatly limited and difficult to develop, between 3 and 5 if water resources are adequate to meet long-term needs but water conservation is included in long-term water planning, and between 5 and 8 if water resources are plentiful, reliable, and easily extracted. The **ILI** is recommended as a bench marking tool, but until there is increased data validity of the variables used in the calculation, the **ILI** should be viewed with care.

NA means not applicable.

Produced water is the total amount of water purchased or produced by the utility.

Real loss comes from main breaks and leaks, storage tank overflows, customer service line breaks, and leaks.

Residential GPCD is the amount of water per capita used solely for residential use and ideally includes both single and multi-family customer use.

Total baseline GPCD is the amount of all water purchased or produced by the utility divided by the service area population and then divided by 365.

Total water loss is the sum of the apparent and real water losses.

WATER CONSERVATION REVIEW

Entity: East Rio Hondo WSC

Date of plan: January 2009 **Review date:** September 2013

UTILITY PROFILE: based on information in water conservation/utility profile

Total baseline GPCD:	92	**Total water loss (GPCD):** *(of baseline GPCD)*	17
Residential GPCD:	78	**Total water loss (percent):** *(of baseline GPCD)*	18

WATER CONSERVATION PLAN: ☐ Approvable ☑ Adopted

5-year total GPCD goal:	90	**5-year total water loss goal:**	15 percent
10-year total GPCD goal:	88	**10-year total water loss goal:**	14 percent

WATER LOSS AUDIT:

Apparent loss (acre-feet):	50.4	**Real loss (acre-feet):**	273.5
Produced water (acre-feet):	2852	**Total water loss (percent):**	11
Connections per mile:	16	**Year of audit:**	2012

If < 32 connections per mile, real loss (gallons) per mile per day: 541
(Average real loss for less than 32 connections is 737 gallons)

If >32 connections per mile, real loss (gallons) per connection per day: NA
(Average real loss for greater than 32 connections is 37 gallons)

Infrastructure Leakage Index *(ILI)*: NA

ADDITIONAL INFORMATION:

The Corporation's water conservation plan addresses the minimum required elements. The Corporation estimates and logs all flush water used as this is a significant amount of water use since flushing is required monthly for dead-end lines. Their leak detection program includes locating leaks through visual inspection and repairing them. The Corporation has replaced 98 percent of the steel carrier pipes in the distribution system with PVC pipes in steel casing. They began a program in 2009 to replace double disk valves with resilient seat gate valves.

STAFF NOTES AND RECOMMENDATIONS:

TWDB Conservation staff recommends the Corporation implement a proactive leak detection program to locate unreported leaks and review their billing system for discrepancies and anomalies to be able to address the amount of water attributed to unreported loss.

Reset Form

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Apparent loss = unauthorized consumption, meter inaccuracy, and billing adjustments and waivers

Approvable = a water conservation plan that substantially meets the minimum requirements of the water conservation plan rules but has not yet been adopted by an applicant's governing body.

GPCD = gallons per capita per day

Infrastructure Leakage Index (ILI) = current annual real loss divided by the unavoidable annual real loss (theoretical minimum real loss); only applies to utilities with more than 5,000 connections, average pressure greater than 35 psi, and a connection density of more than 32 connections per mile; the index is recommended to be less than 3 if water resources are greatly limited and difficult to develop, between 3 and 5 if water resources are adequate to meet long-term needs but water conservation is included in long-term water planning, and between 5 and 8 if water resources are plentiful, reliable and easily extracted. The ILI is recommended as a bench marking tool, but until there is increased data validity of the variables used in the calculation, the ILI should be viewed with care.

NA = not applicable

Produced water = the total amount of water purchased or produced by the utility

Real loss = main breaks and leaks, storage tank overflows, and customer service line breaks and leaks.

Residential GPCD = the amount of water per capita used solely for residential use; ideally includes both single and multi-family customer use

Total baseline GPCD = the amount of all water purchased or produced by the utility divided by service area population divided by 365

Total water loss = the sum of the apparent and real water losses

WATER CONSERVATION REVIEW

Entity: City of Edinburg

Date of plan: August 2009 **Review date:** May 2013

UTILITY PROFILE: based on information in water conservation/utility profile

Total baseline GPCD:	137	**Total water loss (GPCD):** *(of baseline GPCD)*	9.3
Residential GPCD:	N/A	**Total water loss (percent):** *(of baseline GPCD)*	6.8

WATER CONSERVATION PLAN: ☐ Approvable ☑ Adopted

5-year total GPCD goal:	100	**5-year total water loss goal:**	6.5 percent
10-year total GPCD goal:	95	**10-year total water loss goal:**	5 percent

WATER LOSS AUDIT:

Apparent loss (acre-feet):	281	**Real loss (acre-feet):**	1,096
Produced water (acre-feet):	13,638	**Total water loss (percent):**	10
Connections per mile:	74.5	**Year of audit:**	2012

If < 32 connections per mile, real loss (gallons) per mile per day: NA
(Average real loss for less than 32 connections is 737 gallons)

If >32 connections per mile, real loss (gallons) per connection per day: 39
(Average real loss for greater than 32 connections is 37 gallons)

Infrastructure Leakage Index *(ILI)*: 3.2

ADDITIONAL INFORMATION:

The City's water conservation plan addresses the minimum rule requirements. Their water recycling and reuse program treats wastewater effluent and they are exploring the possibilities of treated effluent for agriculture, industry, and private use. The City's meter replacement program includes replacing older meters that may be incorrectly registering to accurately account for water sales and reduce unknown water loss. Their production meters are calibrated annually and maintained on a monthly basis. The City plans to borrow leak detection equipment from TWDB to assist in locating unreported leaks. The City has a program that encourages business owners to replace older water-use fixtures with newer, more efficient ones.

STAFF NOTES AND RECOMMENDATIONS:

The City's 2012 Water Loss Audit showed a large volume of unreported loss. TWDB Conservation staff recommends the City ensure the accuracy of their customer meters and implement a proactive leak detection and repair program. In addition, the City should also review their data and billing system which could help account for unknown water loss.

Reset Form

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Apparent loss = unauthorized consumption, meter inaccuracy, and billing adjustments and waivers

Approvable = a water conservation plan that substantially meets the minimum requirements of the water conservation plan rules but has not yet been adopted by an applicant's governing body.

GPCD = gallons per capita per day

Infrastructure Leakage Index (ILI) = current annual real loss divided by the unavoidable annual real loss (theoretical minimum real loss); only applies to utilities with more than 5,000 connections, average pressure greater than 35 psi, and a connection density of more than 32 connections per mile; the index is recommended to be less than 3 if water resources are greatly limited and difficult to develop, between 3 and 5 if water resources are adequate to meet long-term needs but water conservation is included in long-term water planning, and between 5 and 8 if water resources are plentiful, reliable and easily extracted. The ILI is recommended as a bench marking tool, but until there is increased data validity of the variables used in the calculation, the ILI should be viewed with care.

NA = not applicable

Produced water = the total amount of water purchased or produced by the utility

Real loss = main breaks and leaks, storage tank overflows, and customer service line breaks and leaks.

Residential GPCD = the amount of water per capita used solely for residential use; ideally includes both single and multi-family customer use

Total baseline GPCD = the amount of all water purchased or produced by the utility divided by service area population divided by 365

Total water loss = the sum of the apparent and real water losses

WATER CONSERVATION REVIEW

Entity: City of Grand Prarie Review date: October 2013

WATER CONSERVATION PLAN DATE: April 2009 ☐ **Approvable** ☑ **Adopted**

	Total GPCD	Residential GPCD	Water Loss GPCD	Water Loss Percent
Baseline	161	85	21	14
5-year Goal	150	-	15	10
10-year Goal	148	-	15	10

WATER LOSS AUDIT YEAR: 2012

Apparent loss (gallons): 176,993,138
Produced water (gallons): 9,052,495,922
Connections per mile: 81

Real loss (gallons): 569,296,283
Total water loss (percent): 8
Total water loss (GPCD): 12

If < 32 connections per mile, real loss (gallons) per mile per day: NA
(Average real loss for less than 32 connections is 1,154 gal/mile/day)

If > 32 connections per mile, real loss (gallons) per connection per day: 25
(Average real loss for greater than 32 connections is 47 gal/mile/day)

If > 16 connections per mile and > 3,000 connections
Infrastructure Leakage Index (*ILI*): 2.42

ADDITIONAL INFORMATION:

The City's water conservation plan includes an extensive education and information program with activities such as their mascot, a talking, bicycle riding robot named Professor G.P. Goodwater for public schools, new customer literature and conservation devices, and annual water wise landscaping classes. In 2009 the City planned on replacing all meters with automatic reading system meters, so their meter testing and repair program was suspended because of the replacement program. The City's leak detection program is conducted on an as-needed basis and leak detection equipment has been budgeted for.

STAFF NOTES AND RECOMMENDATIONS:

According to the City's 2012 Water Loss Audit they had 615 million gallons of total loss. TWDB Conservation staff recommends the City meter all authorized "unbilled-unmetered" connections to better account for unreported loss and then consider implementing a proactive leak detection program.

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Apparent loss refers to unauthorized consumption, meter inaccuracy, billing adjustments, and waivers.

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GPCD means gallons per capita per day.

Infrastructure Leakage Index (ILI) is the current annual real loss divided by the unavoidable annual real loss (theoretical minimum real loss) and only applies to utilities with more than 5,000 connections, average pressure greater than 35 psi, and a connection density of more than 32 connections per mile. The **ILI** is recommended to be less than 3 if water resources are greatly limited and difficult to develop, between 3 and 5 if water resources are adequate to meet long-term needs but water conservation is included in long-term water planning, and between 5 and 8 if water resources are plentiful, reliable, and easily extracted. The **ILI** is recommended as a bench marking tool, but until there is increased data validity of the variables used in the calculation, the **ILI** should be viewed with care.

NA means not applicable.

Produced water is the total amount of water purchased or produced by the utility.

Real loss comes from main breaks and leaks, storage tank overflows, customer service line breaks, and leaks.

Residential GPCD is the amount of water per capita used solely for residential use and ideally includes both single and multi-family customer use.

Total baseline GPCD is the amount of all water purchased or produced by the utility divided by the service area population and then divided by 365.

Total water loss is the sum of the apparent and real water losses.

WATER CONSERVATION REVIEW

Entity: City of Houston Review date: September 2013

WATER CONSERVATION PLAN DATE: October 2009 ☐ **Approvable** ☑ **Adopted**

	Total GPCD	Residential GPCD	Water Loss GPCD	Water Loss Percent
Baseline	139	75	21	15
5-year Goal	139	-	15	11
10-year Goal	137	-	14	10

WATER LOSS AUDIT YEAR: 2012

Apparent loss (gallons): 3,959,125,118
Produced water (gallons): 162,935,293,069
Connections per mile: 74

Real loss (gallons): 21,075,363,951
Total water loss (percent): 15
Total water loss (GPCD): 32

If < 32 connections per mile, real loss (gallons) per mile per day: NA
(Average real loss for less than 32 connections is 1,154 gal/mile/day)

If > 32 connections per mile, real loss (gallons) per connection per day: 109
(Average real loss for greater than 32 connections is 47 gal/mile/day)

If > 16 connections per mile and > 3,000 connections
Infrastructure Leakage Index (*ILI*): 8.3

ADDITIONAL INFORMATION:

The City has a program to pull, test, and replace meters determined not to be functioning accurately. Their leak detection program uses surveying and ultrasonic equipment to find and repair leaks. They have dedicated staff for its public education and information program, which runs annual festivals, an education curriculum program, and a community outreach program. The City has an inclining block rate structure. One of its golf courses uses recycled water. The City utilizes 75 pressure-reducing valves to control excessive pressure. For landscape management, the City has an exterior water audit program for their esplanades and also targets large water users. The City is in the process of shifting from groundwater to surface water sources.

STAFF NOTES AND RECOMMENDATIONS:

The City has indicated they are unsure of the volume of real losses due to main breaks. TWDB Conservation staff recommends that the City develop a program for reporting the estimated volume of water lost when repairing leaks and breaks.

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GPCD means gallons per capita per day.

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NA means not applicable.

Produced water is the total amount of water purchased or produced by the utility.

Real loss comes from main breaks and leaks, storage tank overflows, customer service line breaks, and leaks.

Residential GPCD is the amount of water per capita used solely for residential use and ideally includes both single and multi-family customer use.

Total baseline GPCD is the amount of all water purchased or produced by the utility divided by the service area population and then divided by 365.

Total water loss is the sum of the apparent and real water losses.

WATER CONSERVATION REVIEW

Entity: City of Laredo Review date: June 2014

WATER CONSERVATION PLAN DATE: April 2014 ☐ **Approvable** ☑ **Adopted**

	Total GPCD	Residential GPCD	Water Loss GPCD	Water Loss Percent
Baseline	150	85	23	15
5-year Goal	130	74	20	15
10-year Goal	110	62	11	10

WATER LOSS AUDIT YEAR: 2013

Apparent loss (gallons): 141,143,290
Produced water (gallons): 12,214,891,919
Connections per mile: 102

Real loss (gallons): 943,763,380
Total water loss (percent): 9
Total water loss (GPCD): 12

If < 32 connections per mile, real loss (gallons) per mile per day: NA
(Average real loss for less than 32 connections is 1,154 gal/mile/day)

If > 32 connections per mile, real loss (gallons) per connection per day: 35
(Average real loss for greater than 32 connections is 47 gal/connection/day)

If > 16 connections per mile and > 3,000 connections
Infrastructure Leakage Index (*ILI*): 3.5

ADDITIONAL INFORMATION:

The City uses leak detection equipment as often as possible to conduct visual inspections along the distribution lines. During August of 2013, the City implemented the use of an automatic meter reading system which will be completed in five stages over five years. Periodic meter testing is conducted when meters are found to perform outside of the normal accepted parameters of accuracy. The City also conducts an active public education and awareness program.

STAFF NOTES AND RECOMMENDATIONS:

The City should consider implementing a proactive leak detection program and reviewing their data handling for systematic losses, which could reduce their apparent loss.

DEFINITIONS

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GPCD means gallons per capita per day.

Infrastructure Leakage Index (ILI) is the current annual real loss divided by the unavoidable annual real loss (theoretical minimum real loss) and only applies to utilities with more than 5,000 connections, average pressure greater than 35 psi, and a connection density of more than 32 connections per mile. The **ILI** is recommended to be less than 3 if water resources are greatly limited and difficult to develop, between 3 and 5 if water resources are adequate to meet long-term needs but water conservation is included in long-term water planning, and between 5 and 8 if water resources are plentiful, reliable, and easily extracted. The **ILI** is recommended as a bench marking tool, but until there is increased data validity of the variables used in the calculation, the **ILI** should be viewed with care.

NA means not applicable.

Produced water is the total amount of water purchased or produced by the utility.

Real loss comes from main breaks and leaks, storage tank overflows, customer service line breaks, and leaks.

Residential GPCD is the amount of water per capita used solely for residential use and ideally includes both single and multi-family customer use.

Total baseline GPCD is the amount of all water purchased or produced by the utility divided by the service area population and then divided by 365.

Total water loss is the sum of the apparent and real water losses.

WATER CONSERVATION REVIEW

Entity: City of McAllen Review date: October 2013

WATER CONSERVATION PLAN DATE: September 2009 ☐ **Approvable** ☑ **Adopted**

	Total GPCD	Residential GPCD	Water Loss GPCD	Water Loss Percent
Baseline	174	88	19	10
5-year Goal	155	-	14	9
10-year Goal	150	-	12	8

WATER LOSS AUDIT YEAR: 2012

Apparent loss (gallons): 68,888,880
Produced water (gallons): 8,683,451,282
Connections per mile: 55
Real loss (gallons): 912,284,443
Total water loss (percent): 11
Total water loss (GPCD): 17

If < 32 connections per mile, real loss (gallons) per mile per day: NA
(Average real loss for less than 32 connections is 1,154 gal/mile/day)

If > 32 connections per mile, real loss (gallons) per connection per day: 57
(Average real loss for greater than 32 connections is 47 gal/mile/day)

If > 16 connections per mile and > 3,000 connections
Infrastructure Leakage Index (*ILI*): 3.8

ADDITIONAL INFORMATION:

The City's water conservation plan includes a goal for cost-effective recovery measures for major causes of water loss (apparent loss) related to metering. One of these steps has been to implement a meter management study, a meter testing program, and a meter change-out program. They have also implemented an aggressive public outreach and education program and have hired a full-time conservation specialist. Their reuse program provides water to a local golf course as well as other users. The City encourages customers to replace older water fixtures and educates them in low water use landscaping and irrigation.

STAFF NOTES AND RECOMMENDATIONS:

The City's water loss may be less than shown since they did not account for water exported to their wholesale customers. TWDB Conservation staff will work with the City in future water loss audits to ensure accuracy.

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GPCD means gallons per capita per day.

Infrastructure Leakage Index (ILI) is the current annual real loss divided by the unavoidable annual real loss (theoretical minimum real loss) and only applies to utilities with more than 5,000 connections, average pressure greater than 35 psi, and a connection density of more than 32 connections per mile. The **ILI** is recommended to be less than 3 if water resources are greatly limited and difficult to develop, between 3 and 5 if water resources are adequate to meet long-term needs but water conservation is included in long-term water planning, and between 5 and 8 if water resources are plentiful, reliable, and easily extracted. The **ILI** is recommended as a bench marking tool, but until there is increased data validity of the variables used in the calculation, the **ILI** should be viewed with care.

NA means not applicable.

Produced water is the total amount of water purchased or produced by the utility.

Real loss comes from main breaks and leaks, storage tank overflows, customer service line breaks, and leaks.

Residential GPCD is the amount of water per capita used solely for residential use and ideally includes both single and multi-family customer use.

Total baseline GPCD is the amount of all water purchased or produced by the utility divided by the service area population and then divided by 365.

Total water loss is the sum of the apparent and real water losses.

WATER CONSERVATION REVIEW

Entity: Port Arthur Review date: May 2014

WATER CONSERVATION PLAN DATE: May 2014 ☑ **Approvable** ☐ **Adopted**

	Total GPCD	Residential GPCD	Water Loss GPCD	Water Loss Percent
Baseline	286	62	142	66
5-year Goal	215	NA	71	35
10-year Goal	143	NA	37	19

WATER LOSS AUDIT YEAR: 2013

Apparent loss (gallons): 112,301,924
Produced water (gallons): 5,737,268,367
Connections per mile: 65

Real loss (gallons): 3,691,826,179
Total water loss (percent): 66.0
Total water loss (GPCD): 194

If < 32 connections per mile, real loss (gallons) per mile per day: NA
(Average real loss for less than 32 connections is 1,154 gal/mile/day)

If > 32 connections per mile, real loss (gallons) per connection per day: 459
(Average real loss for greater than 32 connections is 47 gal/connection/day)

If > 16 connections per mile and > 3,000 connections
Infrastructure Leakage Index (*ILI*): 39.0

ADDITIONAL INFORMATION:

The City's best management practices include the following: distribution of TWDB education materials to schools; posting public information on television, with water bills and in local media; providing leak detection kits to citizens; implementation and enforcement of the water conservation plan's prohibition on wasting water; using irrigation water from the regional drainage district to water golf courses; and implementing a water wise landscape design and conversion program requiring that only certified irrigation specialists install irrigation systems in accordance with State rules. The City also utilizes a computerized water accounting system, tracking each meter for consistency. Production versus consumption are cross checked to eliminate losses due to large leaks and theft. The City has hired a contractor for a city-wide leak detection and testing of large meters to be completed in June, 2014.

STAFF NOTES AND RECOMMENDATIONS:

This project will replace many of the City's aging water distribution pipelines experiencing problems with water loss and low pressure. The City is seeking planning and design phase funding to replace approximately 75,000 linear feet of existing 6 to 20-inch waterlines and install approximately 19,000 linear feet of new PVC waterlines.

The City will need to provide proof of adoption of their water conservation plan prior to loan closing.

DEFINITIONS

Adopted refers to a water conservation plan that meets the minimum requirements of the water conservation plan rules and has been formerly approved and adopted by the applicant's governing body.

Apparent loss refers to unauthorized consumption, meter inaccuracy, billing adjustments, and waivers.

Approvable refers to a water conservation plan that substantially meets the minimum requirements of the water conservation plan rules but has not yet been adopted by the applicant's governing body.

GPCD means gallons per capita per day.

Infrastructure Leakage Index (ILI) is the current annual real loss divided by the unavoidable annual real loss (theoretical minimum real loss) and only applies to utilities with more than 5,000 connections, average pressure greater than 35 psi, and a connection density of more than 32 connections per mile. The **ILI** is recommended to be less than 3 if water resources are greatly limited and difficult to develop, between 3 and 5 if water resources are adequate to meet long-term needs but water conservation is included in long-term water planning, and between 5 and 8 if water resources are plentiful, reliable, and easily extracted. The **ILI** is recommended as a bench marking tool, but until there is increased data validity of the variables used in the calculation, the **ILI** should be viewed with care.

NA means not applicable.

Produced water is the total amount of water purchased or produced by the utility.

Real loss comes from main breaks and leaks, storage tank overflows, customer service line breaks, and leaks.

Residential GPCD is the amount of water per capita used solely for residential use and ideally includes both single and multi-family customer use.

Total baseline GPCD is the amount of all water purchased or produced by the utility divided by the service area population and then divided by 365.

Total water loss is the sum of the apparent and real water losses.

WATER CONSERVATION REVIEW

Entity: San Antonio Water System (SAWS) Review date: July 2014

WATER CONSERVATION PLAN DATE: May 2014 ☐ **Approvable** ☑ **Adopted**

	Total GPCD	Residential GPCD	Water Loss GPCD	Water Loss Percent
Baseline	143	80	21	14
5-year Goal	136	78	20	14
10-year Goal	135	74	19	14

WATER LOSS AUDIT YEAR: 2013

Apparent loss (gallons): 3,389,300,126
Produced water (gallons): 78,137,939,711
Connections per mile: 79.00

Real loss (gallons): 8,375,236,897
Total water loss (percent): 15.00
Total water loss (GPCD): 19

If < 32 connections per mile, real loss (gallons) per mile per day: NA
(Average real loss for less than 32 connections is 1,154 gal/mile/day)

If > 32 connections per mile, real loss (gallons) per connection per day: 43
(Average real loss for greater than 32 connections is 47 gal/connection/day)

If > 16 connections per mile and > 3,000 connections
Infrastructure Leakage Index (*ILI*): 2.3

ADDITIONAL INFORMATION:

The City has a staff member who's primary responsibility is tracking and reporting non-revenue and lost water volumes as well as periodic water loss team meetings. The goal of the leak detection program is to survey twenty percent of the distribution system each year while responding to repair calls for pinpointing leaks that are surfacing. Through a programmatic effort to improve the efficiency of outdoor watering for lawns and landscapes, the City estimates conservation savings of at least 1,650 acre-feet each year or at least 16,500 acre feet each year by the year 2020. The City claims to run the largest direct-recycled water program in the country. The City approved a brackish groundwater desalination program and plant operation will begin in 2016. The City also supports retrofitting of plumbing fixtures, programs for school-age children and extensive customer outreach through workshops targeting residential and non-residential audiences. The City maintains a inverted block pricing structure with seasonal and non-seasonal rates.

STAFF NOTES AND RECOMMENDATIONS:

SAWS assumed responsibility of operations for Bexar Metropolitan Water District in January 2012. Data for both utilities is aggregated in SAWS' Water Loss Audit.

DEFINITIONS

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Apparent loss refers to unauthorized consumption, meter inaccuracy, billing adjustments, and waivers.

Approvable refers to a water conservation plan that substantially meets the minimum requirements of the water conservation plan rules but has not yet been adopted by the applicant's governing body.

GPCD means gallons per capita per day.

Infrastructure Leakage Index (ILI) is the current annual real loss divided by the unavoidable annual real loss (theoretical minimum real loss) and only applies to utilities with more than 5,000 connections, average pressure greater than 35 psi, and a connection density of more than 32 connections per mile. The **ILI** is recommended to be less than 3 if water resources are greatly limited and difficult to develop, between 3 and 5 if water resources are adequate to meet long-term needs but water conservation is included in long-term water planning, and between 5 and 8 if water resources are plentiful, reliable, and easily extracted. The **ILI** is recommended as a bench marking tool, but until there is increased data validity of the variables used in the calculation, the **ILI** should be viewed with care.

NA means not applicable.

Produced water is the total amount of water purchased or produced by the utility.

Real loss comes from main breaks and leaks, storage tank overflows, customer service line breaks, and leaks.

Residential GPCD is the amount of water per capita used solely for residential use and ideally includes both single and multi-family customer use.

Total baseline GPCD is the amount of all water purchased or produced by the utility divided by the service area population and then divided by 365.

Total water loss is the sum of the apparent and real water losses.

WATER CONSERVATION REVIEW

Entity: City of Sweetwater Review date: August 2013

WATER CONSERVATION PLAN DATE: April 2009 ☐ **Approvable** ☑ **Adopted**

	Total GPCD	Residential GPCD	Water Loss GPCD	Water Loss Percent
Baseline	225	NA	34	15
5-year Goal	223	NA	33	15
10-year Goal	221	NA	33	15

WATER LOSS AUDIT YEAR: 2010

Apparent loss (gallons): 15,789,152
Produced water (gallons): 561,390,398
Connections per mile: 46
Real loss (gallons): 46,969,866
Total water loss (percent): 11
Total water loss (GPCD): 15

If < 32 connections per mile, real loss (gallons) per mile per day: NA
(Average real loss for less than 32 connections is 1,154 gal/mile/day)

If > 32 connections per mile, real loss (gallons) per connection per day: 28
(Average real loss for greater than 32 connections is 47 gal/connection/day)

If > 16 connections per mile and > 3,000 connections
Infrastructure Leakage Index (*ILI*): 1.2

ADDITIONAL INFORMATION:

The City's water conservation plan meets the minimum rule requirements. The City's leak detection and repair program includes monitoring of monthly consumption of the distribution system and using leak detection techniques to locate and reduce leaks. They also respond to leaks reported by customers, utilize reporting by meter readers, continually check and service production numbers, pumping and storage facilities, and rapid response by staff to reported problems. The City has also implemented a retrofit program and supplies materials for public education concerning water conserving landscaping. Their total gallons per capita per day includes water use by their industrial customers.

STAFF NOTES AND RECOMMENDATIONS:

None.

DEFINITIONS

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Apparent loss refers to unauthorized consumption, meter inaccuracy, billing adjustments, and waivers.

Approvable refers to a water conservation plan that substantially meets the minimum requirements of the water conservation plan rules but has not yet been adopted by the applicant's governing body.

GPCD means gallons per capita per day.

Infrastructure Leakage Index (ILI) is the current annual real loss divided by the unavoidable annual real loss (theoretical minimum real loss) and only applies to utilities with more than 5,000 connections, average pressure greater than 35 psi, and a connection density of more than 32 connections per mile. The **ILI** is recommended to be less than 3 if water resources are greatly limited and difficult to develop, between 3 and 5 if water resources are adequate to meet long-term needs but water conservation is included in long-term water planning, and between 5 and 8 if water resources are plentiful, reliable, and easily extracted. The **ILI** is recommended as a bench marking tool, but until there is increased data validity of the variables used in the calculation, the **ILI** should be viewed with care.

NA means not applicable.

Produced water is the total amount of water purchased or produced by the utility.

Real loss comes from main breaks and leaks, storage tank overflows, customer service line breaks, and leaks.

Residential GPCD is the amount of water per capita used solely for residential use and ideally includes both single and multi-family customer use.

Total baseline GPCD is the amount of all water purchased or produced by the utility divided by the service area population and then divided by 365.

Total water loss is the sum of the apparent and real water losses.