Water Conservation & Water Loss - what are you doing?

Gulf Coast Water Conservation Symposium

John T. Sutton
Texas Water Development Board

Unless specifically noted, this presentation does not necessarily reflect official Board positions or decisions.

Who Needs to Submit?

≥3300 connections

Financial obligation w/TWDB >$500k

Surface water right w/TCEQ

Wholesale customer

When to Revise?

Every five years

Due May 1

More often if needed

Helpful Hint: Plan year is considered the year it was adopted, not drafted

The Facts…

- One size does not fit all.
- What is our water story?
- What have we accomplished?
- Who uses water?
- Who/what drives peak demand?
- Are we growing?
- What do we value?

Starting with the Basics

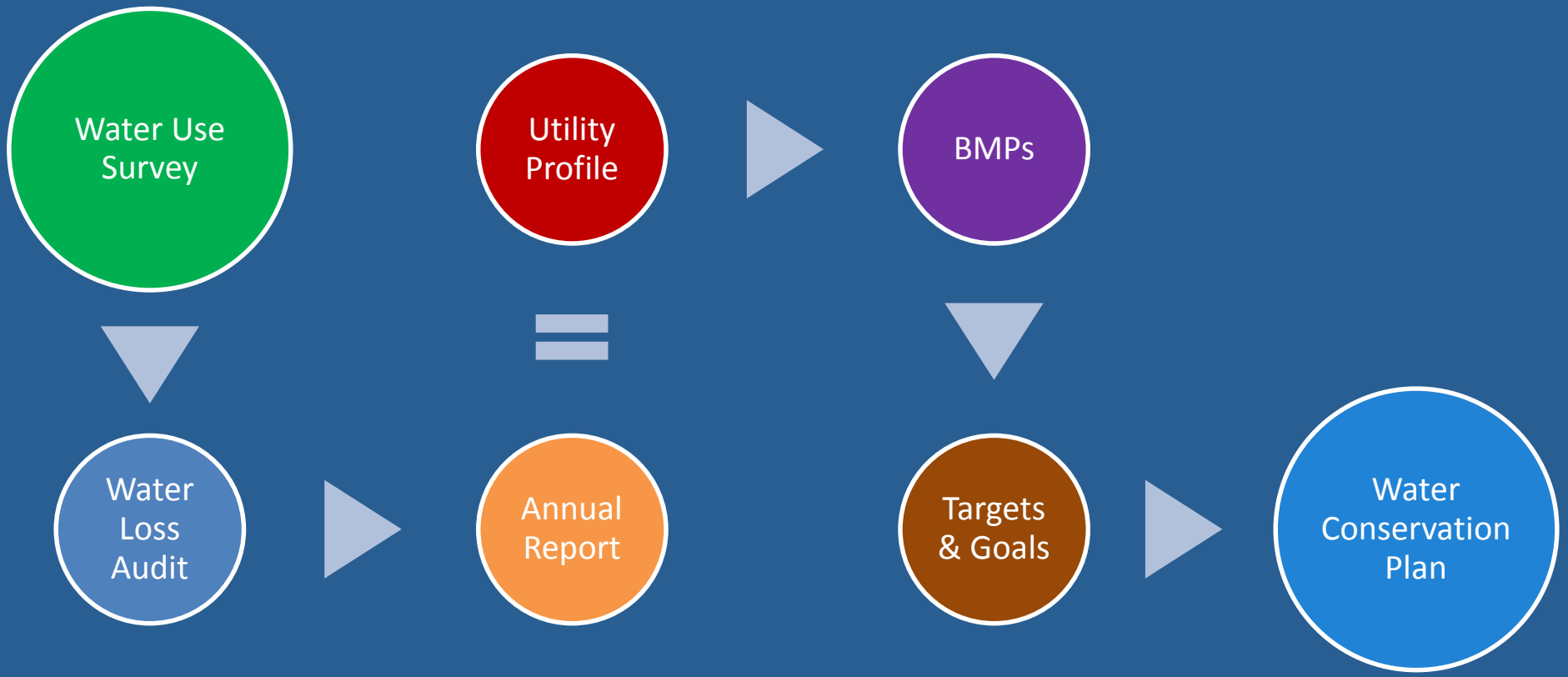
DO

- Other departments
- Involve customers
- Use the data
- Be realistic
- Set goals
- **Provide details**

Don't

- Copies of TWDB materials
- Complete text of Texas Code
- General statements
- Copy other plans

Process


Water Use Survey
Utility Profile
BMPs
Water Loss Audit
Annual Report
Targets & Goals
Water Conservation Plan

Online Application

Texas Water Development Board

Water Loss, Use and Conservation

WLUC | Water Use Survey | Water Loss Audit | Water Conservation

Water Loss Audit

- Water Loss Audit List

PWS Code	System Name	Year Due	Status	Submitted Date	Authorized Users
1260002	City of Watertown	2019	Not Submitted		

Water Conservation Annual Report

- WC Annual Report List

PWS Code	Utility Type	System Name	Year Due	Status	Submitted Date	Authorized Users
1260002	Retail Water Supplier	City of Watertown	2019	Not Started		

Water Conservation Utility Profile

- WC Utility Profile List

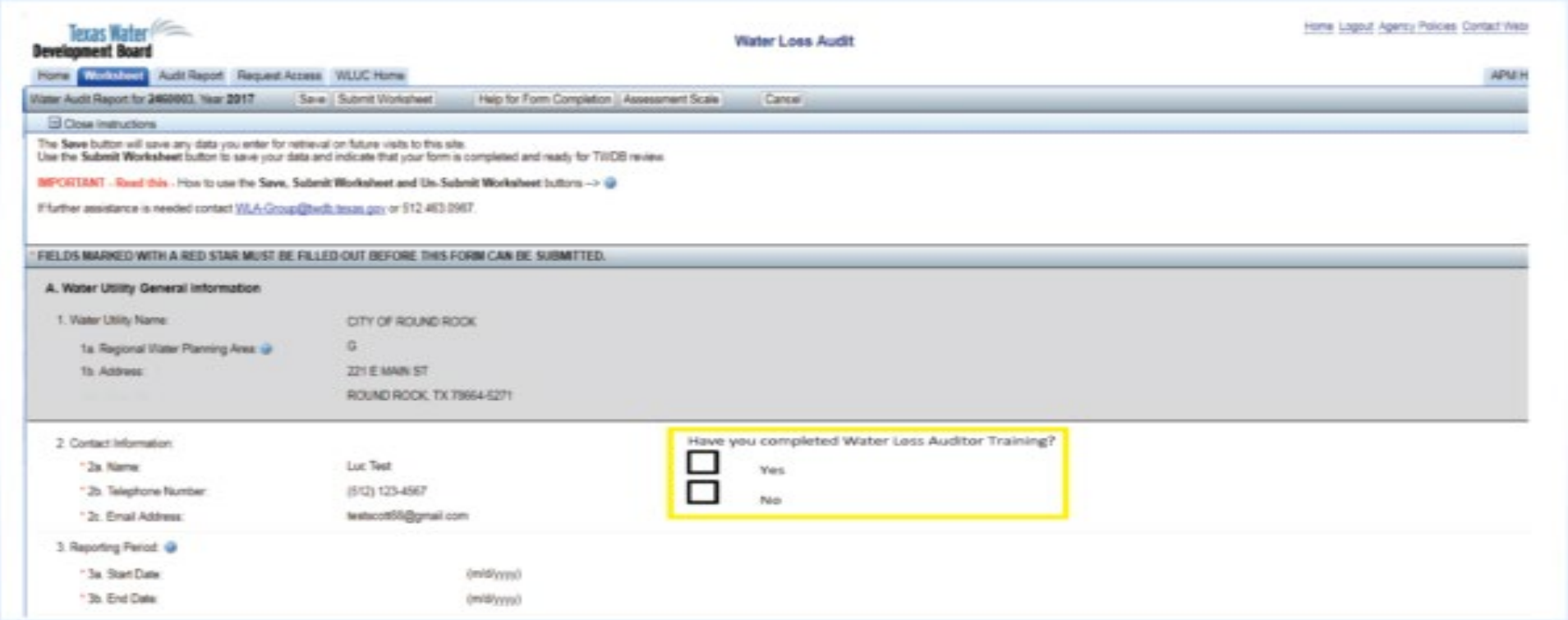
No record found

Water Conservation Plan

- WC Plan List

No record found

Water Loss



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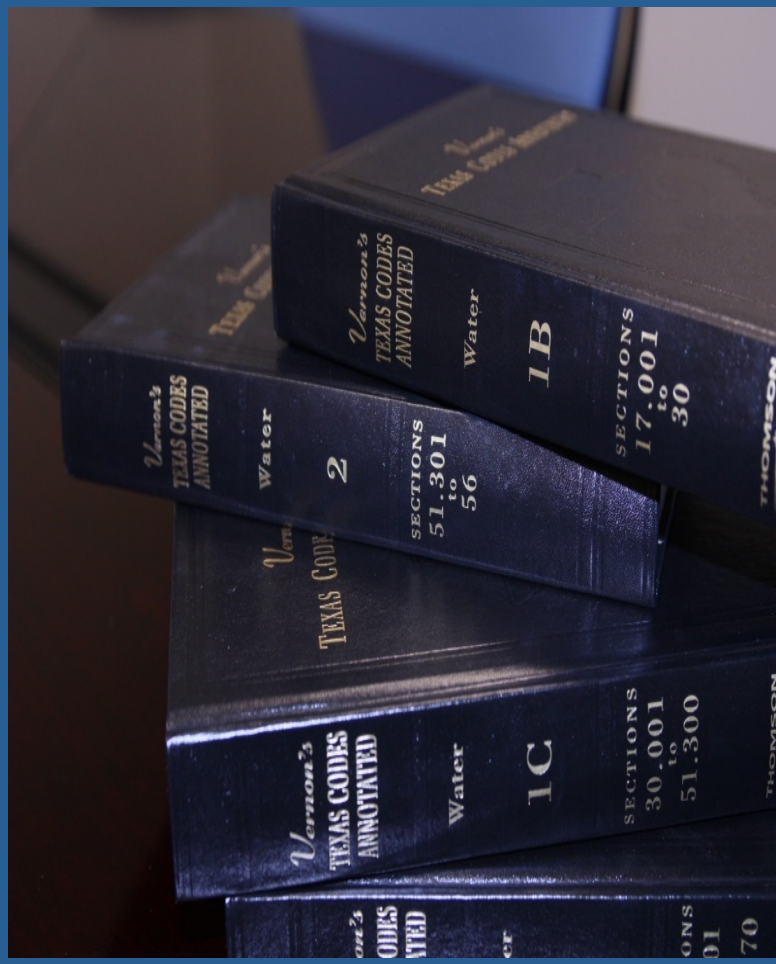
Requirements

Texas Water Code 16.0121

- 2003 - Required every five years
  - Include in region water plans
- 2011 – Loans submit annually
- 2013 - >3,300 connections submit annually
  - Thresholds for loan applicants
  - Report in CCR or next bill
- 2015 - Threshold waiver
- 2017 - Training required



Why Complete an Audit?

- System efficiency
- Extend supply
- Target asset upgrades
- Saves money
- Required
  - Loan/Grant
- Regional Water Planning

What is Water Loss?

~~A: Unaccounted for water~~

B: Water In - Water Out

C: Both A & B

D: System Input - Total Authorized Consumption

E: Real Loss + Apparent Loss

F: Both D & E

G: All of the Above

<table>
<tr><td rowspan="8">Totals for
Region N
27 Audit(s) Submitted</td><td rowspan="8">System Input Value
30,211,213,675
100%</td><td rowspan="3">Authorization Consumption
27,395,261,187
90.7%</td><td rowspan="2">Bill Consumption
26,903,520,189
89.0%</td><td>Billed Metered
26,902,906,689
89.0%</td><td rowspan="2">Revenue Water
26,903,520,189
89.0%</td><td rowspan="8"></td></tr>
<tr><td>Billed Unmetered
613,500
0.0%</td></tr>
<tr><td>Unbilled Consumption
491,740,998
1.7%</td><td>Unbilled Metered
109,750,508
0.4%</td><td rowspan="5">Non-Revenue Water
3,308,306,986
10.9%</td></tr>
<tr><td>Unbilled Unmetered
381,990,490
1.3%</td></tr>
<tr><td rowspan="5">Water Loss
2,815,952,488
9.2%</td><td rowspan="3">Apparent Loss
447,319,383
1.4%</td><td>Unauthorized Consumption
73,313,887
0.2%</td></tr>
<tr><td>Customer Meter Accuracy Loss
371,633,867
1.2%</td></tr>
<tr><td>System Data Handling Discrepancy
2,371,629
0.0%</td></tr>
<tr><td rowspan="2">Real Loss
2,368,633,105
7.8%</td><td>Reported Breaks And Leaks
188,749,810
0.6%</td></tr>
<tr><td>Unreported Loss
2,179,883,295
7.2%</td></tr>
</table>

Operational Performance in Water Loss

Apparent Losses Normalized

= Apparent Loss Volume / # of Connections / 365 days

Real Losses Normalized

= Infrastructure Leakage Index *(if 3,000 or > connections and 16 or > connection density)*

[ILI = Real Loss / UARL]

and one of the following

= Real Loss Volume / # of Connections / 365 days

or

= Real Loss Volume / Length of Main Lines / 365 days

Validation of Data

- Validation is:
  - A process to identify and evaluate uncertainty in water loss audit data
- Validation provides:
  - A separate set of eyes
  - Accurate assessment of data collection procedures
  - Assurance to effectively set targets and control measures

SYSTEM DATA	0.5	1	1.5	2	2.5	3	3.5
Line 6 Length of main lines, miles	*Current condition:* Poorly assembled and maintained paper as-built records of existing water main installations makes accurate determination of system pipe length impossible. Length of mains is estimated.	*Current condition:* Paper records in poor or uncertain condition (no annual tracking of installations & abandonments). Poor procedures to ensure that new water mains installed by developers are accurately documented.	*Conditions between 1 and 2*	*Current condition:* Sound written policy and procedures exist for documenting new water main installations, but gaps in management result in a uncertain degree of error in tabulation of mains length.	*Conditions between 2 and 3*	*Current condition:* Sound written policy and procedures exist for permitting and commissioning new water mains. Highly accurate paper records with regular field validation; or electronic records and asset management system in good condition. Includes system backup.	*Conditions between 3 and 4*
Improvements in quantifying the length of mains	*To improve to 1:* Assign personnel to inventory current as-built records and compare with customer billing system records and highway plans in order to verify poorly documented pipelines. Assemble policy documents regarding permitting and documentation of water main installations by the utility and building developers; identify gaps in procedures that result in poor documentation of new water main installations.	*To improve to 2:* Complete inventory of paper records of water main installations for several years prior to audit year. Review policy and procedures for commissioning and documenting new water main installation.		*To improve to 3:* Finalize updates/improvements to written policy and procedures for permitting/commissioning new main installations. Confirm inventory of records for five years prior to audit year; correct any errors or omissions.		*To improve to 4:* Launch random field checks of limited number of locations. Convert to electronic database such as a Geographic Information System (GIS) with backup as justified. Develop written policy and procedures.	

Water Loss Control Planning

Functional Focus Area	Level I (0-25)	Level II (26-50)	Level III (51-70)	Level IV (71-90)	Level IV (91-100)
Audit Data Collection	Launch auditing and loss control team; address production meter deficiencies.	Analyze business process for customer metering/billing functions and water supply operation.	Establish/revise policies and procedures for data collection.	Refine data collection practices and establish as routine business process.	Annual water audit is 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 system: customer meter testing, leak survey, theft.	Establish ongoing mechanisms for customer meter accuracy testing, active leakage control, and infrastructure monitoring.	Refine, enhance, or expand ongoing programs based on economic justification.	Stay abreast of improvements in metering, meter reading, billing, leakage management, and infrastructure rehabilitation.
Long-term loss control	N/A	Begin to asses long-term needs requiring large expenditure: customer meter replacement, water main replacement, new customer billing system, or Automatic Meter Reading.	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	N/A	N/A	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	N/A	N/A	Preliminary Comparisons – can begin to rely upon Infrastructure Leakage Index (ILI) for performance comparison for real losses.	Performance Benchmarking – ILI is meaningful in comparing real loss standing.	Identify Best Practices – the ILI is very reliable as a real loss performance indicator for best in class service.

* Adapted from American Water Works Association©

Tracking Performance - Percentage

Field on Audit	2015	2016
Total System Input Volume	2,000,000,000 gallons	2,100,000,000 gallons
Total Authorized Consumption	1,650,000,000 gallons	1,750,000,000 gallons
Total Water Loss	350,000,000 gallons	350,000,000 gallons
Percent of Water Loss	17.5%	16.7%
Real Loss per Connection per Day	56.7 gallons per connection per day	56.7 gallons per connections per day
Apparent Loss per Connection per Day	9.8 gallons per connection per day	9.8 gallons per connection per day

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Water Loss, Use and Conservation

WLUC | Water Use Survey | Water Loss Audit | Water Conservation

Water Use Survey

Water Use Survey List

Survey Number	PWS Code	System Name	Status	File Date	Authorized Users
0316200	840003	Water Springs SUD	Submitted		123

Water Loss Audit

Water Loss Audit List

PWS Code	System Name	Year Due	Status	Submitted Date	Authorized Users
840003	Water Springs SUD	2019	Submitted	05/01/2018	

Water Conservation Annual Report

WC Annual Report List

PWS Code	Utility Type	System Name	Year Due	Status	Submitted Date	Authorized Users
840003	Retail Water Supplier	Water Springs SUD	2019	Not Started		

Water Conservation Utility Profile

WC Utility Profile List

PWS Code	Utility Type	System Name	Year Due	Status	Submitted Date	Authorized Users
840003	Retail Water Supplier	Water Springs SUD	2018	Not Started		

Water Conservation Plan

WC Plan List

PWS Code	Utility Type	System Name	Year Due	Status	Submitted Date	Authorized Users
840003	Retail Water Supplier	Water Springs SUD	2019	Not Started		

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Water Conservation

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Utility Profile
Retail Water Supplier

SECTION I: Utility Data

Water Utility General Information

Name of Utility: Effervescent Water Supply

B. System Input

Provide system input data for the previous five years.
Total System Input = Self supplied + Imported - Exported

Year	Water Produced in Gallons	Purchased/Imported Water in Gallons	Exported Water in Gallons	Total System Input	Total GPCD
2018	24,053,096,907	0	1,284,475,258	22,768,621,649	192
2017	22,903,189,691	0	1,344,741,237	21,558,448,454	182
2016	25,064,414,141	0	1,327,069,388	23,737,344,753	203
2015	23,269,618,947	15,099,738,852	12,668,445,835	25,700,911,964	220
2014	23,464,359,009	15,322,817,424	12,460,868,091	26,326,308,342	225
Historic Average	23,750,935,739	6,084,511,255	5,817,119,962	24,018,327,032	204

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Water Conservation

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Utility Profile
Retail Water Supplier

SECTION II: System Data

Water Utility General Information

Name of Utility: Effervescent Water Supply

B. Accounting Data

1. For the previous five years, enter the number of gallons of RETAIL water provided to each major water use category.

Water Use Category	Residential - Single Family	Residential - Multi-family (units)	Industrial	Commercial	Institutional	Agricultural	Total
2018	1,740,205,118	52,790,190	0	344,619,018	48,159,390	0	2,185,773,716
2017	1,644,972,157	50,912,940	0	321,091,629	62,014,950	0	2,078,991,676
2106	16,551,000	0	0	0	0	0	16,551,000
2015	18,087,000	0	0	0	0	0	18,087,000
2014	1,554,150,103	44,820,240		292,897,623			1,891,867,966

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Retail Water Supplier

SECTION II: System Data

F. Peak Day Use

Year	Average Daily Use (gal)	Peak Day Use (gal)	Ratio (peak/avg)
2014	5,866,731	6,873,456	1.1716
2015	4,897,126	4,064,717	0.8300
2016	5,165,980	5,814,836	1.1256
2017	6,413,742	8,316,717	1.2967
2018	6,726,172	8,916,228	1.3256

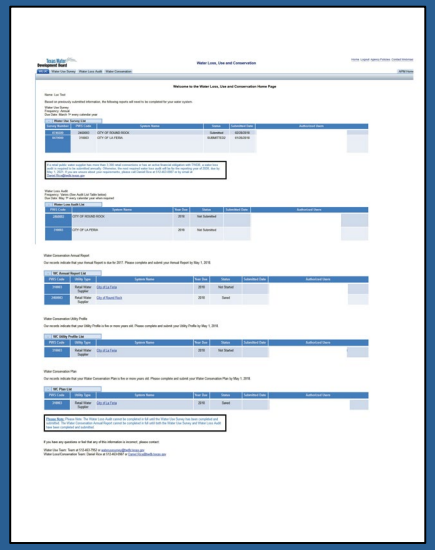
G. Summary of Historic Water Use

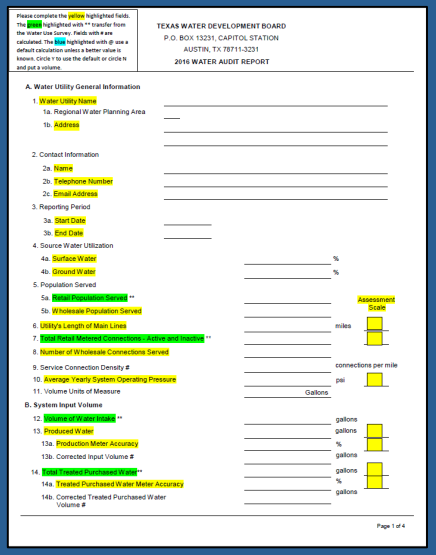
Water Use Category	Historic Average	Percent of Connections	Percent of Water Use
Residential - Single Family	994,793,075	92.87%	80.34%
Residential - Multi-Family	29,704,674	1.38%	2.40%
Industrial	0	0.00%	0.00%
Commercial	191,721,654	5.71%	15.48%
Institutional	22,034,868	0.03%	1.78%
Agricultural	0	0.00%	0.00%

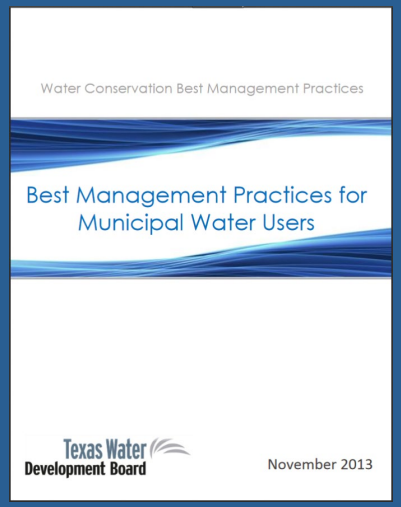
Requirements

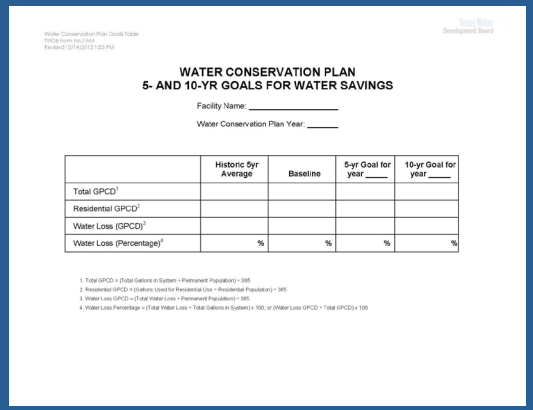
Evaluation of w/ww system, this includes UP	5 & 10-year goals for Total, Residential, and Water Loss GPCDs	Implementation schedule to achieve goals	Method for tracking implementation and effectiveness
Master meter and universal metering information	Measures to determine water loss	Leak detection, repair, and water loss program details	Non-promotional water rate structure
Means of implementation and enforcement	Documentation to regional water planning group	Copy of Drought Contingency Plan	

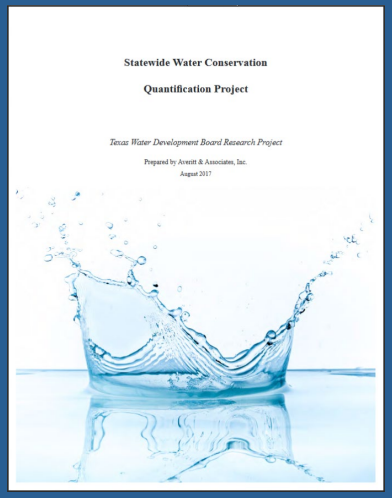
Considerations











Conservation Tool

- Pre-loaded data for 462 water utilities
- Alternative base and projected data can be used
- Menu of possible conservation activities
- Develop and save different scenarios
- Estimate water savings and costs
- Estimate water savings for annual report

A Best Management Practice

- Why this strategy?
- How you plan to implement it.
- What you hope to accomplish.
- How you will evaluate if it is working.

Best Management Practices

- *Probably Doing*
  - Conservation coordinator
  - Pricing/rates
  - Metering all connections
  - System audit & loss control
  - Public information
- *Strongly Consider*
  - Pricing/rates
  - School education/public info
  - Partnering with nonprofits
  - Prohibiting water waste
- *Need to Consider*
  - Cost effective analysis
  - Athletic field, golf course, and park conservation
  - Landscape irrigation conservation and incentives
  - Residential irrigation audits
  - ICI programs
  - Incentive programs
  - Graywater
  - Rainwater harvesting and reuse programs
  - Wholesale agency assistance
  - Small utility outreach

Coming Soon…

- Customer Characterization
- Plumbing Assistance Program for Economically Disadvantage Customers
- Outdoor Water Schedule
- Enforcement of Irrigation License Standards
- Custom Conservation Rebates

Customer Characterization -
Analysis to Prioritize BMP Selection

- Should be called: DO THIS FIRST!
- Asks about patterns in housing, water usage of customers, challenges of your system.
- Fundamental: Why do conservation at all? What does our community need?
- THEN: pick the BMP's that will get you there

Plumbing assistance for economically disadvantaged customers

- Water & sewer costs are going up
- Leaks account for on average 12% of household water usage
- Households in poverty may not be able to afford leak repairs or the water bill
- A defined assistance program mitigates rate increases
- Conservation for everyone

Outdoor Watering Schedule BMP

- Develop a reasonable regulation

- Not a deprivation message

Enforcement of Irrigation License Standards BMP

- Develop enforcement program
  - fees for irrigation permits that cover costs of checking plans and inspecting systems
  - Make local ordinance against systems without permits and without proper irrigation design and irrigator oversight during installation
  - Inform Customers of their rights
  - Work with local irrigation association that will applaud this effort!

Custom Conservation Rebate

- How to craft a rebate offer based on confirmed water savings by big customers
- Savings agreement negotiated and assured with a contractual agreement
- Example program protocol
- Example contracts
- Case Study Examples*: types* of industry and what they can do to save with a little help

Details, Details, Details!

Reports

AR GPCD

Connections Data

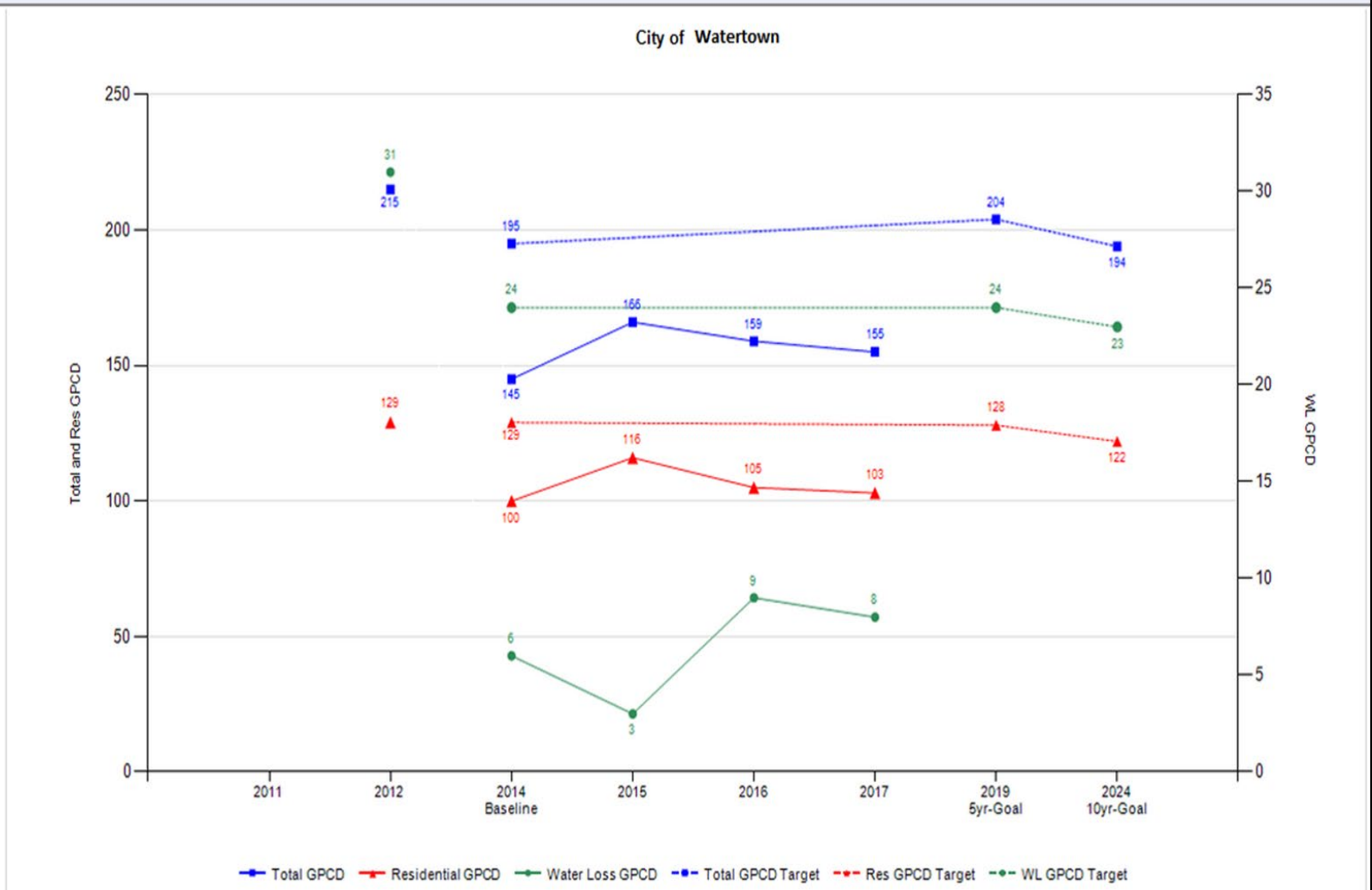
Water Use Data

Targets & Goals

Water Conservation 5-Year and 10-Year GPCD Targets and Goals

Utility Name: CITY OF WATERTOWN

Get Graph Report



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Water Conservation

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- Utility Profile
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- Annual Report

Conservation Plan
Retail Water Supplier

CONTACT INFORMATION

Wastewater ID Number: 20388

Conservation Plan Contact Information:

Last Name: *

First Name: *

Title:

Address:

City: State: Select Zip: Zip+4:

Email: *

Phone: * x

Is this person the designated Conservation Coordinator? (*) Yes ( ) No

Regional Water Planning Group: M

Groundwater Conservation District:

Our records indicate that you:

- [x] Received financial assistance of $500,000 or more from TWDB
- [x] Have 3,300 or more retail connections
- [ ] Have a surface water right with TCEQ

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Water Conservation Plan

5-AND 10-YR GOALS FOR WATER SAVINGS
For Retail Water Supplier

Provide specific and quantified five- and 10-year goals in the table below.
In the first column, historic data, if available, from previously submitted annual reports has been entered.

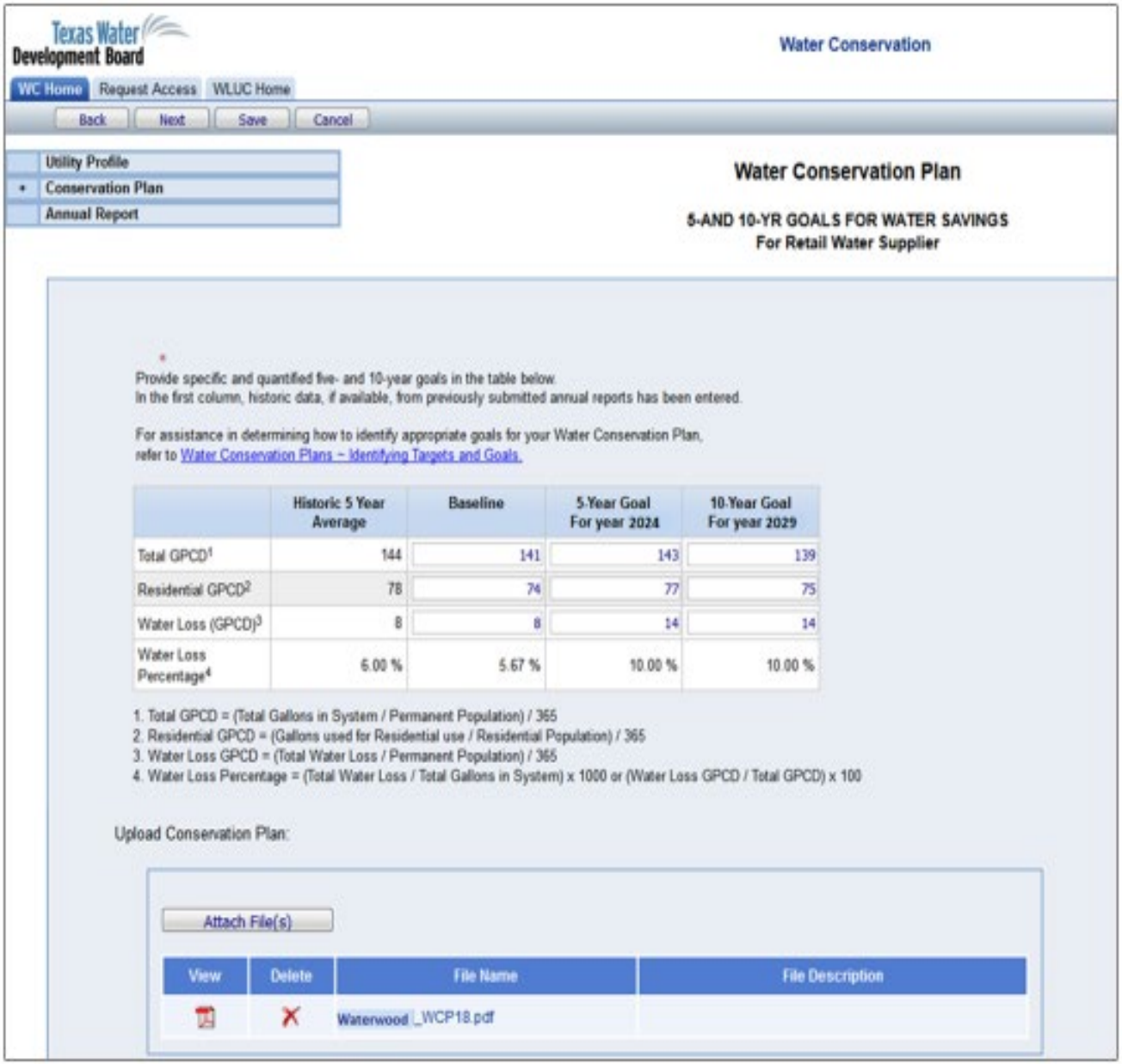
For assistance in determining how to identify appropriate goals for your Water Conservation Plan, refer to Water Conservation Plans ~ Identifying Targets and Goals.

	Historic 5 Year Average	Baseline	5-Year Goal For year 2023	10-Year Goal For year 2028
Total GPCD[1]	157		151	148
Residential GPCD[2]	85		120	119
Water Loss (GPCD)[3]	17		15	13
Water Loss Percentage[4]	10.83 %	0.00 %	9.93 %	8.78 %

1. Total GPCD = (Total Gallons in System / Permanent Population) / 365
2. Residential GPCD = (Gallons used for Residential use / Residential Population) / 365
3. Water Loss GPCD = (Total Water Loss / Permanent Population) / 365
4. Water Loss Percentage = (Total Water Loss / Total Gallons in System) x 1000 or (Water Loss GPCD / Total GPCD) x 100

Upload Conservation Plan:

Attach File(s)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5-AND 10-YR GOALS FOR WATER SAVINGS
For Retail Water Supplier
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Historic 5 Year Average
Baseline
5-Year Goal For year 2024
10-Year Goal For year 2029
Total GPCD[1] 144 141 143 139
Residential GPCD[2] 78 74 77 75
Water Loss (GPCD)[3] 8 8 14 14
Water Loss Percentage[4] 6.00 % 5.67 % 10.00 % 10.00 %
1. Total GPCD = (Total Gallons in System / Permanent Population) / 365
2. Residential GPCD = (Gallons used for Residential use / Residential Population) / 365
3. Water Loss GPCD = (Total Water Loss / Permanent Population) / 365
4. Water Loss Percentage = (Total Water Loss / Total Gallons in System) x 1000 or (Water Loss GPCD / Total GPCD) x 100
Upload Conservation Plan:
Attach File(s)
View
Delete
File Name
File Description
Waterwood_WCP18.pdf

Now What?

Wrote it

Submitted it

TWDB/TCEQ approved it

Done?

In Summary…

- Address the minimum requirements
- Consider best management practices
- Incorporate projects/activities
- **Provide details!**
- Utilize available resources **(new tool!)**
- Request an early review of draft
- Use plan as a beneficial tool
- Surface water right holders follow TCEQ

Resources

- Historic report data

  www.twdb.texas.gov/apps/wcreps/wcreports.aspx

- Online reporting application (LUC)
- Water Conservation Planning Tool & water conservation resources

  www.twdb.texas.gov/conservation/municipal/plans/index.asp

- Best management practices

  www.twdb.texas.gov/conservation/BMPs/Mun/index.asp

  www.savetexaswater.org/bmp/municipal/index.asp

And More…

- Quantifying Conservation Report

  www.twdb.texas.gov/conservation/doc/StatewideWaterConservationQuantificationProject.pdf?d=8371.500000008382
- Regional water plans

  www.twdb.texas.gov/waterplanning/rwp/index.asp
- Water Loss Auditor Training

  www.twdb.texas.gov/conservation/municipal/waterloss/auditor_training.asp
- **Us!**

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