

Chapter 5C

Water Conservation Recommendations

Water conservation is defined by Texas Water Code §11.002(8) as “the development of water resources; and those practices, techniques and technologies that will reduce the consumption of water, reduce the loss or waste of water, improve the efficiency in the use of water, or increase the recycling and reuse of water so that a water supply is made available for future or alternative uses.” Water conservation measures are long-term, permanent strategies to reduce water use.

Title 31 Texas Administrative Code (31 TAC) §357.34(h) requires the 2021 Regional Water Plan to consolidate and present recommendations that may include Best Management Practices (BMPs) appropriate for the region. Further, for water user groups (WUGs) with identified water needs, conservation water management strategies (WMSs) must be included as part of the WUG list of strategies to meet shortages or a summary of reasons must be provided in the plan for not including conservation WMSs.

Following Section 5C.1 is a discussion of water conservation practices and trends in the East Texas Regional Water Planning Area (ETRWPA). This will be followed by a summary and discussion in Section 5C.2 of water conservation plans in use by WUGs in the region and BMPs in use currently or which could be implemented by WUGs in the future.

Conservation WMSs identified for WUGs with needs are addressed in Chapter 5B within the discussions of WMSs for these WUGs. For WUGs with identified needs where conservation WMSs were not recommended, Section 5C.3 of this chapter includes a discussion of reasons for not making such recommendations.

5C.1 Water Conservation Practices and Trends in the East Texas Regional Water Planning Area

The ETRWPA water demand projections incorporate an expected level of conservation to be implemented over the planning period. For municipal use, the assumed reductions in per capita water use are the result of the implementation of three regulatory initiatives:

- The Water Saving Performance Standards Act, implemented by Texas in 1992. This act prohibits the sale, distribution, or importation of plumbing fixtures that do not meet certain low flow performance standards. House Bill 2667, implemented September 1, 2009, updated the water savings performance standards. For new fixtures, the average toilet flush volume is limited to 1.28 gallons, and the maximum showerhead flow is limited to 2.5 gallons per minute.
- A federal requirement that residential clothes washers manufactured on or after January 1, 2007, must achieve a water factor¹ of 9.5 gallons per cubic foot of capacity. For front-loading machines, the maximum integrated water factor² decreases to 4.5 gallons per cubic foot on March 7, 2015.

¹ Total weighted per-cycle water consumption for the cold wash/cold rinse cycle divided by the clothes container capacity.

² Total weighted per-cycle water consumption for all wash cycles divided by the clothes container capacity.



For top-loading machines, the maximum integrated water factor decreases to 8.4 gallons per cubic foot on March 7, 2015, and 6.5 gallons per cubic foot on January 1, 2018.

- A federal requirement that residential dishwashers manufactured on or after May 30, 2013, must achieve water consumption of 5.0 gallons per cycle or less.

The “low flow plumbing fixture rules” measure assumes that all new construction will be built with water saving plumbing fixtures and that existing plumbing fixtures will be replaced over time with low flow fixtures. The “efficient new residential clothes washer standards” and “efficient new residential dishwasher standards” measures assume that all new construction will be built with efficient clothes washers and dishwashers and that existing clothes washers and dishwashers will be replaced over time with efficient appliances. On a regional basis, these regulatory initiatives are projected to reduce municipal water use by 11.1 percent (over 30,000 acre-feet (ac-ft) per year) by 2070. See Appendix 5C-A for volumetric water savings by county.

The ETRWPA is a water-rich region, and water conservation in the region is generally driven by economics rather than by lack of water supply. The East Texas Regional Water Planning Group (ETRWPG) believes that water users in the ETRWPA will implement advanced water conservation measures (i.e., savings associated with active conservation measures) as economic conditions dictate to each individual user. Given the general abundance of accessible water supply to the water users in the ETRWPA, the ETRWPG believes the water conservation strategies included in this planning period represent an economically achievable level of conservation.

5C.1.1 Water Use in the East Texas Regional Water Planning Area

The State of Texas Water Conservation Implementation Task Force has set a statewide goal of an average per capita consumption of 140 gallons per capita per day (gpcd). The Water Conservation Implementation Task Force also set a recommended goal for municipal water suppliers to have a minimum annual reduction of one percent in total gpcd until the entity achieves a total gpcd of 140 or less. Currently, over 39 percent of the municipal water users in the ETRWPA are projected to use less than 100 gallons per capita per day (gpcd) in 2020 and 71 percent are projected to use less than the Water Conservation Implementation Task Force recommended 140 gpcd; therefore, the potential savings from advanced municipal conservation could be considered relatively small.

It must be recognized that long-term changes to water supplies can be brought on by impacts on water quality or quantity, or by changing economic conditions. Such changes could require additional emphasis on water conservation in the future. The need for additional water conservation will continue to be evaluated in future plans.

The base per-capita values used to calculate demand projections in Chapter 2 are presented in Table 5C.1 for every WUG in the ETRWPA. The base gpcd for each WUG was calculated by the Texas Water Development Board (TWDB) using 2011 water-use surveys, setting a minimum gpcd value of 60.



Table 5C.1 Texas Water Development Board Base Per Capita Water Use in the East Texas Regional Water Planning Area by Water User Group

Water User Group	Base GPCD	Water User Group	Base GPCD
AFTON GROVE WSC	146	JACOBS WSC	117
ALGONQUIN WATER RESOURCES OF TEXAS	69	JASPER	203
ALTO	175	JASPER COUNTY WCID 1	77
ALTO RURAL WSC	185	JEFFERSON COUNTY WCID 10	87
ANDERSON COUNTY CEDAR CREEK WSC	98	JOAQUIN	147
ANGELINA WSC	85	KELLY G BREWER	147
APPLEBY WSC	170	KILGORE	202
ARP	153	KIRBYVILLE	171
ATHENS	192	KOUNTZE	116
B B S WSC	96	LAKE LIVINGSTON WSC	70
B C Y WSC	113	LEAGUEVILLE WSC	104
BEAUMONT	221	LILLY GROVE SUD	133
BECKVILLE	132	LINDALE	211
BEN WHEELER WSC	85	LINDALE RURAL WSC	78
BERRYVILLE	106	LOVELADY	181
BETHEL ASH WSC	100	LUFKIN	158
BEVIL OAKS	99	LUMBERTON MUD	90
BLACKJACK WSC	168	M & M WSC	86
BRIDGE CITY	89	MAURICEVILLE SUD	70
BROOKELAND FWSD	113	MCCLELLAND WSC	149
BROWNSBORO	151	MEEKER MWD	124
BRUSHY CREEK WSC	86	MELROSE WSC	139
BULLARD	185	MINDEN BRACHFIELD WSC	63
CARO WSC	97	MOORE STATION WSC	123
CARROLL WSC	113	MOSCOW WSC	141
CARTHAGE	222	MT ENTERPRISE WSC	156
CENTER	304	MURCHISON	148
CENTERVILLE WSC	120	NACOGDOCHES	173
CENTRAL WCID OF ANGELINA COUNTY	72	NECHES WSC	126
CHALK HILL SUD	87	NEDERLAND	125
CHANDLER	161	NEW LONDON	322
CHESTER WSC	164	NEW PROSPECT WSC	80
CHINA	113	NEW SUMMERFIELD	122
CHOICE WSC	109	NEWTON	168
COLMESNEIL	225	NORTH CHEROKEE WSC	118
CORRIGAN	121	NORTH HARDIN WSC	71



Table 5C.1 Texas Water Development Board Base Per Capita Water Use in the East Texas Regional Water Planning Area by Water User Group (Cont.)

Water User Group	Base GPCD	Water User Group	Base GPCD
COUNTY-OTHER, ANDERSON	135	NORWOOD WSC	150
COUNTY-OTHER, ANGELINA	111	ORANGE	129
COUNTY-OTHER, CHEROKEE	113	ORANGE COUNTY WCID 1	119
COUNTY-OTHER, HARDIN	116	ORANGE COUNTY WCID 2	130
COUNTY-OTHER, HENDERSON	91	ORANGEFIELD WSC	89
COUNTY-OTHER, HOUSTON	166	OVERTON	199
COUNTY-OTHER, JASPER	103	PALESTINE	240
COUNTY-OTHER, JEFFERSON	151	PANOLA-BETHANY WSC	187
COUNTY-OTHER, NACOGDOCHES	103	PENNINGTON WSC	94
COUNTY-OTHER, NEWTON	106	PINEHURST	124
COUNTY-OTHER, ORANGE	114	PINELAND	93
COUNTY-OTHER, PANOLA	99	PLEASANT SPRINGS WSC	164
COUNTY-OTHER, POLK	102	POLLOK-REDTOWN WSC	97
COUNTY-OTHER, RUSK	107	PORT ARTHUR	320
COUNTY-OTHER, SABINE	87	PORT NECHES	102
COUNTY-OTHER, SAN AUGUSTINE	95	R P M WSC	107
COUNTY-OTHER, SHELBY	107	RAYBURN COUNTRY MUD	103
COUNTY-OTHER, SMITH	114	REDLAND WSC	80
COUNTY-OTHER, TRINITY	74	RURAL WSC	102
COUNTY-OTHER, TYLER	122	RUSK	159
CRAFT TURNEY WSC	93	RUSK RURAL WSC	100
CROCKETT	171	SAN AUGUSTINE	228
CROSS ROADS SUD	83	SAN AUGUSTINE RURAL WSC	94
CRYSTAL FARMS WSC	99	SAND HILLS WSC	163
CRYSTAL SYSTEMS TEXAS	291	SILSBEE	127
CUSHING	171	SLOCUM WSC	115
CYPRESS CREEK WSC	186	SODA WSC	84
D & M WSC	137	SOUR LAKE	139
DAMASCUS-STRYKER WSC	121	SOUTH JASPER COUNTY WSC	76
DEAN WSC	153	SOUTH NEWTON WSC	60
DIBOLL	127	SOUTH RUSK COUNTY WSC	98
EAST LAMAR WSC	124	SOUTHERN UTILITIES	162
EBENEZER WSC	149	SWIFT WSC	147
EDOM WSC	107	TATUM	182
ELDERVILLE WSC	60	TDCJ BETO GURNEY & POWLEDGE UNITS	289
ELKHART	164	TDCJ COFFIELD MICHAEL	551
EMERALD BAY MUD	147	TDCJ EASTHAM UNIT	407



Table 5C.1 Texas Water Development Board Base Per Capita Water Use in the East Texas Regional Water Planning Area by Water User Group (Cont.)

Water User Group	Base GPCD	Water User Group	Base GPCD
ETOILE WSC	111	TENAHA	171
FIVE WAY WSC	106	THE CONSOLIDATED WSC	110
FLAT FORK WSC	109	TIMPSON	137
FOUR PINES WSC	91	TROUP	187
FOUR WAY SUD	84	TUCKER WSC	107
FRANKSTON	178	TYLER	180
FRANKSTON RURAL WSC	127	TYLER COUNTY WSC	113
G M WSC	60	UPPER JASPER COUNTY WATER AUTHORITY	116
GARRISON	210	VIRGINIA HILL WSC	96
GASTON WSC	113	WALNUT GROVE WSC	120
GILL WSC	113	WALSTON SPRINGS WSC	100
GOODSPRINGS WSC	91	WARREN WSC	130
GRAPELAND	133	WELLS	153
GROVES	133	WEST GREGG SUD	86
GROVETON	105	WEST HARDIN WSC	68
GUM CREEK WSC	97	WEST JACKSONVILLE WSC	141
HARDIN COUNTY WCID 1	91	WEST JEFFERSON COUNTY MWD	86
HEMPHILL	220	WHITEHOUSE	122
HENDERSON	233	WILDWOOD POA	182
HUDSON WSC	68	WODEN WSC	119
HUNTINGTON	100	WOODLAWN WSC	89
HUXLEY	125	WOODVILLE	200
JACKSON WSC	91	WRIGHT CITY WSC	111
JACKSONVILLE	160	ZAVALLA	101

5C.1.2 Water Loss in the East Texas Regional Water Planning Area

Since 2003, retail public water utilities have been required to complete and submit a water loss audit form to the TWDB once every five years. Since 2013, retail public utilities that supply potable water to more than 3,300 connections or receive financial assistance from the TWDB must file an annual water audit with the TWDB. The most recent available data were reported in 2018 for water loss during calendar year 2017. The TWDB compiled the data from these reports. The water audit reporting requirements follow the International Water Association and American Water Works Association Water Loss Control Committee methodology.

The primary purposes of a water loss audit are to account for all of the water being used and to identify potential areas where water can be saved. Water audits track multiple sources of water loss that are commonly described as apparent loss and real loss. Apparent loss is water that was used but for which the utility did not receive compensation. Apparent losses are associated with customer meters under-registering, billing adjustment and waivers, and unauthorized consumption. Real loss is water that was



physically lost from the system before it could be used, including main breaks and leaks, customer service line breaks and leaks, and storage overflows. The sum of the apparent loss and the real loss make up the total water loss for a utility.

In the ETRWPA, 36 public water suppliers submitted a water loss audit to TWDB for calendar year 2017. These water suppliers represent a retail service population of approximately 665,000 people, or about 58 percent of the regional population. Table 5C.2 shows a summary of reported 2017 water loss accounting for the ETRWPA.

Table 5C.2 Reported 2017 Water Loss Accounting in the East Texas Regional Water Planning Area

System Input Volume 39,766,361,869 100.0%	Authorized Consumption 30,853,952,487 77.6%	Billed Consumption 28,767,060,097 72.3%	Billed Metered 28,737,914,742 72.3%	Revenue Water 28,767,060,097 72.3%
			Billed Unmetered 29,145,355 0.1%	
		Unbilled Consumption 2,086,892,390 5.2%	Unbilled Metered 1,445,944,231 3.6%	Non-Revenue Water 10,999,301,772 27.7%
			Unbilled Unmetered 640,948,159 1.6%	
	Water Loss 8,912,409,382 22.4%	Apparent Loss 1,358,574,661 3.4%	Unauthorized Consumption 100,382,539 0.3%	
			Customer Meter Accuracy Loss 1,057,698,802 2.7%	
			Systematic Data Handling Discrepancy 200,493,320 0.5%	
		Real Loss 7,553,834,721 19.0%	Reported Breaks and Leaks 1,329,073,651 3.3%	
		Unreported Loss 6,224,761,070 15.7%		



One problem with the reported water loss accounting data is negative real water losses. Three utilities reported negative real losses. The physical meaning of a negative water loss is that water is infiltrating into the distribution system, which is not realistic.

On a regional basis, the reported percentage of total water loss for the ETRWPA was 22.4 percent. Based on this figure, it appears that enhanced water loss control programs may be a potentially feasible water conservation strategy for some WUGs in the East Texas Region.

5C.2 Water Conservation Plans

The Texas Commission on Environmental Quality (TCEQ) requires water conservation plans for all municipal, industrial, and other non-irrigation water users with surface water rights of 1,000 ac-ft per year or more, all irrigation water users with surface water rights of 10,000 ac-ft per year or more, and all retail public water suppliers providing water service to 3,300 connections or more.^[1] Water conservation plans are also required for all water users applying for a new or amended State water right and for entities seeking more than \$500,000 in State funding for water supply projects.

All conservation plans must specify quantifiable 5-year and 10-year conservation goals and targets. While these goals are not enforceable, they must be identified. Updated water conservation plans for WUGs in the region were to be submitted to the Executive Director of the TCEQ and to the ETRWPG by May 1, 2019. Failure to submit a water conservation plan is a violation of the Texas Water Code, Section 11.1272 and the Texas Administrative Code, Section 288.30, and is subject to enforcement by the TCEQ.

In the ETRWPA, 30 entities hold municipal, industrial, or other non-irrigation surface water rights in excess of 1,000 ac-ft per year, four entities have irrigation water rights greater than 10,000 ac-ft per year, and 24 entities serve 3,300 connections or more. A list of the users in the ETRWPG required to submit water conservation plans is shown in Table 5C.3.

Other entities have contracts with regional and wholesale water providers (WWPs) for greater than 1,000 ac-ft per year. Presently, these water users are not required to develop water conservation plans unless the user is seeking State funding; however, a WWP may request that its customers prepare a conservation plan to assist in meeting the goals and targets of the WWP's plan.

To assist entities in the ETRWPA with developing water conservation plans, model plans for municipal water users (major or retail public water suppliers), industrial users, mining, and irrigation districts are available on the TCEQ's website (https://www.tceq.texas.gov/permitting/water_rights/wr_technical-resources/conserve.html). Each of these model plans addresses the latest TCEQ requirements and is intended to be modified by each user to best reflect the activities appropriate to the entity.



Table 5C.3 Water Users and Types of Use that are Required to Develop, Implement, and Submit Water Conservation Plans

Entity	WUG	3,300 Connections or More	Non-Irrigation Water Right of 1,000 ac-ft/yr or More				Irrigation Water Right of 10,000 ac-ft/yr or More	Financial Assistance of \$500,000 or More from TWDB
			Municipal / Domestic	Industrial	Mining	Other		
Athens	Yes	•						
Beaumont	Yes	•	•					
Bridge City	Yes	•						
Carthage	Yes	•						
Center	Yes		•					
G-M WSC	Yes						•	
Groves	Yes	•						
Henderson	Yes	•	•					
Jacksonville	Yes	•	•					
Jasper	Yes	•						
Kilgore	Yes	•	•					
Lake Livingston WSC	Yes						•	
Lindale Rural WSC	Yes	•						
Lufkin	Yes	•	•	•	•			
Lumberton MUD	Yes	•						
Mauriceville MUD	Yes	•						
Nacogdoches	Yes	•	•					
Nederland	Yes	•						
Orange	Yes	•						
Orange County WCID 1	Yes	•					•	
Palestine	Yes	•						
Port Arthur	Yes	•						
Port Neches	Yes	•						
San Augustine	Yes		•					
Silsbee	Yes	•						
Southern Utilities Company	Yes	•						
The Consolidated WSC	Yes	•						
Tyler	Yes	•	•	•				
Angelina & Neches River Authority	No		•	•				
Angelina-Nacogdoches WCID 1	No		•	•				
Athens Municipal Water Authority	No		•	•				
E I Dupont De Nemours & Co	No			•				
Entergy Texas Inc.	No			•				
Exxon Mobil Oil Co	No			•				
Houston Co WCID 1	No		•					



Table 5C.3 Water Users and Types of Use That are Required to Develop, Implement, and Submit Water Conservation Plans (Cont.)

Entity	WUG	3,300 Connections or More	Non-Irrigation Water Right of 1,000 ac- ft/yr or More				Irrigation Water Right of 10,000 ac-ft/yr or More	TWDB Loans \$500,000 or More
			Municipal / Domestic	Industrial	Mining	Other		
Jefferson County Drainage District No 6	No					•		
Joe Broussard II et al	No						•	
Lower Neches Valley Authority	No		•	•	•	•		
Luminant Generation Co LLC	No			•	•		•	
Luminant Mining Co LLC	No				•			
M Half Circle Ranch Company	No						•	
Motiva Enterprises LLC	No			•				
Panola Co FWSD 1	No		•	•				
Premcor Refining Group Inc.	No			•				
Rowan Companies Inc.	No			•				
Sabine River Authority	No		•	•	•	•		
Texas Parks & Wildlife Dept.	No			•				
Union Oil Company of California	No			•				
United States Department of Energy	No				•			
Upper Neches River MWD	No		•					

NOTE: List may not include applicants for new water rights or TWDB funding.
Water user group (WUG), water supply corporation (WSC), municipal utility district (MUD), Water Control & Improvement District (WCID), municipal water district (MWD)

Implemented water conservation strategies vary by water user and are shown in Table 5C.4. This table lists water conservation strategies for individuals who have submitted water conservation plans to the TWDB, TCEQ, or City of Nacogdoches as of October 31, 2019, or who have published water conservation plans on their web sites. The focus of the conservation activities for municipal water users in the ETRWPA are:

- Education and public awareness programs.
- Reduction of unaccounted for water through universal metering, water audits, maintenance and repair of water systems, and meter testing and repair.
- Water rate structures that discourage water waste.
- Table 5C.5 summarizes water conservation measures implemented by the utilities for which water conservation plans were available.



Table 5C.4 Primary Water Conservation Strategies Documented in Water Conservation Plans

Entity	Plan Date	Primary Water Conservation Strategies						
		Enhanced Water Loss Control Programs	Public Education / Awareness Programs	Assigned Water Conservation Coordinator	Water Waste Prohibition	Rate Structure Not Promoting Excessive Use	Fixture Retrofit Program	Other
		Active Conservation Strategies						
Angelina & Neches River Authority	2019	•	•			•		
Angelina-Nacogdoches WCID No.1	2019	•	•					
City of Athens	2019	•	•	•				
City of Beaumont	2019	•	•	•				•
City of Bridge City	2019	•	•			•	•	•
City of Carthage	2019	•	•				•	•
City of Center	2019	•	•				•	•
City of Groves	2019		•					
City of Jasper	2019	•	•					
City of Kilgore	2019	•	•			•		
City of Lufkin	2019	•	•			•		
City of Nacogdoches	2018	•	•			•		•
City of Orange	2019	•	•					
City of Palestine	2019	•	•		•	•		
City of Port Arthur	2019	•	•	•	•	•		•
City of Port Neches	2009	•	•					
City of San Augustine	2015	•	•					
City of Silsbee	2019	•	•					
City of Tyler	2019	•	•	•	•	•	•	•
G-M WSC	2019	•	•			•		
Houston County WCID 1	2019	•	•			•		•
Lake Livingston WSC	2019		•	•		•		
Lindale Rural WSC	2019	•	•					
Lower Neches Valley Authority	2019	•	•			•		
Lumberton MUD	2019	•	•			•		
Mauriceville MUD	2019	•	•			•		
Orange County WCID 1	2019	•	•	•				•
Sabine River Authority	2019	•	•					•
Southern Utilities Company	2019	•	•	•	•	•		
Upper Neches River MWA	2019	•	•					

Water control & improvement district (WCID), water supply corporation (WSC), municipal utility district (MUD), municipal water authority (MWA)



Table 5C.5 Summary of Measures in Water Conservation Plans

Number of Plans That Include Measure	Measure
30	Public education (distribute materials, web site, school programs, news articles, conservation tips, etc.)
28	Enhanced water loss control measures (comprehensive water loss audits, active leak detection and repair, replacement/repair of mains and lines that are a significant source of water loss, etc.)
15	Increasing block rate structure to promote conservation
7	Designated water conservation coordinator
6	Water reuse/recycling
4	Water waste prohibition
4	Retrofit program for inefficient plumbing fixtures
3	Landscape irrigation conservation and/or incentives
2	Park and athletic field conservation
1	Residential water audits and irrigation checkups
1	Efficient municipal landscaping practices
1	Wholesale agency assistance to customers
1	Water-wise landscape design program
1	Pressure reduction

5C.3 Recommended Water Conservation Strategies in the East Texas Regional Water Planning Area

Water conservation actions implemented as strategies would result in savings above that assumed for the TWDB water demand projections. The Texas Water Development Board, in conjunction with the Texas Commission on Environmental Quality and the Water Conservation Advisory Council has developed guidelines for conservation BMPs. These BMP guidelines are available online at <https://www.twdb.texas.gov/conservation/BMPs/>. Recommended water conservation strategies are presented by WUG type in the following sections.

5C.3.1 Municipal Water Conservation Strategies

Water conservation BMPs were evaluated for municipal WUGs that have a projected per capita water use greater than 140 gpcd, regardless of whether they have a demonstrated need. Evaluated water conservation practices included enhanced public and school education, water conservation pricing, and an enhanced water loss control program.

Enhanced Public and School Education. Enhanced public and school education would involve providing formal and indirect means of information on how to conserve water beyond current efforts. Education costs were applied to all of the entities meeting the above criteria. Assumptions made in evaluating the efficiency of this measure included restrictions that the annual budget spent on education would be limited to approximately \$1.50 per capita. The total budget available will be an indication as to the effectiveness of the program. Table 5C.6 indicated efficiencies assigned to various ranges of available budget.



Table 5C.6 Water Conservation Efficiencies for Enhanced Public and School Education

Budget		Efficiency of Conservation
Low	High	
\$1,500 (minimum)	\$14,999	1.5%
\$15,000	\$29,999	2.0%
\$30,000	\$44,999	2.5%
\$45,000	\$60,000 (maximum)	3.0%

Water Conservation Pricing. Water conservation pricing requires an increasing rate structure with increasing use. The minimum price increase between rate blocks should be 25 percent. For maximum effectiveness, the price increase between rate blocks should be at least 50 percent.^[2] The effectiveness of this measure is, in part, determined by whether water conservation pricing is currently implemented. Water conservation pricing is assumed to achieve a 1.5 percent reduction in demand.

Enhanced Water Loss Control Program. An enhanced water loss control program involves committing more resources towards identifying and repairing leaks, replacing inaccurate water meters, minimizing billing errors, and replacing mains with chronic leakage. Utilities would strive to achieve target water loss percentages that depend on water system characteristics. For more rural utilities with fewer than 32 connections per mile of main, the target water loss is 18 percent of water entering the system (Table 5C.7). For more urban or suburban utilities with 32 or more connections per mile of main, the target water loss is 12 percent of water entering the system. For WUGs with severe water loss, achieving the water loss target may involve replacing a substantial portion of the potable water transmission and distribution system. Only utilities that have submitted a water loss audit to the TCEQ within the last five years were considered for an enhanced water loss control program.

Table 5C.7 Enhanced Water Loss Control Program Targets

Service Connections per Mile of Main	Water Loss Target (% of System Input)
Less than 32	18% or less
32 or more	12% or less

The projected total water savings is provided in Table 5C.8 for WUGs that have a projected per capita water use greater than 140 gpcd, regardless of having a demonstrated need, or are the project sponsor for a recommended water management strategy that involves an interbasin transfer.



Table 5C.8 Water Conservation Savings for Selected Water User Groups

Entity (County)	Amount Conserved (ac-ft per year)					
	2020	2030	2040	2050	2060	2070
Alto (Cherokee)	4	6	7	7	9	10
Alto Rural WSC (Cherokee)	9	16	18	21	25	28
Appleby WSC (Nacogdoches)	9	17	20	23	27	32
ARP (Smith)	2	0	0	0	0	0
Athens (Henderson)	7	13	16	20	23	27
Beaumont (Jefferson)	2,027	3,425	4,202	5,112	6,171	7,382
Blackjack WSC (Cherokee)	2	3	4	5	5	6
Brownsboro (Henderson)	3	0	0	0	0	0
Bullard (Smith)	11	22	28	36	44	54
Carthage (Panola)	23	39	41	44	47	50
Center (Shelby)	26	45	52	57	64	70
Chandler (Henderson)	9	17	21	26	32	36
Chester WSC (Tyler)	2	5	5	5	6	6
Colmesneil (Tyler)	4	6	6	7	7	8
County-Other, Houston (Houston)	2	3	3	4	4	4
County-Other, Jefferson (Jefferson)	34	0	0	0	0	0
Crockett (Houston)	19	29	30	32	34	36
Crystal Systems Texas (Smith)	18	38	52	71	92	118
Cushing (Nacogdoches)	10	19	24	30	37	45
Cypress Creek WSC (Tyler)	2	3	3	3	3	4
Dean WSC (Smith)	11	18	0	0	0	0
Elkhart (Anderson)	4	6	6	7	7	8
Frankston (Anderson)	4	6	7	7	7	8
Garrison (Nacogdoches)	4	6	8	9	10	12
Hemphill (Sabine)	4	8	7	7	8	8
Henderson (Rusk)	83	148	179	235	283	334
Jacksonville (Cherokee)	50	85	110	129	152	178
Jasper (Jasper)	75	124	141	158	178	196
Kilgore (Rusk)	10	19	21	25	28	32
Kirbyville (Jasper)	6	9	10	11	11	12
Lindale (Smith)	7	14	18	23	29	36
Lovelady (Houston)	2	3	3	3	4	4
Lufkin (Angelina)	151	239	273	0	0	0
MT Enterprise WSC (Rusk)	4	8	0	0	0	0
Nacogdoches (Nacogdoches)	247	426	532	656	802	966
New London (Rusk)	13	22	26	30	36	40
Newton (Newton)	6	10	10	11	12	12
Norwood WSC (Anderson)	2	0	0	0	0	0
Overton (Smith)	8	15	18	21	24	28
Palestine (Anderson)	81	129	140	150	161	172
Panola-Bethany WSC (Panola)	0	0	0	0	1	2
Pleasant Springs WSC (Anderson)	2	4	5	5	5	6
Port Arthur (Jefferson)	2,708	4,449	5,222	6,029	6,844	7,664
Rusk (Cherokee)	15	26	30	34	40	46



Table 5C.8 Water Conservation Savings for Selected Water User Groups

Entity (County)	Amount Conserved (ac-ft per year)					
	2020	2030	2040	2050	2060	2070
San Augustine (San Augustine)	10	17	18	20	22	23
Sand Hills WSC (Shelby)	4	8	8	9	10	12
Southern Utilities (Smith)	514	866	1,058	1,279	1,527	1,803
Tatum (Rusk)	4	8	9	10	12	14
TDCJ Beto Gurney & Powledge Units (Anderson)	16	27	29	30	32	34
TDCJ Coffield Michael (Anderson)	44	75	80	85	91	96
TDCJ Eastham Unit (Houston)	15	25	27	29	30	32
Tenaha (Shelby)	4	6	6	7	8	8
Troup (Smith)	6	11	12	14	17	18
Tyler (Smith)	657	1,101	1,338	1,613	1,924	2,268
Wells (Cherokee)	2	0	0	0	0	0
Wildwood POA (Hardin)	4	6	7	7	8	8
Woodville (Tyler)	17	28	30	32	34	36
TOTAL	7,017	11,658	13,920	16,188	18,987	22,032

The following WUGs have water needs but use less than 140 gpcd:

- Joaquin (Shelby)
- D & M WSC (Nacogdoches)
- Moore Station WSC (Henderson)
- Whitehouse (Smith)
- Jacobs WSC (Rusk)
- Wright City WSC (Cherokee)
- R P M WSC (Smith)

In addition, seven WUGs are customers of the Lower Neches Valley Authority (LNVA), a WWP with a recommended WMS involving an interbasin transfer. These WUGs are also projected to use less than 140 gpcd:

- County-Other (Jefferson)
- Groves (Jefferson)
- Jefferson County Water Control & Improvement District #10 (Jefferson)
- Nederland (Jefferson)
- Port Neches (Jefferson)
- West Jefferson County Municipal Water District (Jefferson)

The WUGs listed above already use water in an efficient manner. It should be noted that, the water demand projections for these entities already include projected water savings from natural replacement of inefficient fixtures and appliances with high-efficiency toilets and showerheads, residential clothes washers, and residential dishwashers. For these WUGs, the “built-in” water savings from these measures



is 7.7 percent of pre-savings water demand in 2020, increasing to 14.3 percent in 2070. For these reasons, no additional water conservation strategies are recommended for WUGs that use less than 140 gpcd.

5C.3.2 Other Water User Groups

Water conservation measures for other water user groups are described in the following sections.

Manufacturing. Industrial water users include large petrochemical industries as well as smaller local manufacturers. The current state of water conservation at existing manufacturing facilities is unknown. Conservation measures associated with industries are highly industry- and site-specific. For example, some industries can utilize brackish water supplies or wastewater effluent while others require only potable water. In addition, the water demand types of future industries are unknown.

It is important in evaluating conservation strategies for industries to balance the water savings from conservation to economic benefits to the industry and the region. In the ETRWPA, where water is readily available, requiring costly changes to processes and equipment may not be practical economically. Finally, although it is expected that manufacturers will implement water conservation measures during the planning period, the ETRWPG does not have the industry- and site-specific information necessary to identify the current status of manufacturing water conservation or to say what measures should be implemented. In light of these considerations, the ETRWPG has not recommended water conservation strategies for manufacturing WUGs.

Irrigation. Most irrigation occurs in the lower parts of the Neches and Sabine Basins. Much of the irrigation water is delivered by canals and is used for rice farming along the coast. The LNVA is the largest provider of agricultural irrigation water in the ETRWPA. LNVA has implemented significant irrigation water conservation measures, including:

- Information and education program.
- Meter repair and replacement program
- Water billing based on water usage: In 2005, LNVA began billing rice farmers based on metered water use rather than farmed acreage. After implementation of this measure, average water consumption was reduced from 3.79 ac-ft per acre farmed in 2004 to 2.84 ac-ft per acre farmed in 2005, a reduction of about 25 percent.
- Canal water loss reduction: From 2009 to 2013, LNVA reduced its canal water loss from 25 percent to 14 percent through aggressive leak detection and repair along with vegetation control. This represents a reduction in canal water loss of more than 23,000 ac-ft per year.
- Neches River saltwater barrier: This measure is estimated to conserve an average of 200,000 ac-ft per year of stored, fresh water that does not have to be released to prevent saltwater intrusion into the river.

Individual farmers also apply measures such as minimization of water loss from on-farm water distribution, irrigation scheduling, land leveling, and tailwater recovery. As described above, significant increases in efficiency have already been achieved. In addition, the appropriate water conservation strategies for individual farms are site-specific. Although the ETRWPG encourages implementation of irrigation water conservation measures, it does not have the farm-specific information necessary to identify the current status of on-farm water conservation or to recommend what measures should be implemented. In light of these considerations, the ETRWPG has not recommended further water conservation strategies for irrigation WUGs.



Other. Steam-electric power, livestock, and mining WUGs together account for between 17 and 19 percent of the total water demand in the ETRWPA during the planning period. The demand for steam-electric use is projected remain at approximately 8 percent of the total demand during the 50-year period. The projections for steam-electric use were provided by the TWDB. Livestock and mining together comprise 9 to 10 percent of the total demand. The cost of water in these industries comprises a small percentage of the overall business cost, and it is not expected that these industries will see an economic benefit to water conservation. Based on these considerations, water conservation strategies have not been recommended for steam-electric, livestock and mining WUGs.

