Region I
East Texas Regional
Water Planning Group

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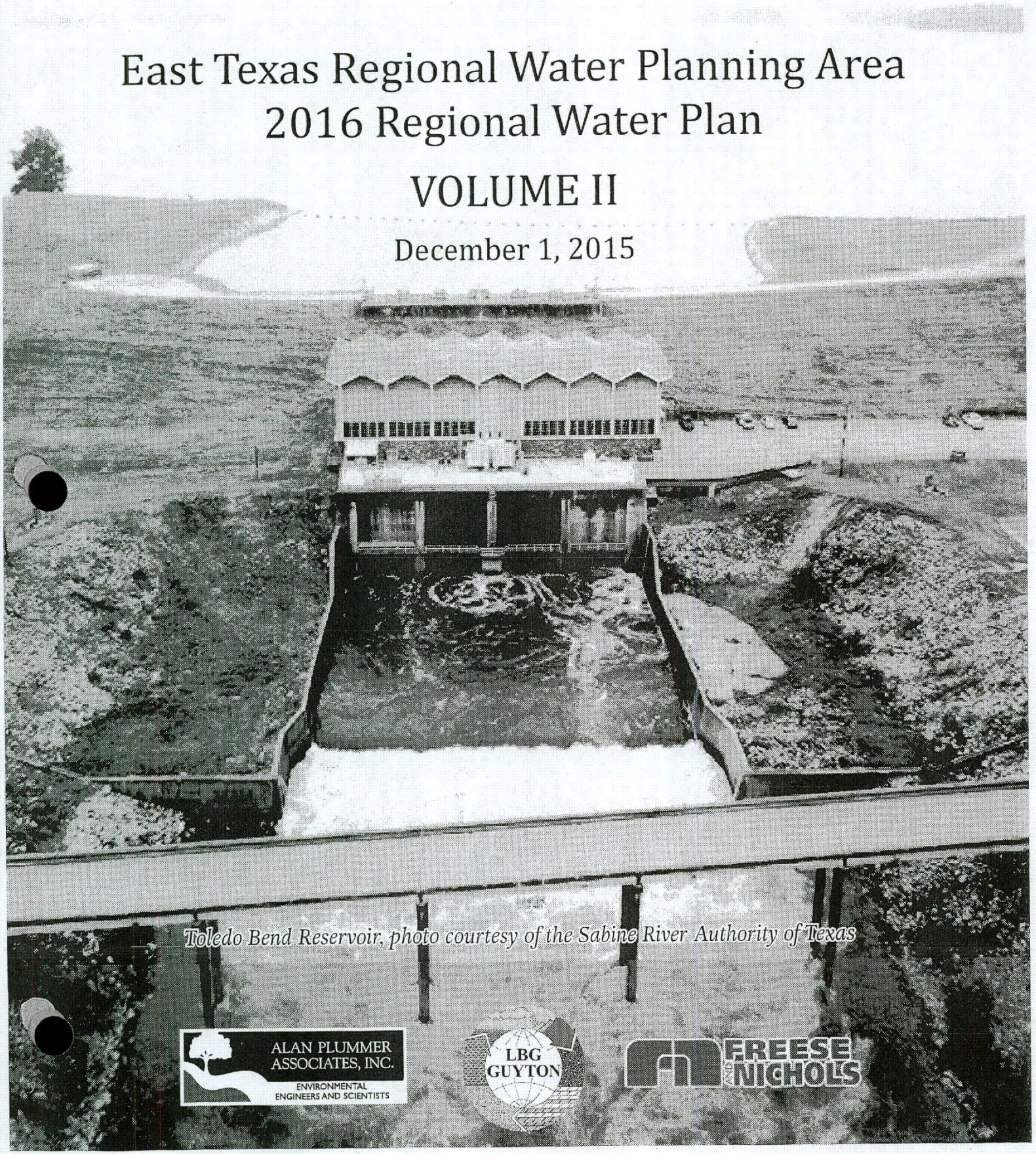
East Texas Regional Water Planning Area
2016 Regional Water Plan

VOLUME II

December 1, 2015



Toledo Bend Reservoir, photo courtesy of the Sabine River Authority of Texas

ALAN PLUMMER ASSOCIATES, INC.
ENVIRONMENTAL ENGINEERS AND SCIENTISTS

LBG GUYTON

FREESE AND NICHOLS

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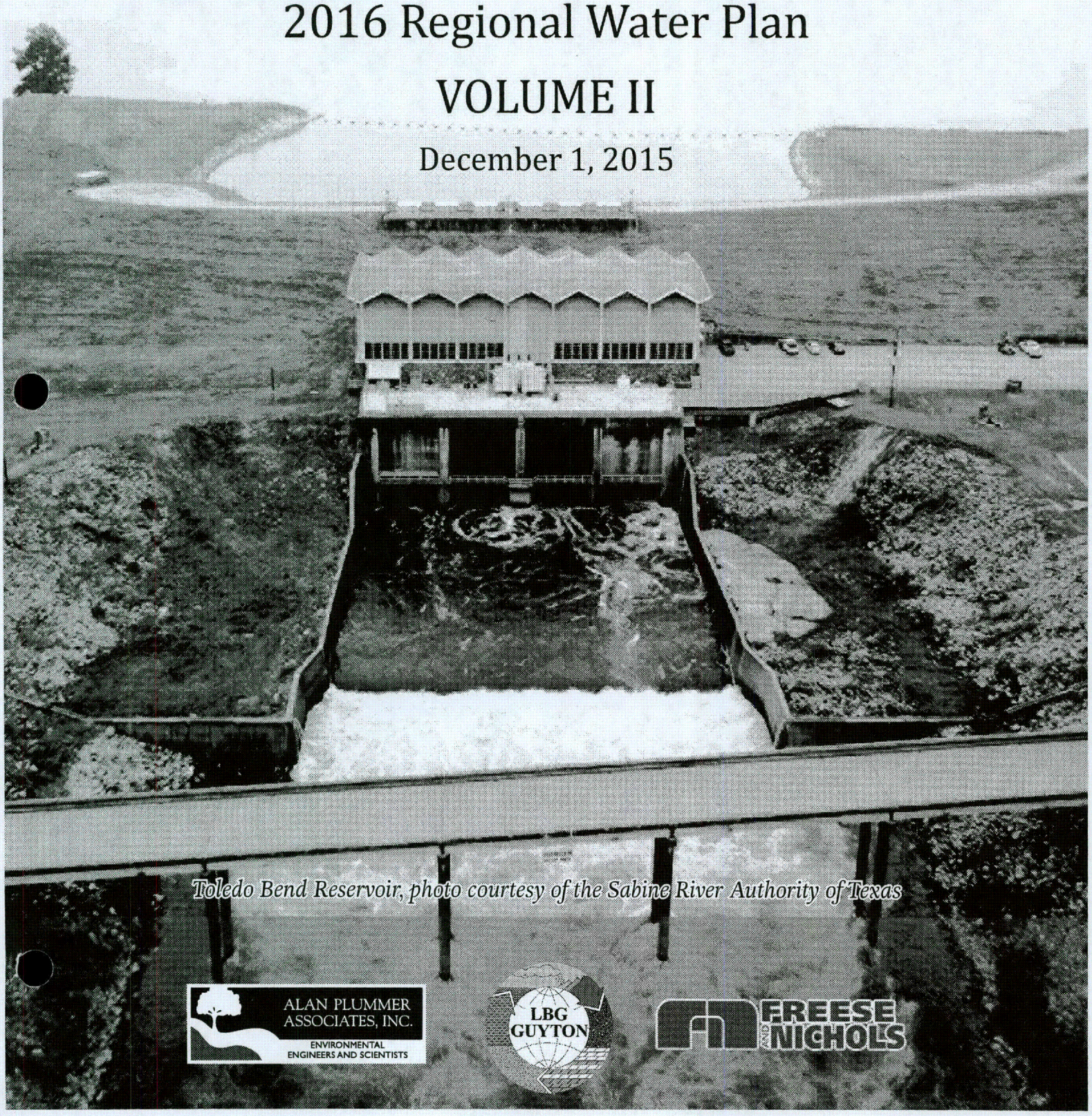

Toledo Bend Reservoir, photo courtesy of the Sabine River Authority of Texas

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Appendix 1-A

Species of Special Concern in the ETRWPA

The TPWD has compiled a list of species of special concern in the State of Texas. Rare species are listed by county in the Rare, Threatened, and Endangered Species Database, which includes regulatory listing and habitats of each species.

Table 1-A.1 identifies rare, threatened or endangered species in the region by county and lists federal and state status for each species. Species are grouped by taxonomic assemblage (i.e., bird, insect, fish, mammal, vascular plant, etc.). Information on habitats for these species may be found on the TPWD website, http://tpwd.texas.gov/gis/rtest/.

The key to the federal and state status for threatened and endangered species follows:

LE, LT	Federally Listed Endangered/Threatened
PE, PT	Federally Proposed Endangered/Threatened
SAE, SAT	Federally Listed Endangered/Threatened by Similarity of Appearance
C	Federal Candidate for Listing; formerly Category 1 Candidate
DL, PDL	Federally Delisted/Proposed for Delisting
NL	Not Federally Listed
E, T	State Listed Endangered/Threatened
NT	Not tracked or no longer tracked by the State
"blank"	Rare, but with no regulatory listing status

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Taxon	Common Name	Federal Status	State Status	County																				
				Anderson	Angelina	Cherokee	Hardin	Henderson	Houston	Jasper	Jefferson	Nacogdoches	Newton	Orange	Panola	Polk	Rusk	Sabine	San Augustine	Shelby	Smith	Trinity	Tyler
Amphibians	Southern Crawfish Frog							●	●	●	●		●			●						●	
Birds	American Peregrine Falcon	DL	T	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Arctic Peregrine Falcon	DL		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Bachman's Sparrow		T	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●
	Bald Eagle	DL	T	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Black Rail										●													
	Brown Pelican	DL	E								●			●										
	Henslow's Sparrow			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Interior Least Tern	LE	E	●		●		●	●						●		●			●	●			
	Peregrine Falcon	DL	T	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Piping Plover	LT	T	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Red Knot	T		●				●	●		●												●	
	Red-cockaded Woodpecker	LE	E	●	●	●	●		●	●		●	●		●	●		●	●		●	●	●	●
	Reddish egret		T								●													
	Snowy Plover										●													
	Sooty tern		T											●										
	Sprague's Pipit	C		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Swallow-tailed kite		T		●		●			●	●	●	●	●		●		●	●	●				●
	Western snowey plover										●													
	Western Snowy Plover										●													
	White-faced Ibis		T	●			●			●	●		●	●									●	
	Whooping Crane	LE	E	●				●																
	Wood Stork		T	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Crustaceans	A crayfish (1 of 5 species, Procambarus nechesae)				●																		●	
	Texas prairie crayfish				●																			

Taxon	Common Name	Federal Status	State Status	County																				
				Anderson	Angelina	Cherokee	Hardin	Henderson	Houston	Jasper	Jefferson	Nacogdoches	Newton	Orange	Panola	Polk	Rusk	Sabine	San Augustine	Shelby	Smith	Trinity	Tyler
Fishes	American Eel			●	●	●	●		●	●	●		●	●		●						●	●
	Blackside darter		T									●			●					●	●		
	Blue sucker		T				●			●			●					●					●
	Creek chubsucker		T		●	●	●		●	●		●	●		●	●	●	●	●	●	●	●	
	Ironcolor shiner									●			●	●	●		●	●		●	●		
	Orangebelly darter				●	●				●		●	●		●	●	●	●	●	●	●		
	Paddlefish		T	●	●	●	●		●	●		●	●		●	●	●	●	●	●	●	●	●
	Smalltooth sawfish	LE	E								●												
	Western sand darter						●			●			●		●		●	●		●	●		●
Insects	A caddisfly			●																			
	A mayfly									●													
	A Purse casemaker caddisfly			●																			
	Bay skipper										●												
	Gulf Coast clubtail												●										
	Holzenthal's philopotamid caddisfly			●																			
	Morse's net-spinning caddisfly			●																			
	Texas emerald dragonfly			●				●	●									●	●	●		●	
Mammals	Black bear	T/SA;NL	T	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Louisiana black bear	LT	T	●	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●		●	●
	Plains spotted skunk			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Rafinesque's big-eared bat		T		●	●	●		●	●	●	●	●	●	●	●	●	●	●	●		●	●
	Red wolf	LE	E	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Southeastern myotis bat			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Mollusks	Louisiana pigtoe		T	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Sandbank pocketbook		T	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Southern hickorynut		T	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●
	Texas heelsplitter		T	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Texas pigtoe		T	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Triangle pigtoe		T	●	●	●	●					●								●			
Plants	Boynton's oak				●																		
	Bristle nailwort											●											

Taxon	Common Name	Federal Status	State Status	County																						
				Anderson	Angelina	Cherokee	Hardin	Henderson	Houston	Jasper	Jefferson	Nacogdoches	Newton	Orange	Panola	Polk	Rusk	Sabine	San Augustine	Shelby	Smith	Trinity	Tyler
Plants	Carrizo leather flower					•		•													•		
	Chapman's orchid						•				•			•									•
	Chapman's yellow-eyed grass							•															
	Earth fruit (Tinytim)	LT	T	•											•								
	Florida ladies-tresses						•				•		•										•
	Long-sepaled false dragonhead						•			•			•	•									•
	Navasota false foxglove																						•
	Navasota ladies'-tresses	LE	E							•													
	Neches River rosemallow	T				•			•	•												•	
	Nixon's dwarf hawthorn											•											
	Nodding yucca									•			•										
	Panicled indigobush			•	•	•		•	•	•		•	•			•	•				•	•	•
	Rough-stem aster			•				•													•		
	Sandhill woolywhite																						
	Shinner's sunflower												•								•		
	Small-headed pipewort			•				•															
	Texas golden gladecress	E																•	•				
	Texas ladies'-tresses																						•
	Texas prairie dawn	LE	E																			•	
	Texas screwstem				•		•			•		•	•			•			•				•
	Texas three-birds orchid								•														
	Texas trailing phlox	LE	E				•									•							•
	Texas trillium				•	•			•	•		•			•		•				•		
	White bladderpod	LE	E																•				
	White firewheel						•						•										•
Reptiles	Alligator snapping turtle		T	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Atlantic hawksbill sea turtle	LE	E								•												
	Green sea turtle	LT	T								•												
	Kemp's Ridley sea turtle	LE	E								•												
	Leatherback sea turtle	LE	E								•												
	Loggerhead sea turtle	LT	T								•												

Taxon	Common Name	Federal Status	State Status	County																				
				Anderson	Angelina	Cherokee	Hardin	Henderson	Houston	Jasper	Jefferson	Nacogdoches	Newton	Orange	Panola	Polk	Rusk	Sabine	San Augustine	Shelby	Smith	Trinity	Tyler
Reptiles	Louisiana pine snake	C	T		●	●	●		●	●		●	●			●		●	●			●	●
	Northern scarlet snake		T			●	●	●		●	●		●	●	●		●	●	●	●	●		●
	Texas diamondback terrapin										●			●									
	Texas horned lizard		T	●		●		●	●		●	●		●			●				●		
	Timber rattlesnake		T	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

Appendix 1-B

Water Loss Audits

The TWDB established new requirements requiring water audit reporting for public utilities that provide potable water. Every five years public utilities must perform a water audit computing the utility's most recent annual water loss. Entities with active financial obligations with the TWDB are required to submit water loss data annually. This appendix provides Entity-Level Water Loss Audit Data for 2013 as well as a Statewide Region-Level 2010 Water Loss Audit Data Summary.

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PWS Name	PWS Code	Is Loan Wsc Required	Is Connections Required	Is Five Year Required	Person Filing Name	Report Period Start	Report Period End	Surface Water Percentage	Ground Water Percentage	Retail Population Served	Wholesale Population Served
Angelina WSC	TX0030016	TRUE	FALSE	FALSE	Keith Weathers	01/01/13	12/31/13	0.00	100.00	3,750	0
Beechwood WSC	TX2020014	TRUE	FALSE	FALSE	Laura Zito	01/01/13	12/31/13	0.00	100.00	1,143	0
Brookeland FWSD	TX2020004	TRUE	FALSE	FALSE	Becky Hall	01/01/13	12/31/13	0.00	100.00	1,419	0
City of Beaumont Water Utility Dept	TX1230001	FALSE	TRUE	FALSE	Amalia Villarreal	01/01/13	12/31/13	64.30	35.70	175,341	7,778
City of Bridge City	TX1810001	FALSE	TRUE	FALSE	Mike Lund	01/01/13	12/31/13	0.00	100.00	8,700	72
City of Bridge City Waterwood Estates	TX1810175	FALSE	FALSE	FALSE	Mike Lund	01/01/13	12/31/13	0.00	100.00	225	0
City of Brownsboro	TX1070003	FALSE	FALSE	FALSE	Gary Arnold	01/01/13	12/31/13	0.00	100.00	1,440	486
City of Carthage	TX1830001	FALSE	TRUE	FALSE	Debbie Pierce	01/01/13	12/31/13	1.00	99.00	6,668	5,627
City of Center	TX2100001	FALSE	FALSE	FALSE	John Holt	01/01/13	12/31/13	100.00	0.00	5,193	0
City of Crockett	TX1130001	FALSE	TRUE	FALSE	Kelly McChesney	01/01/13	12/31/13	99.00	1.00	6,679	164
City of Groves	TX1230012	FALSE	TRUE	FALSE	Marcus Johnson	01/01/13	12/31/13	100.00	0.00	15,733	0
City of Hemphill	TX2020001	TRUE	FALSE	FALSE	Donald Iles	01/01/13	12/31/13	100.00	0.00	1,198	3,000
City of Henderson	TX2010001	FALSE	TRUE	FALSE	James Hughes	01/01/13	12/31/13	31.07	68.93	16,212	150
City of Huntington	TX0030002	FALSE	FALSE	FALSE	Damon Walters	01/01/13	12/31/13	100.00	0.00	0	0
City of Huxley	TX2100019	TRUE	FALSE	FALSE	Gerald Huddleston	01/01/13	12/31/13	100.00	0.00	2,307	0
City of Jasper	TX1210001	TRUE	TRUE	FALSE	Erik Rogers	01/01/13	12/31/13	0.00	100.00	4,776	0
City of Kountze	TX1000001	TRUE	FALSE	FALSE	George Timothy Drake II	01/01/13	12/31/13	0.00	100.00	3,405	0
City of Lovelady	TX1130003	TRUE	FALSE	FALSE	Thomas Vaughn	01/01/13	12/31/13	26.00	74.00	649	0
City of Nederland	TX1230006	FALSE	TRUE	FALSE	Robert Sangster	01/01/13	12/31/13	100.00	0.00	17,545	0
City of Orange	TX1810004	FALSE	TRUE	FALSE	David Martindale	01/01/13	12/31/13	0.00	100.00	18,643	0
City of Palestine	TX0010001	FALSE	TRUE	FALSE	Robert Sedgwick	01/01/13	12/31/13	100.00	0.00	18,712	250
City of Port Arthur	TX1230009	FALSE	TRUE	FALSE	JohnTomplait	01/01/13	12/31/13	100.00	0.00	53,818	0
City of Port Neches	TX1230010	FALSE	TRUE	FALSE	Ken DuBois	01/01/13	12/31/13	100.00	0.00	13,040	0
City of San Augustine	TX2030001	FALSE	FALSE	FALSE	chris anding	01/01/13	12/31/13	100.00	0.00	2,108	0
City of Silsbee	TX1000002	FALSE	TRUE	FALSE	Joe Moreno	01/01/13	12/31/13	0.00	100.00	9,888	0
City of Tyler	TX2120004	FALSE	TRUE	FALSE	P. Clayton Nicolardi	01/01/13	12/31/13	96.70	3.30	109,242	11,527
Cypress Creek WSC	TX2290007	TRUE	FALSE	FALSE	ELMER MAY	01/01/13	12/31/13	0.00	100.00	810	0
El Pinon Estates Water System	TX2030013	FALSE	FALSE	FALSE	Lonzo Gale	10/01/13	12/31/13	0.00	100.00	135	0
Forest Hills Water Supply	TX1210012	TRUE	FALSE	FALSE	Becky Hall	01/01/13	12/31/13	0.00	100.00	453	0
G M WSC	TX2020067	TRUE	TRUE	FALSE	Debra Daniel	01/01/13	12/31/13	80.00	20.00	8,922	0
Jefferson County WCID 10	TX1230003	FALSE	FALSE	FALSE	Thomas E. McDonald	01/01/13	12/31/13	100.00	0.00	5,500	0
Lake Livingston Big Thicket Retreat	TX1000053	FALSE	FALSE	FALSE	Big Thicket Retreat	01/01/13	12/31/13	0.00	100.00	108	0
Lake Livingston Wayward Winds Oasis	TX2290014	FALSE	FALSE	FALSE	Boyd McDaniel	01/01/13	12/31/13	0.00	100.00	39	0
Lilly Grove SUD	TX1740014	TRUE	FALSE	FALSE	Donna Harris	01/01/13	12/31/13	0.00	100.00	2,130	0
Loma Linda Subdivision	TX2100038	FALSE	FALSE	FALSE	Lonzo Gale	01/01/13	12/31/13	0.00	100.00	66	0
Lumberton MUD	TX1000035	TRUE	TRUE	FALSE	Robb Starr	01/01/13	12/31/13	0.00	100.00	21,450	0
Meeker MWD	TX1230004	TRUE	FALSE	FALSE	Stephanie Hoppe	01/01/13	12/31/13	0.00	100.00	3,300	0
Mulberry Water Supply Brookeland FWSD	TX1210049	TRUE	FALSE	FALSE	Becky Hall	01/01/13	12/31/13	0.00	100.00	111	0
Orange County WCID 1	TX1810005	TRUE	TRUE	FALSE		01/01/13	12/31/13	0.00	100.00	17,031	0
Rayburn Country MUD	TX1210014	TRUE	FALSE	FALSE	Linda Powell	01/15/13	12/15/13	0.00	100.00	1,893	0
Shawnee Shores	TX2020050	TRUE	FALSE	FALSE	Becky Hall	01/01/13	12/31/13	0.00	100.00	348	0
South Newton WSC	TX1760022	TRUE	FALSE	FALSE	Brandy Lane	01/01/13	12/31/13	0.00	100.00	5,000	0
Toledo Village WSC	TX1760002	TRUE	FALSE	FALSE	Becky Hall	01/01/13	12/31/13	0.00	100.00	1,701	0
Tyler County WSC	TX2290037	TRUE	FALSE	FALSE	Jerry Lovelady	01/01/13	12/31/13	0.00	100.00	5,100	0
Woodland Shores Subdivision	TX2100037	FALSE	FALSE	FALSE	Lonzo Gale	01/01/13	12/31/13	0.00	100.00	57	0

PWS Name	Main Lines Miles	Main Lines Miles AS	Wholesale Connections Served	Retail Connections Served	Service Connection Density (c)	Yearly Operating Pressure	Yearly Operating Pressure AS	Volume Units Of Measure	Old Volume Units Of Measure	Water Delivery	Water Delivery AS
Angelina WSC	51	3	0	1,250	25	80	3	G	G	83,587,000	4
Beechwood WSC	11	0	0	504	46	50	0	G	G	0	0
Brookeland FWSD	28	3	0	469	17	75	3	G	G	26,030,000	3
City of Beaumont Water Utility Dept	707	4	4	58,447	83	55	5	G	G	9,451,212,000	4
City of Bridge City	67	4	3	267	4	46	5	G	G	251,281,000	5
City of Bridge City Waterwood Estates	2	4	0	75	38	49	4	G	G	6,732,000	4
City of Brownsboro	16	2	1	380	23	80	2	G	G	47,888,400	4
City of Carthage	330	3	8	4,024	12	42	3	G	G	909,154,000	3
City of Center	82	4	0	2,467	30	50	1	G	G	1,052,708,000	3
City of Crockett	40	0	59	3,186	80	80	0	G	G	373,258,000	0
City of Groves	90	3	0	6,350	71	55	3	G	G	732,678,000	5
City of Hemphill	17	1	3000	692	41	40	1	G	G	193,968,000	3
City of Henderson	125	3	1	5,914	47	50	3	G	G	930,641,000	4
City of Huntington	0	0	0	0	0	0	0	G	G	0	0
City of Huxley	70	1	0	769	11	60	2	G	G	62,580,000	5
City of Jasper	156	0	0	4,786	31	76	2	G	G	608,998,000	4
City of Kountze	40	2	0	1,135	28	54	3	G	G	84,811,000	4
City of Lovelady	12	2	0	388	32	48	3	G	G	31,507,800	4
City of Nederland	106	4	1	8,380	79	58	0	G	G	759,671,000	0
City of Orange	156	2	0	6,921	44	53	2	G	G	1,040,512,000	5
City of Palestine	275	1	0	7,500	27	85	1	G	G	1,570,313,000	4
City of Port Arthur	350	2	0	22,848	65	50	3	G	G	5,622,523,000	5
City of Port Neches	250	4	0	5,334	21	47	4	G	G	565,595,000	4
City of San Augustine	29	3	0	998	34	65	2	G	G	257,201,000	3
City of Silsbee	25	0	0	3,296	132	59	0	G	G	279,818,540	0
City of Tyler	693	5	10	36,414	53	70	2	G	G	8,907,739,200	4
Cypress Creek WSC	30	0	0	270	9	70	0	G	G	23,118,000	0
El Pinon Estates Water System	4	1	0	45	11	42	2	G	G	150,000	3
Forest Hills Water Supply	8	3	0	151	19	55	3	G	G	10,565,000	0
G M WSC	25	1	0	2,974	119	70	2	G	G	27,142,500	4
Jefferson County WCID 10	28	3	0	2,185	78	47	2	G	G	183,410,000	5
Lake Livingston Big Thicket Retreat	5	4	0	36	7	52	3	G	G	2,368,000	4
Lake Livingston Wayward Winds Oasis	2	4	0	13	7	50	3	G	G	675,000	4
Lilly Grove SUD	130	3	0	980	8	85	5	G	G	105,450,000	5
Loma Linda Subdivision	1	1	0	33	66	50	2	G	G	2,121,000	4
Lumberton MUD	305	1	0	7,541	25	54	4	G	G	685,469,000	5
Meeker MWD	48	3	0	1,100	23	50	5	G	G	100,761,560	3
Mulberry Water Supply Brookeland FWSD	1	0	0	37	37	46	3	G	G	1,664,740	4
Orange County WCID 1	110	3	0	4,866	44	55	5	G	G	423,523,000	4
Rayburn Country MUD	44	0	0	778	18	65	0	G	G	109,202,000	0
Shawnee Shores	9	0	0	116	14	55	4	G	G	2,074,470	3
South Newton WSC	87	1	0	1,408	16	53	2	G	G	114,036,000	4
Toledo Village WSC	25	3	0	567	23	55	3	G	G	16,546,900	4
Tyler County WSC	235	0	0	1,787	8	60	0	G	G	168,890,900	0
Woodland Shores Subdivision	12	1	0	19	2	45	2	G	G	608,000	4

PWS Name	Production Meter Accuracy Percentage	Production Meter Accuracy Percentage AS	Corrected Input Volume (c)	Wholesale Water Imported	Wholesale Water Imported AS	Wholesale Water Exported	Wholesale Water Exported AS	System Input Volume (c)	Billed Metered (c)	Billed Metered AS
Angelina WSC	100.00	4.00	83,587,000	0	5	0	5	83,587,000	74,934,000	4
Beechwood WSC	97.00	0.00	0	16816000	0	0	0	16,816,000	12,355,000	0
Brookeland FWSD	99.30	4.00	26,213,494	0	0	0	0	26,213,494	20,209,340	3
City of Beaumont Water Utility Dept	99.90	5.00	9,460,672,673	0	5	561,659,500	4	8,899,013,173	5,179,053,900	3
City of Bridge City	96.00	5.00	261,751,042	0	5	0	5	261,751,042	244,807,000	5
City of Bridge City Waterwood Estates	96.00	4.00	7,012,500	0	5	10	5	7,012,490	6,347,000	4
City of Brownsboro	99.80	5.00	47,984,369	0	0	769,500	3	47,214,869	34,288,392	2
City of Carthage	95.00	2.00	957,004,211	0	0	0	0	957,004,211	843,784,250	4
City of Center	95.00	2.00	1,108,113,684	0	0	0	0	1,108,113,684	892,076,300	4
City of Crockett	98.90	0.00	377,409,505	369193000	0	373,217,700	0	373,384,805	243,236,800	0
City of Groves	99.00	5.00	740,078,788	0	0	0	0	740,078,788	410,254,128	3
City of Hemphill	100.00	3.00	193,968,000	0	0	123,283,000	3	70,685,000	44,818,000	2
City of Henderson	99.90	4.00	931,572,573	0	0	5,415,786	3	926,156,787	748,631,931	3
City of Huntington	0.00	0.00	0	0	0	0	0	0	0	0
City of Huxley	100.30	0.00	62,392,822	0	0	0	0	62,392,822	48,041,000	2
City of Jasper	96.00	4.00	634,372,917	0	0	0	0	634,372,917	480,854,914	2
City of Kountze	102.00	5.00	83,148,039	0	0	0	0	83,148,039	71,755,083	3
City of Lovelady	97.00	4.00	32,482,268	8190800	4	0	1	40,673,068	21,016,300	4
City of Nederland	98.00	0.00	775,174,490	0	0	0	0	775,174,490	570,458,000	4
City of Orange	98.00	5.00	1,061,746,939	0	0	0	0	1,061,746,939	566,263,000	2
City of Palestine	100.00	5.00	1,570,313,000	0	0	0	0	1,570,313,000	1,151,563,000	5
City of Port Arthur	98.00	5.00	5,737,268,367	0	0	0	0	5,737,268,367	1,861,216,310	3
City of Port Neches	98.00	4.00	577,137,755	0	0	0	0	577,137,755	473,331,100	4
City of San Augustine	100.00	5.00	257,201,000	0	3	47,553,000	3	209,648,000	170,786,000	2
City of Silsbee	101.00	0.00	277,048,059	0	0	260,550	0	276,787,509	258,448,600	0
City of Tyler	100.20	2.00	8,889,959,281	0	5	388,015,000	4	8,501,944,281	7,586,613,000	4
Cypress Creek WSC	100.00	0.00	23,118,000	0	0	0	0	23,118,000	17,031,500	0
El Pinon Estates Water System	96.00	2.00	156,250	0	0	0	0	156,250	143,000	2
Forest Hills Water Supply	101.00	4.00	10,460,396	0	0	0	0	10,460,396	9,474,480	3
G M WSC	99.00	4.00	27,416,667	132662130	4	0	0	160,078,797	125,279,980	2
Jefferson County WCID 10	101.70	5.00	180,344,149	0	0	0	0	180,344,149	128,393,000	2
Lake Livingston Big Thicket Retreat	99.00	4.00	2,391,919	0	0	0	0	2,391,919	1,867,000	2
Lake Livingston Wayward Winds Oasis	99.00	4.00	681,818	0	0	0	0	681,818	540,000	2
Lilly Grove SUD	98.00	5.00	107,602,041	0	0	0	0	107,602,041	83,508,000	2
Loma Linda Subdivision	96.00	4.00	2,209,375	0	0	0	0	2,209,375	2,001,000	2
Lumberton MUD	99.90	5.00	686,155,155	0	5	0	5	686,155,155	607,681,140	5
Meeker MWD	104.00	5.00	96,886,115	7100	5	0	0	96,893,215	86,767,039	3
Mulberry Water Supply Brookeland FWSD	100.30	4.00	1,659,761	0	0	0	0	1,659,761	1,573,820	0
Orange County WCID 1	98.00	4.00	432,166,327	0	0	0	0	432,166,327	310,284,880	5
Rayburn Country MUD	99.00	0.00	110,305,051	0	0	0	0	110,305,051	56,838,900	0
Shawnee Shores	98.20	3.00	2,112,495	0	0	0	0	2,112,495	1,860,350	0
South Newton WSC	99.00	0.00	115,187,879	0	0	0	0	115,187,879	76,971,940	2
Toledo Village WSC	99.60	4.00	16,613,353	0	0	0	0	16,613,353	13,348,520	3
Tyler County WSC	100.00	0.00	168,890,900	0	0	0	0	168,890,900	92,429,000	0
Woodland Shores Subdivision	97.00	3.00	626,804	0	0	0	0	626,804	599,000	2

PWS Name	Billed Unmetered	Billed Unmetered AS	Unbilled Metered	Unbilled Metered AS	Unbilled Unmetered (c)	Unbilled Unmetered Uses System Input Vol	Unbilled Unmetered AS	Total Authorized Consumption (c)	Water Losses (c)	Customer Meter Accuracy Percentage
Angelina WSC	0	5	800,000	2	1,044,838	TRUE	5	76,778,838	6,808,163	95
Beechwood WSC	0	0	0	0	210,200	TRUE	0	12,565,200	4,250,800	97
Brookeland FWSD	0	0	0	0	327,669	TRUE	0	20,537,009	5,676,486	95
City of Beaumont Water Utility Dept	0	5	188,896,000	4	111,237,665	TRUE	1	5,479,187,565	3,419,825,608	98
City of Bridge City	0	3	1,890,000	3	3,271,888	TRUE	3	249,968,888	11,782,154	96
City of Bridge City Waterwood Estates	0	5	0	5	87,656	TRUE	4	6,434,656	577,834	96
City of Brownsboro	0	0	403,280	2	590,186	TRUE	0	35,281,858	11,933,011	96
City of Carthage	0	0	0	0	24,840,505	FALSE	4	868,624,755	88,379,456	95
City of Center	45,586,000	3	36,937,000	2	13,851,421	TRUE	2	988,450,721	119,662,963	98
City of Crockett	0	0	5,000,000	0	4,667,310	FALSE	0	252,904,110	120,480,695	95
City of Groves	0	0	77,123,085	3	51,415,390	FALSE	0	538,792,603	201,286,185	96
City of Hemphill	11,332,000	2	5,332,000	1	883,563	TRUE	3	62,365,563	8,319,438	98
City of Henderson	0	0	61,313,600	2	21,721,900	FALSE	2	831,667,431	94,489,356	96
City of Huntington	0	0	0	0	0	TRUE	0	0	0	0
City of Huxley	0	0	0	0	7,089,500	FALSE	3	55,130,500	7,262,322	97
City of Jasper	0	0	0	0	7,929,661	TRUE	0	488,784,575	145,588,341	95
City of Kountze	0	0	1,798,160	2	1,039,350	TRUE	2	74,592,593	8,555,446	99
City of Lovelady	100,000	1	200,000	2	508,413	TRUE	1	21,824,713	18,848,355	98
City of Nederland	0	0	0	0	9,689,681	TRUE	1	580,147,681	195,026,809	98
City of Orange	0	0	0	0	13,271,837	TRUE	2	579,534,837	482,212,102	96
City of Palestine	0	0	0	0	0	FALSE	1	1,151,563,000	418,750,000	100
City of Port Arthur	0	0	208,100	3	71,715,855	TRUE	1	1,933,140,265	3,804,128,103	95
City of Port Neches	924,600	1	17,644,100	3	60,330,200	FALSE	3	552,230,000	24,907,755	98
City of San Augustine	0	0	30,897,000	0	2,620,600	TRUE	0	204,303,600	5,344,400	95
City of Silsbee	0	0	260,550	0	3,459,844	TRUE	0	262,168,994	14,618,516	98
City of Tyler	4,738,322	2	0	2	106,274,304	TRUE	1	7,697,625,626	804,318,656	100
Cypress Creek WSC	0	0	0	0	288,975	TRUE	0	17,320,475	5,797,525	90
El Pinon Estates Water System	0	0	0	0	1,953	TRUE	1	144,953	11,297	96
Forest Hills Water Supply	0	0	34,290	3	130,755	TRUE	0	9,639,525	820,871	95
G M WSC	0	0	0	0	2,000,985	TRUE	0	127,280,965	32,797,832	95
Jefferson County WCID 10	0	0	0	0	2,254,302	FALSE	2	130,647,302	49,696,847	97
Lake Livingston Big Thicket Retreat	0	0	0	0	29,899	TRUE	0	1,896,899	495,020	100
Lake Livingston Wayward Winds Oasis	0	0	0	0	8,523	TRUE	0	548,523	133,295	100
Lilly Grove SUD	0	0	0	0	1,345,026	TRUE	2	84,853,026	22,749,015	96
Loma Linda Subdivision	0	0	0	0	27,617	TRUE	1	2,028,617	180,758	96
Lumberton MUD	0	5	34,724,556	3	6,654,675	FALSE	0	649,060,371	37,094,784	99
Meeker MWD	0	0	0	0	1,211,165	TRUE	0	87,978,204	8,915,011	99
Mulberry Water Supply Brookeland FWSD	0	0	0	0	20,747	TRUE	0	1,594,567	65,194	95
Orange County WCID 1	3,235,000	0	218,459	0	5,402,079	TRUE	0	319,140,418	113,025,908	98
Rayburn Country MUD	0	0	0	0	1,378,813	TRUE	0	58,217,713	52,087,337	80
Shawnee Shores	0	0	0	0	26,406	TRUE	0	1,886,756	225,739	95
South Newton WSC	0	0	26,845,623	1	1,439,848	TRUE	0	105,257,411	9,930,467	98
Toledo Village WSC	0	0	0	0	207,667	TRUE	0	13,556,187	3,057,166	95
Tyler County WSC	0	0	0	0	20,600,000	FALSE	0	113,029,000	55,861,900	96
Woodland Shores Subdivision	0	0	0	0	7,835	TRUE	3	606,835	19,969	99

PWS Name	Customer Meter Accuracy Percentage AS	Customer Meter Accuracy Loss (c)	Data Handling Discrepancy	Data Handling Discrepancy AS	Unauthorized Consumption (c)	Unauthorized Consumption Uses System Input Vol	Unauthorized Consumption AS	Total Apparent Losses (c)	Reported Breaks Leaks	Reported Breaks Leaks AS
Angelina WSC	2	3,943,895	0	0	208,968	TRUE	0	4,152,862	0	0
Beechwood WSC	0	382,113	0	0	42,040	TRUE	0	424,153	1,189,200	0
Brookeland FWSD	3	1,063,649	0	0	65,534	TRUE	4	1,129,183	611,030	4
City of Beaumont Water Utility Dept	3	105,694,978	0	2	22,247,533	TRUE	2	127,942,510	358,762,335	1
City of Bridge City	5	10,200,292	50000	2	654,378	TRUE	0	10,904,669	475,000	2
City of Bridge City Waterwood Estates	4	264,458	50000	2	17,531	TRUE	3	331,990	100,000	3
City of Brownsboro	3	1,428,683	0	0	118,037	TRUE	0	1,546,720	1,005,656	4
City of Carthage	3	44,409,697	0	0	275,160	FALSE	1	44,684,857	3,953,328	3
City of Center	2	18,205,639	1944401	1	2,770,284	TRUE	2	22,920,324	10,500,000	2
City of Crockett	0	12,801,937	0	0	933,462	TRUE	0	13,735,399	6,300,000	0
City of Groves	3	17,093,922	0	0	1,850,197	TRUE	0	18,944,119	15,000,000	0
City of Hemphill	2	914,653	0	0	176,713	TRUE	0	1,091,366	1,000,000	2
City of Henderson	0	31,192,997	0	0	2,315,392	TRUE	0	33,508,389	5,017,500	3
City of Huntington	0	0	0	0	0	TRUE	0	0	0	0
City of Huxley	2	1,485,804	0	0	155,982	TRUE	0	1,641,786	24,000	1
City of Jasper	1	25,308,153	0	0	1,585,932	TRUE	0	26,894,086	204	3
City of Kountze	2	433,129	0	0	207,870	TRUE	2	640,999	2,127,669	4
City of Lovelady	3	428,904	0	0	101,683	TRUE	2	530,587	1,000,000	3
City of Nederland	4	11,642,000	0	0	1,937,936	TRUE	1	13,579,936	50,000,000	1
City of Orange	2	23,594,292	0	0	2,654,367	TRUE	2	26,248,659	18,000,000	2
City of Palestine	2	0	0	0	3,925,783	TRUE	0	3,925,783	250,000,000	4
City of Port Arthur	1	97,958,753	0	0	14,343,171	TRUE	0	112,301,924	2,500,000,000	3
City of Port Neches	3	9,659,818	0	5	1,442,844	TRUE	2	11,102,663	4,750,000	3
City of San Augustine	2	8,988,737	0	0	524,120	TRUE	0	9,512,857	1,500,000	1
City of Silsbee	0	5,274,461	0	0	691,969	TRUE	0	5,966,430	50,000	0
City of Tyler	2	0	0	4	21,254,861	TRUE	2	21,254,861	5,000,000	2
Cypress Creek WSC	0	1,892,389	0	0	57,795	TRUE	0	1,950,184	1,330,200	0
El Pinon Estates Water System	1	5,958	0	1	391	TRUE	1	6,349	0	0
Forest Hills Water Supply	3	498,657	0	0	26,151	TRUE	4	524,808	81,450	4
G M WSC	2	6,593,683	0	0	400,197	TRUE	0	6,993,880	4,891,282	3
Jefferson County WCID 10	2	3,970,918	0	2	450,860	FALSE	1	4,421,778	15,123,183	4
Lake Livingston Big Thicket Retreat	4	9,382	0	5	5,980	TRUE	0	15,362	76,673	5
Lake Livingston Wayward Winds Oasis	4	2,714	0	5	1,705	TRUE	0	4,418	2,514	5
Lilly Grove SUD	2	3,479,500	0	0	269,005	TRUE	2	3,748,505	21,942,000	3
Loma Linda Subdivision	4	83,375	20000	3	5,523	TRUE	0	108,898	60,000	4
Lumberton MUD	3	9,254,028	315048	3	1,715,388	TRUE	2	11,284,463	5,512,792	3
Meeker MWD	0	876,435	800000	3	242,233	TRUE	0	1,918,668	3,659,000	1
Mulberry Water Supply Brookeland FWSD	0	82,833	0	0	4,149	TRUE	0	86,982	36,889	4
Orange County WCID 1	1	6,332,344	61590571	1	1,080,416	TRUE	1	69,003,331	22,795,000	0
Rayburn Country MUD	0	14,209,725	0	0	275,763	TRUE	0	14,485,488	46,050,000	0
Shawnee Shores	3	97,913	0	0	5,281	TRUE	0	103,194	242,410	0
South Newton WSC	0	1,570,856	0	0	287,970	TRUE	0	1,858,826	500,000	0
Toledo Village WSC	3	702,554	0	0	41,533	TRUE	5	744,087	283,796	4
Tyler County WSC	0	3,851,208	0	0	500,000	FALSE	0	4,351,208	34,891,000	0
Woodland Shores Subdivision	3	6,051	0	0	1,567	TRUE	0	7,618	7,000	2

PWS Name	Unreported Loss (c)	Unreported Leaks Repaired AS	Total Real Losses (c)	Apparent Plus Real Losses(c)	Nonrevenue Water (c)	Apparent Loss Connections (c)	Real Loss Volume (c)	Unavoidable Annual Real Losses (c)	Infrastructure Leakage Index (c)
Angelina WSC	2,655,300	0	2,655,300	6,808,163	8,653,000	9	2,655,300	13,531,572	0
Beechwood WSC	2,637,447	0	3,826,647	4,250,800	4,461,000	2	3,826,647	2,467,732	2
Brookeland FWSD	3,936,273	0	4,547,303	5,676,486	6,004,154	7	4,547,303	6,072,596	1
City of Beaumont Water Utility Dept	2,933,120,763	2	3,291,883,098	3,419,825,608	3,719,959,273	6	3,291,883,098	252,782,794	13
City of Bridge City	402,484	2	877,484	11,782,154	16,944,042	112	877,484	6,758,311	0
City of Bridge City Waterwood Estates	145,844	2	245,844	577,834	665,490	12	245,844	394,722	1
City of Brownsboro	9,380,635	0	10,386,291	11,933,011	12,926,477	11	10,386,291	4,266,199	2
City of Carthage	39,741,270	1	43,694,598	88,379,456	113,219,961	30	43,694,598	36,621,837	1
City of Center	86,242,639	1	96,742,639	119,662,963	170,451,384	25	96,742,639	14,849,478	7
City of Crockett	100,445,296	0	106,745,296	120,480,695	130,148,005	12	106,745,296	20,273,560	5
City of Groves	167,342,066	0	182,342,066	201,286,185	329,824,660	8	182,342,066	28,895,955	6
City of Hemphill	6,228,072	0	7,228,072	8,319,438	14,535,000	4	7,228,072	2,858,242	3
City of Henderson	55,963,466	3	60,980,966	94,489,356	177,524,856	16	60,980,966	28,531,138	2
City of Huntington	0	0	0	0	0	0	0	0	0
City of Huxley	5,596,535	0	5,620,535	7,262,322	14,351,822	6	5,620,535	10,819,695	1
City of Jasper	118,694,052	2	118,694,256	145,588,341	153,518,003	15	118,694,256	43,325,996	3
City of Kountze	5,786,777	1	7,914,446	8,555,446	11,392,956	2	7,914,446	7,620,872	1
City of Lovelady	17,317,768	1	18,317,768	18,848,355	19,556,768	4	18,317,768	2,157,062	8
City of Nederland	131,446,872	0	181,446,872	195,026,809	204,716,490	4	181,446,872	38,750,838	5
City of Orange	437,963,443	2	455,963,443	482,212,102	495,483,939	10	455,963,443	36,409,418	13
City of Palestine	164,824,218	1	414,824,218	418,750,000	418,750,000	1	414,824,218	81,060,569	5
City of Port Arthur	1,191,826,179	0	3,691,826,179	3,804,128,103	3,876,052,057	13	3,691,826,179	97,102,775	38
City of Port Neches	9,055,092	2	13,805,092	24,907,755	102,882,055	6	13,805,092	36,927,853	0
City of San Augustine	-5,668,457	1	-4,168,457	5,344,400	38,862,000	26	-4,168,457	7,273,848	-1
City of Silsbee	8,602,086	0	8,652,086	14,618,516	18,338,909	5	8,652,086	13,543,425	1
City of Tyler	778,063,795	0	783,063,795	804,318,656	910,592,959	2	783,063,795	235,346,927	3
Cypress Creek WSC	2,517,141	0	3,847,341	5,797,525	6,086,500	20	3,847,341	5,181,540	1
El Pinon Estates Water System	4,948	0	4,948	11,297	13,250	0	4,948	435,219	0
Forest Hills Water Supply	214,613	2	296,063	820,871	985,916	10	296,063	1,323,545	0
G M WSC	20,912,670	0	25,803,952	32,797,832	34,798,817	6	25,803,952	14,853,493	2
Jefferson County WCID 10	30,151,887	1	45,275,070	49,696,847	51,951,149	6	45,275,070	8,221,191	6
Lake Livingston Big Thicket Retreat	402,985	0	479,658	495,020	524,919	1	479,658	605,633	1
Lake Livingston Wayward Winds Oasis	126,363	0	128,877	133,295	141,818	1	128,877	223,179	1
Lilly Grove SUD	-2,941,490	2	19,000,510	22,749,015	24,094,041	10	19,000,510	26,380,558	1
Loma Linda Subdivision	11,859	1	71,859	180,758	208,375	9	71,859	139,704	1
Lumberton MUD	20,297,529	2	25,810,321	37,094,784	78,474,015	4	25,810,321	54,817,452	0
Meeker MWD	3,337,343	0	6,996,343	8,915,011	10,126,176	5	6,996,343	7,750,410	1
Mulberry Water Supply Brookeland FWSD	-58,677	2	-21,788	65,194	85,941	6	-21,788	184,018	0
Orange County WCID 1	21,227,577	0	44,022,577	113,025,908	118,646,447	39	44,022,577	26,599,375	2
Rayburn Country MUD	-8,448,150	0	37,601,850	52,087,337	53,466,151	51	37,601,850	8,416,207	4
Shawnee Shores	-119,866	0	122,544	225,739	252,145	2	122,544	1,272,454	0
South Newton WSC	7,571,642	0	8,071,642	9,930,467	38,215,939	4	8,071,642	13,190,775	1
Toledo Village WSC	2,029,283	2	2,313,079	3,057,166	3,264,833	4	2,313,079	4,422,523	1
Tyler County WSC	16,619,692	0	51,510,692	55,861,900	76,461,900	7	51,510,692	33,712,860	2
Woodland Shores Subdivision	5,352	1	12,352	19,969	27,804	1	12,352	1,113,122	0

PWS Name	Real Loss Connections (c)	Real Loss Miles (c)	Total Apparent Losses 2 (c)	Retail Price Of Water	Retail Price Of Water AS	Cost Of Apparent Losses (c)	Real Losses Duplicate 2 (c)	Variable Production Cost Of Water	Variable Production Cost Of Water AS	Cost Of Real Losses (c)
Angelina WSC	6	143	4,152,862	0.00	5.00	8,596	2,655,300	0	0	5,496
Beechwood WSC	21	951	424,153	2.87	0.00	1,217,320	3,826,647	3	0	10,140,613
Brookeland FWSD	27	445	1,129,183	0.00	4.00	2,823	4,547,303	0	4	2,274
City of Beaumont Water Utility Dept	154	12757	127,942,510	0.00	4.00	522,005	3,291,883,098	0	4	1,310,169
City of Bridge City	9	36	10,904,669	0.00	3.00	26,171	877,484	0	0	114
City of Bridge City Waterwood Estates	9	337	331,990	0.00	4.00	863	245,844	0	4	81
City of Brownsboro	75	1728	1,546,720	0.01	2.00	16,241	10,386,291	0	2	5,681
City of Carthage	30	363	44,684,857	0.00	2.00	172,037	43,694,598	0	2	50,249
City of Center	107	3232	22,920,324	0.00	3.00	55,467	96,742,639	0	2	84,843
City of Crockett	92	7311	13,735,399	0.01	0.00	189,549	106,745,296	0	0	1,473,085
City of Groves	79	5551	18,944,119	0.65	2.00	12,313,677	182,342,066	0	1	32,821,572
City of Hemphill	29	1165	1,091,366	0.00	1.00	3,274	7,228,072	0	1	19,444
City of Henderson	28	1337	33,508,389	0.00	4.00	110,578	60,980,966	0	3	48,785
City of Huntington	0	0	0	0.00	0.00	0	0	0	0	0
City of Huxley	20	220	1,641,786	5.00	0.00	8,208,931	5,620,535	0	1	12,101
City of Jasper	68	2085	26,894,086	0.00	2.00	29,315	118,694,256	0	2	2,967,356
City of Kountze	19	542	640,999	0.00	2.00	1,846	7,914,446	0	4	2,691
City of Lovelady	129	4182	530,587	0.01	2.00	4,643	18,317,768	0	1	109,907
City of Nederland	59	4690	13,579,936	0.00	4.00	34,629	181,446,872	0	0	217,736
City of Orange	181	8008	26,248,659	2.51	2.00	65,884,134	455,963,443	0	2	50,155,979
City of Palestine	152	4133	3,925,783	3.52	2.00	13,818,754	414,824,218	0	3	3,526,006
City of Port Arthur	443	28899	112,301,924	0.00	2.00	494,128	3,691,826,179	0	3	2,152,335
City of Port Neches	7	151	11,102,663	0.00	3.00	35,529	13,805,092	0	3	79,379
City of San Augustine	0	0	9,512,857	21.78	2.00	207,190,022	-4,168,457	0	1	-1,292,222
City of Silsbee	7	948	5,966,430	0.03	0.00	178,993	8,652,086	0	0	173,042
City of Tyler	59	3096	21,254,861	0.00	4.00	47,823	783,063,795	0	3	440,082
Cypress Creek WSC	39	351	1,950,184	0.37	0.00	711,817	3,847,341	1	0	3,847,341
El Pinon Estates Water System	0	3	6,349	0.00	1.00	24	4,948	0	1	19
Forest Hills Water Supply	5	101	524,808	0.00	4.00	1,312	296,063	0	4	178
G M WSC	24	2828	6,993,880	0.00	2.00	25,528	25,803,952	8	2	211,076,324
Jefferson County WCID 10	57	4430	4,421,778	0.02	4.00	103,912	45,275,070	0	2	43,011
Lake Livingston Big Thicket Retreat	37	268	15,362	0.04	3.00	595	479,658	0	3	192
Lake Livingston Wayward Winds Oasis	27	186	4,418	0.04	3.00	171	128,877	0	3	77
Lilly Grove SUD	53	400	3,748,505	4.25	2.00	15,931,147	19,000,510	1	1	23,750,638
Loma Linda Subdivision	6	394	108,898	0.00	3.00	490	71,859	0	1	323
Lumberton MUD	9	232	11,284,463	0.00	3.00	25,954	25,810,321	0	3	6,762
Meeker MWD	17	399	1,918,668	0.01	5.00	18,995	6,996,343	0	2	2,099
Mulberry Water Supply Brookeland FWSD	0	0	86,982	0.00	4.00	217	-21,788	0	4	-13
Orange County WCID 1	25	1096	69,003,331	0.00	5.00	179,409	44,022,577	0	1	7,924
Rayburn Country MUD	132	2341	14,485,488	0.01	0.00	166,583	37,601,850	0	0	31,962
Shawnee Shores	3	40	103,194	0.00	4.00	258	122,544	0	4	61
South Newton WSC	16	254	1,858,826	0.00	0.00	7,435	8,071,642	0	0	4,359
Toledo Village WSC	11	253	744,087	0.00	4.00	1,860	2,313,079	0	4	1,619
Tyler County WSC	79	601	4,351,208	0.00	0.00	15,229	51,510,692	0	0	19,059
Woodland Shores Subdivision	2	3	7,618	0.00	3.00	10	12,352	0	1	16

East Texas Regional Water Planning Area
2013 Production Water Loss Audit Data

PWS Name	Total Assessment Score (c)	Total Cost Of Losses (c)	Saved Date	Survey Submitted	Date Submitted	Create Date	Total Loss Percent (c)
Angelina WSC	47	14,093	06/11/14	TRUE	06/11/14	06/11/14	8.15
Beechwood WSC	0	11,357,934		TRUE	04/08/14	04/08/14	25.28
Brookeland FWSD	35	5,097	03/31/14	TRUE	03/31/14	02/05/14	21.65
City of Beaumont Water Utility Dept	58	1,832,175	05/01/14	TRUE	05/01/14	04/28/14	38.43
City of Bridge City	57	26,285	04/28/14	TRUE	04/28/14	04/16/14	4.50
City of Bridge City Waterwood Estates	66	944	04/28/14	TRUE	04/28/14	04/16/14	8.24
City of Brownsboro	31	21,922	04/17/14	TRUE	04/17/14	04/15/14	25.27
City of Carthage	31	222,285	04/04/14	TRUE	05/21/14	04/02/14	9.24
City of Center	34	140,310	04/30/14	TRUE	04/30/14	04/29/14	10.80
City of Crockett	0	1,662,634	04/22/14	TRUE	04/23/14	04/22/14	32.27
City of Groves	28	45,135,249	04/15/14	TRUE	04/23/14	03/06/14	27.20
City of Hemphill	25	22,718	01/24/14	TRUE	01/24/14	01/24/14	11.77
City of Henderson	37	159,362	05/12/14	TRUE	05/21/14	05/09/14	10.20
City of Huntington	0	0	04/24/14	FALSE		04/24/14	0.00
City of Huxley	17	8,221,032	03/28/14	TRUE	03/28/14	03/27/14	11.64
City of Jasper	22	2,996,671	05/27/14	TRUE	05/27/14	05/27/14	22.95
City of Kountze	36	4,537	03/10/14	TRUE	03/10/14	03/06/14	10.29
City of Lovelady	38	114,549	01/08/14	TRUE	01/08/14	01/08/14	46.34
City of Nederland	19	252,365	04/28/14	TRUE	04/28/14	04/28/14	25.16
City of Orange	30	116,040,113		TRUE	05/09/14	05/09/14	45.42
City of Palestine	29	17,344,760	05/06/14	TRUE	05/07/14	05/06/14	26.67
City of Port Arthur	31	2,646,463	04/23/14	TRUE	04/23/14	03/11/14	66.31
City of Port Neches	48	114,908	04/02/14	TRUE	04/02/14	03/19/14	4.32
City of San Augustine	28	205,897,800	04/14/14	TRUE	04/15/14	04/14/14	2.55
City of Silsbee	0	352,035	03/31/14	TRUE	03/31/14	02/26/14	5.28
City of Tyler	48	487,905	04/23/14	TRUE	05/21/14	04/07/14	9.46
Cypress Creek WSC	0	4,559,158		TRUE	05/14/14	05/14/14	25.08
El Pinon Estates Water System	16	42		TRUE	03/27/14	03/27/14	7.23
Forest Hills Water Supply	37	1,490	02/05/14	TRUE	03/31/14	01/29/14	7.85
G M WSC	26	211,101,851	02/24/14	TRUE	02/26/14	02/24/14	20.49
Jefferson County WCID 10	35	146,923	04/04/14	TRUE	04/04/14	03/21/14	27.56
Lake Livingston Big Thicket Retreat	37	787	02/28/14	TRUE	02/28/14	02/28/14	20.70
Lake Livingston Wayward Winds Oasis	37	248	03/04/14	TRUE	03/04/14	03/04/14	19.55
Lilly Grove SUD	34	39,681,784	02/06/14	TRUE	02/06/14	02/04/14	21.14
Loma Linda Subdivision	30	813	03/27/14	TRUE	04/04/14	03/27/14	8.18
Lumberton MUD	57	32,717	05/29/14	TRUE	05/29/14	05/27/14	5.41
Meeker MWD	35	21,094	05/22/14	TRUE	05/22/14	05/22/14	9.20
Mulberry Water Supply Brookeland FWSD	25	204	02/05/14	TRUE	03/31/14	02/05/14	3.93
Orange County WCID 1	30	187,333	05/09/14	TRUE	05/09/14	04/07/14	26.15
Rayburn Country MUD	0	198,545	02/24/14	TRUE	02/24/14	02/20/14	47.22
Shawnee Shores	21	319	02/05/14	TRUE	03/31/14	02/05/14	10.69
South Newton WSC	10	11,794	03/04/14	TRUE	03/04/14	03/04/14	8.62
Toledo Village WSC	39	3,479	02/05/14	TRUE	03/31/14	02/05/14	18.40
Tyler County WSC	0	34,288	04/14/14	TRUE	04/14/14	04/14/14	33.08
Woodland Shores Subdivision	25	25	03/28/14	TRUE	04/04/14	03/28/14	3.19

Appendix 2-A

Correspondence of the ETRWPG Chair to the TWDB

Following is a letter from Kelley Holcomb, Chair of the ETRWPG, to the TWDB, regarding the 2016 Plan Projected Demands. The letter is dated September 27, 2012, and contains a letter prepared by Alan Plummer Associates, Inc. presenting revised non-municipal demand projections with the following attachments:

- Attachment 1 – Summary of Proposed non-Municipal Water Demands
- Attachment 2 – Non-Municipal Water Demands Revisions on Tables Provided by the Texas Water Development Board
- Attachment 3 – Irrigation Water Demands Evaluation
- Attachment 4 – Rice Irrigation Demand Projections Technical Memorandum
- Attachment 5 – Meeting Summary of Non-Municipal Water Demands in Jefferson County
- Attachment 6 – John Martin Correspondence Regarding Manufacturing and Steam-Electric Demands in Tyler County
- Attachment 7 – Kelley Holcomb Correspondence Regarding Mining Demands

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EAST TEXAS
Regional Water Planning Group
Region I WPG

September 27, 2012

Ms. Melanie Callahan
Executive Administrator
Texas Water Development Board
1700 North Congress Avenue
Austin, Texas 78701

Re: Transmittal of Recommended Changes to Proposed Non-Municipal Water Demand Projections for the East Texas Regional Water Planning Area (Region I)

Dear Ms. Callahan:

The Texas Water Development Board (TWDB) has provided proposed non-municipal water demand projections for the 20 counties included in the East Texas Regional Water Planning Area (ETRWPA). In addition, the TWDB has invited the East Texas Regional Water Planning Group (ETRWPG) to submit recommendations for changes to the proposed projections before the proposed projections are taken to the agency's board (Board) for adoption. On September 12, 2012, the ETRWPG considered the projections and agreed that changes to some categories of projections are justified.

Attached is a letter from Mr. Rex H. Hunt, P.E., of Alan Plummer Associates, Inc., Project Manager for the ETRWPA consultant team. The letter transmits the recommended changes to the proposed non-municipal water demand projections. In addition, the letter includes back-up information related to the proposed changes. These recommended changes have been adopted by the ETRWPG.

Pursuant to the TWDB request, the consultant team will transmit separately, via electronic mail, an electronic file (Excel spreadsheet) of the changes recommended herein to Mr. Lann Bookout, TWDB Project Manager for the ETRWPA. The electronic file will include the tables contained in Attachment 2 of the enclosed recommendations.

Lila Fuller, Administrative Contact
P. O. Box 635030, Nacogdoches, TX 75963-5030
Phone: 936-559-2504 Fax: 936-559-2912

It is understood that additional changes to the mining water demand are being contemplated by TWDB staff as a result of revisions that are underway to a report on mining demand in the State. Mining water demand associated particularly with the oil and gas industry is an especially important issue to the ETRWPG due to significant gas-shale plays located within the region. If projections are modified for the ETRWPA, as a result of the revised report, the ETRWPG requests the opportunity to review those changes before projections are formalized by Board action.

In addition, it is understood that the TWDB staff will evaluate this request and incorporate changes, as appropriate, prior to submitting the final proposed projections to the Board for approval. The Board's approval of the projections will then start a process of formal adoption, which will include a public comment period wherein the ETRWPG may formally request further changes to the projections, if desired.

The ETRWPG appreciates the opportunity to submit these recommendations for changes to the non-municipal water demand projections. Please do not hesitate to contact me if you have any questions.

Respectfully,

Kelley Holcomb, Chair
East Texas Regional Water Planning Group

Enclosures

cc: Mr. Lann Bookout, Texas Water Development Board
Ms. Lila Fuller, City of Nacogdoches

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ALAN R. TUCKER, PE

1600-002-01

September 26, 2012

Mr. Kelley Holcomb, Chair
East Texas Regional Water Planning Group
c/o City of Nacogdoches
202 E. Pilar Street
Nacogdoches, Texas 75961

Re: Recommended Revisions to Non-Municipal Water Demands
East Texas Regional Water Planning Area

Dear Chairman Holcomb:

This letter transmits recommendations for modifications of the non-municipal water demands for the 2016 Regional Water Plan (2016 Plan) for the East Texas Regional Water Planning Area (ETRWPA). These recommendations were requested by the East Texas Regional Water Planning Group (ETRWPG) at its meeting on February 1, 2012. Following is a brief explanation of the non-municipal demands and the recommended changes. A summary of the recommended changes is provided as Attachment 1 to this letter. Attachment 2 provides the information in a format requested by the Texas Water Development Board (TWDB).

NON-MUNICIPAL WATER DEMAND CHANGES

The non-municipal water demands are divided into five categories of use, as follows:

- Irrigation
- Manufacturing
- Steam-Electric
- Mining
- Livestock

The TWDB provided initial estimates of water demand for each county in the ETRWPA for each of these categories of use and requested the ETRWPG to consider whether any changes should be made to the demands. At the February 1 meeting of the ETRWPG, the consultant team was charged with the task of evaluating the demand projections and suggesting potential changes to the projections, as appropriate. Several specific areas in need of evaluation were identified at the meeting, including rice irrigation in coastal counties in the region, a possible new irrigation need for bio-fuel crops, and poultry water demands in the region. At the ETRWPG meeting of September 12, 2012, additional possible changes were discussed, including modifications for mining, manufacturing, and steam-electric categories in selected counties. Following (Table 1) is a summary of the proposed changes to non-municipal water demands for the ETRWPA on a category by category basis. The recommended projections are shown in red.

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Table 1
Summary of Proposed Revisions by Demand Category

Demand Category	State Water Plan Year	Volume (af/yr)					
		2020	2030	2040	2050	2060	2070
Irrigation	2012 Plan Projections[1]	151,417	151,771	152,153	152,575	153,040	NA
	2017 Plan Projections[2]	89,375	89,653	89,953	90,284	90,648	91,137
	2017 ETRWPG Projections[3]	177,919	187,894	194,851	197,546	195,445	192,186
Manufacturing	2012 Plan Projections	591,904	784,140	821,841	857,902	893,476	NA
	2017 Plan Projections	608,237	800,559	838,209	874,116	908,943	945,456
	2017 ETRWPG Projections	608,667	800,989	838,639	874,546	909,373	945,886
Mining	2012 Plan Projections	37,297	17,331	18,385	19,432	20,314	NA
	2017 Plan Projections	25,474	21,792	16,664	11,636	6,857	7,066
	2017 ETRWPG Projections	22,817	17,923	6,716	5,590	4,600	4,890
Steam Electric	2012 Plan Projections	80,989	94,515	111,006	131,108	155,611	NA
	2017 Plan Projections	81,016	94,547	111,043	131,152	155,663	183,747
	2017 ETRWPG Projections	82,018	95,544	112,035	132,137	156,640	184,714
Livestock	2012 Plan Projections	25,114	26,899	29,020	31,546	34,533	NA
	2017 Plan Projections	21,389	22,911	24,723	26,883	29,443	30,126
	2017 ETRWPG Projections	24,027	25,549	27,361	29,521	32,081	32,764
Total Non-Municipal Water Demands	2012 Plan Projections	886,721	1,074,656	1,132,405	1,192,563	1,256,974	NA
	2017 Plan Projections	825,491	1,029,462	1,080,592	1,134,071	1,191,554	1,257,532
	2017 ETRWPG Projections	915,448	1,127,899	1,179,602	1,239,340	1,298,139	1,360,440

[1] 2012 Plan Projections are from the *2012 State Water Plan* and *2011 Update of the Regional Water Plan* in the East Texas Regional Water Planning Area (ETRWPA) or Region I

[2] 2017 Plan Projections are from the 2017 database (DB17) provided by the Texas Water Development Board

[3] 2017 ETRWPG Projections are those proposed by the East Texas Regional Water Planning Group (ETRWPG)

A discussion of all recommendations for non-municipal demands by category is described below.

Irrigation

The consultant team recommends revisions to irrigation demands for all counties but one in the ETRWPA. Changes to 16 of the 20 counties in the region are related to recent historical irrigation demands, while changes to non-municipal demands in three counties are related to an alternative approach to projections of rice irrigation demands.

The TWDB projections of irrigation demand for the 2017 State Water Plan were based generally on an assumption of average demand for each county in the region using the most recent five years of available irrigation data. This average demand was used as the starting point for the projections. Demand changes over time rose, fell, or remained constant in accordance with what the previous water plan assumed. The consultant team has revised this approach by assuming that the starting point would be the maximum demand of the last five years of data. This approach was used for the following counties in the ETRWPA:

Anderson	Nacogdoches	Shelby
Angelina	Newton	Smith
Cherokee	Panola	Trinity
Henderson	Polk	Tyler
Houston	Rusk	
Jasper	San Augustine	

The revised approach has had the effect of increasing irrigation demand for the 16 counties. Attachment 3 contains a summary of the irrigation water demand evaluation for each of the above counties.

For Hardin, Jefferson, and Orange Counties, a different approach was taken. These counties have significant rice irrigation demands (or have had historically). The approach taken to project irrigation demands in these counties was detailed in a draft technical memorandum prepared by the consultant team entitled, *Rice Water Demand Projections Revisions*, dated August 21, 2012. This memorandum was presented to the ETRWPG Technical Committee in August and to the ETRWPG at the September 12 meeting and is included as Attachment 4 to this letter. The revised approach for rice irrigation demands had the effect of significantly increasing irrigation demand in these three counties over what the TWDB has proposed.

The TWDB has not yet indicated whether they agree with the approach proposed in the draft *Rice Water Demand Projections Revisions* Technical Memorandum. TWDB staff indicated that they believe there should be an assumption of no rice irrigation in Orange County on the belief that there has been no credible report of irrigation within the past five years.

An additional modification to irrigation demands for Jefferson County has been developed to account for a new bio-fuels industry that appears to be ready to take off in the county. Under contract to oil and gas industry companies, farmers in Jefferson County are beginning to raise "energy cane," which is a crop with a high capacity for producing bio-fuels. It has been estimated that approximately 26,000 acre-feet per year (af/yr) of irrigation will be needed for this crop in Jefferson County by 2020. This assumption has been carried forward for each decade in the planning period. Attachment 5 contains a copy of a summary of a meeting with representatives of the farming industry, oil and gas industry, the TWDB, and the ETRWPG, in which bio-fuels crop irrigation demands were addressed.

Sabine County irrigation projections have been assumed in previous water plans to be zero throughout the planning horizon. Likewise, the TWDB projected irrigation demand for Sabine County to remain at zero throughout the planning horizon. There is no historical information that irrigated agriculture is occurring in the county. Therefore, it is recommended that Sabine County continue to reflect no irrigation demand.

Table 1 and Figure 1 in Attachment 1 provide the recommended irrigation demands for each county in the ETRWPA.

Manufacturing

Changes to the TWDB's proposed manufacturing water demand numbers are recommended only for Tyler County. John Martin of the Southeast Texas Groundwater Conservation District and representing Groundwater Management Area 14 on the ETRWPG, has reported that a new wood pellet manufacturing facility is under construction in the City of Woodville and has received authorization from the Southeast Texas Groundwater Conservation District to withdraw 430 af/yr of groundwater for use in the process. Attachment 6 contains an email from Mr. Martin regarding manufacturing and steam-electric demands in Tyler County. In addition, Mr. Martin has requested additional documentation regarding this demand from the manufacturer. He expects this demand to be in place prior to 2020. Therefore, this demand has been added to the Tyler County manufacturing demand projections for 2020 and is assumed to remain constant through 2070.

Table 2 and Figure 2 in Attachment 1 provide the recommended manufacturing demands for each county in the ETRWPA.

Steam Electric

Changes to the TWDB's proposed steam electric water demand numbers are only recommended for Tyler County. John Martin has reported that a biomass electric generating facility is under construction in the City of Woodville and is expected to have a demand of 1,029 af/yr. He expects this demand to be in place prior to 2020 (see

Attachment 6). Mr. Martin has requested additional documentation regarding steam electric demand from the power generating company. Therefore, this demand has been added to the Tyler County steam electric demand projections.

Table 3 and Figure 3 in Attachment 1 provide the recommended steam electric demands for each county in the ETRWPA.

Mining

Changes to the TWDB's proposed mining water demands are not recommended for any county in the ETRWPA except Nacogdoches, Panola, Rusk, Sabine, San Augustine, and Shelby Counties. At the September 12 ETRWPA meeting, Leah Adams, General Manager for the Panola County Groundwater Conservation District and the representative from GMA 11, reported that the shale gas water demands for Panola County are approximately 50% above the initial demands provided by the TWDB. In addition, documentation of mining water projections has been provided for Nacogdoches, Rusk, Sabine, San Augustine, and Shelby Counties (see Attachment 7). On the basis of these reports, mining water demand projections have been modified for six counties in the ETRWPA.

The TWDB is expecting a revision of the Bureau of Economic Geology report on mining water demands soon. The revised report may make significant changes to the TWDB's proposed mining water demand projections. It will be necessary to revisit these demands at that time.

Table 4 and Figure 4 in Attachment 1 provide the recommended mining demands for each county in the ETRWPA.

Livestock

Changes to livestock water demands are recommended for the ETRWPA on the basis of a significant change in the way poultry water demands are determined. The consultant team, with the support of David Alders from the ETRWPG, have researched water demands for poultry production and concluded that the water demand projections provided by the TWDB are inadequate, as they do not account for cooling water demands for the poultry houses in the region. Cooling water demands appear to increase the water requirements for poultry by approximately 15 gallons per 1,000 chickens. The result has been a projected increase in livestock water demand for all counties in the region. A technical memorandum will be prepared to describe the methodology for the revisions to the poultry water demands.

Table 5 and Figure 5 in Attachment 1 provide the recommended livestock demands for each county in the ETRWPA.

NEXT STEPS

Once the ETRWPG has approved the final numbers for its recommended demands, it will be necessary to transmit the recommended changes to TWDB. At the request of the ETRWPG, the ETRWPA consultant team will prepare a final transmittal to the TWDB, which will include the final demand projections in the format provided in Attachment 2. This will include an electronic submittal of the projections as an excel file.

We appreciate the opportunity to support the ETRWPG in preparation of the 2016 Regional Water Plan. Please let me know if you need additional information or have any questions.

Sincerely,

ALAN PLUMMER ASSOCIATES, INC.
TBPE Firm Registration No. F-13

Rex H. Hunt, PE
Principal

RHH/rjm

Enclosures

cc: Mr. Michael Harbordt, East Texas Regional Water Planning Group
Mr. Lann Bookout, Texas Water Development Board
Ms. Simone Kiel, P.E., Freese and Nichols, Inc.

Attachment 1
Summary of Proposed Non-Municipal Water Demands

Table 1

Attachment 1
East Texas Regional Water Planning Area
Non-Municipal Water Demand Projections
Irrigation Water Demands

County	State Water Plan Year	Volume (af/yr)					
		2020	2030	2040	2050	2060	2070
Anderson	2012 Plan Projections[1]	212	212	212	212	212	NA
	2017 Plan Projections[2]	403	403	403	403	403	403
	2017 ETRWPG Projections[3]	462	462	462	462	462	462
Angelina	2012 Plan Projections	30	30	30	30	30	NA
	2017 Plan Projections	294	294	294	294	294	294
	2017 ETRWPG Projections	481	481	481	481	481	481
Cherokee	2012 Plan Projections	321	321	321	321	321	NA
	2017 Plan Projections	294	294	294	294	294	294
	2017 ETRWPG Projections	355	355	355	355	355	355
Hardin	2012 Plan Projections	3,502	3,502	3,502	3,502	3,502	NA
	2017 Plan Projections	1,349	1,349	1,349	1,349	1,349	1,349
	2017 ETRWPG Projections	3,414	3,645	3,804	3,861	3,802	3,712
Henderson	2012 Plan Projections	10	10	10	10	10	NA
	2017 Plan Projections	284	284	284	284	284	284
	2017 ETRWPG Projections	384	384	384	384	384	384
Houston	2012 Plan Projections	3,024	3,343	3,691	4,077	4,503	NA
	2017 Plan Projections	2,333	2,579	2,847	3,145	3,474	3,922
	2017 ETRWPG Projections	2,989	3,235	3,503	3,801	4,130	4,578
Jasper	2012 Plan Projections	0	0	0	0	0	NA
	2017 Plan Projections	0	0	0	0	0	0
	2017 ETRWPG Projections	36	36	36	36	36	36
Jefferson	2012 Plan Projections	140,000	140,000	140,000	140,000	140,000	NA
	2017 Plan Projections	82,814	82,814	82,814	82,814	82,814	82,814
	2017 ETRWPG Projections	161,952	171,165	177,490	179,735	177,394	173,833
Nacogdoches	2012 Plan Projections	302	302	302	302	302	NA
	2017 Plan Projections	330	330	330	330	330	330
	2017 ETRWPG Projections	400	400	400	400	400	400
Newton	2012 Plan Projections	367	367	367	367	367	NA
	2017 Plan Projections	0	0	0	0	0	0
	2017 ETRWPG Projections	375	375	375	375	375	375
Orange	2012 Plan Projections	2,509	2,509	2,509	2,509	2,509	NA
	2017 Plan Projections	0	0	0	0	0	0
	2017 ETRWPG Projections	3,730	3,983	4,156	4,218	4,153	4,056
Panola	2012 Plan Projections	0	0	0	0	0	NA
	2017 Plan Projections	31	31	31	31	31	31
	2017 ETRWPG Projections	64	64	64	64	64	64
Polk	2012 Plan Projections	135	135	135	135	135	NA
	2017 Plan Projections	259	259	259	259	259	259
	2017 ETRWPG Projections	428	428	428	428	428	428

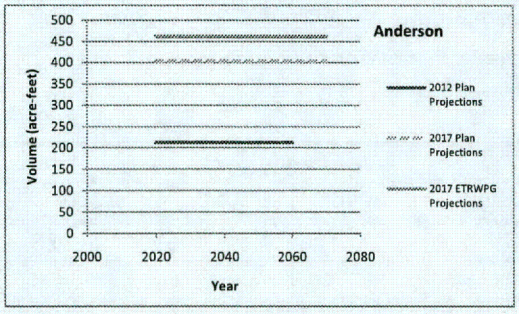
Attachment 1
East Texas Regional Water Planning Area
Non-Municipal Water Demand Projections
Irrigation Water Demands

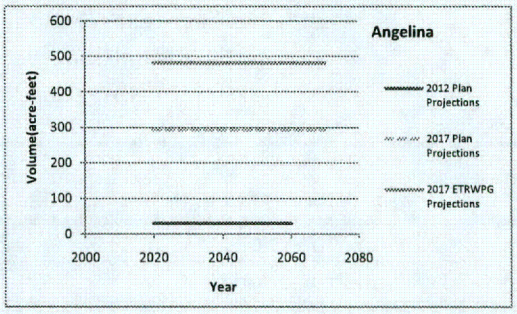
County	State Water Plan Year	Volume (af/yr)					
		2020	2030	2040	2050	2060	2070
Rusk	2012 Plan Projections	126	126	126	126	126	NA
	2017 Plan Projections	0	0	0	0	0	0
	2017 ETRWPG Projections	100	100	100	100	100	100
Sabine	2012 Plan Projections	0	0	0	0	0	NA
	2017 Plan Projections	0	0	0	0	0	0
	2017 ETRWPG Projections	0	0	0	0	0	0
San Augustine	2012 Plan Projections	225	225	225	225	225	NA
	2017 Plan Projections	0	0	0	0	0	0
	2017 ETRWPG Projections	62	62	62	62	62	62
Shelby	2012 Plan Projections	30	34	37	41	46	NA
	2017 Plan Projections	0	0	0	0	0	0
	2017 ETRWPG Projections	26	26	26	26	26	26
Smith	2012 Plan Projections	595	626	657	689	723	NA
	2017 Plan Projections	610	642	674	707	742	783
	2017 ETRWPG Projections	1,486	1,518	1,550	1,583	1,618	1,659
Trinity	2012 Plan Projections	0	0	0	0	0	NA
	2017 Plan Projections	0	0	0	0	0	0
	2017 ETRWPG Projections	500	500	500	500	500	500
Tyler	2012 Plan Projections	29	29	29	29	29	NA
	2017 Plan Projections	374	374	374	374	374	374
	2017 ETRWPG Projections	675	675	675	675	675	675
TOTAL	2012 Plan Projections	151,417	151,771	152,153	152,575	153,040	NA
	2017 Plan Projections	89,375	89,653	89,953	90,284	90,648	91,137
	2017 ETRWPG Projections	177,919	187,894	194,851	197,546	195,445	192,186

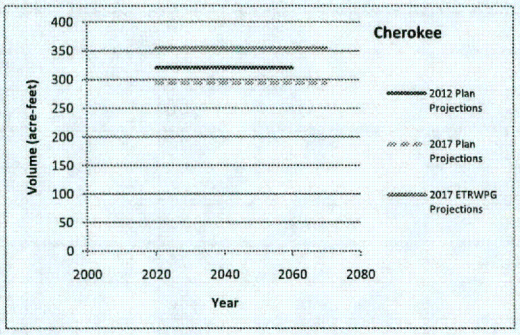
(1) 2012 Plan Projections are from the *2012 State Water Plan* and *2011 Update of the Regional Water Plan* in the East Texas Regional Water Planning Area (ETRWPA) or Region I

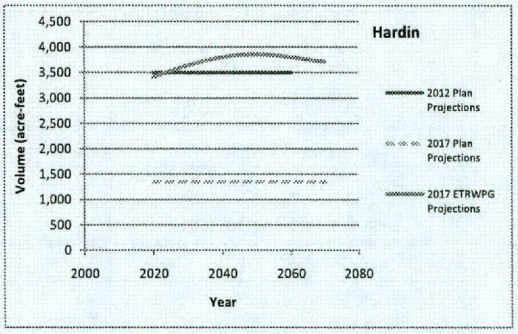
(2) 2017 Plan Projections are from the 2017 database (DB17) provided by the Texas Water Development Board

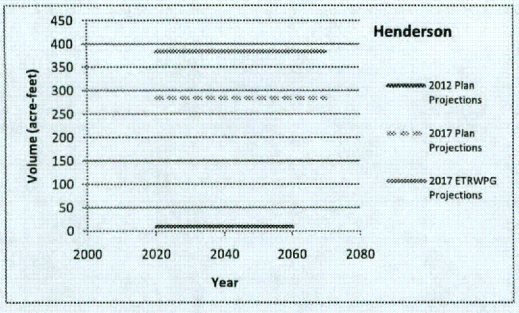
(3) 2017 ETRWPG Projections are those proposed by the East Texas Regional Water Planning Group (ETRWPG)

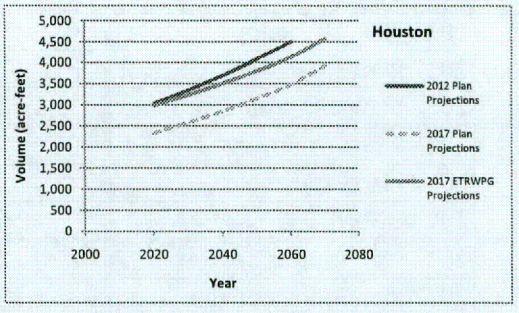


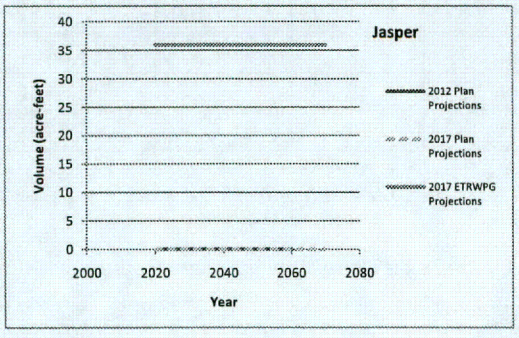


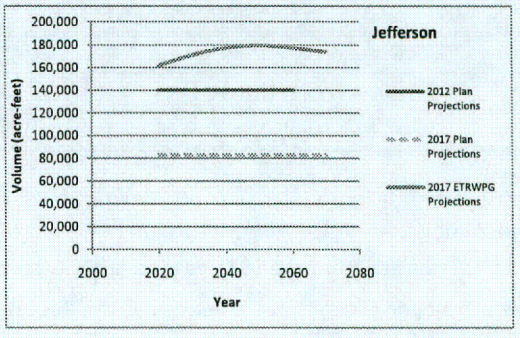


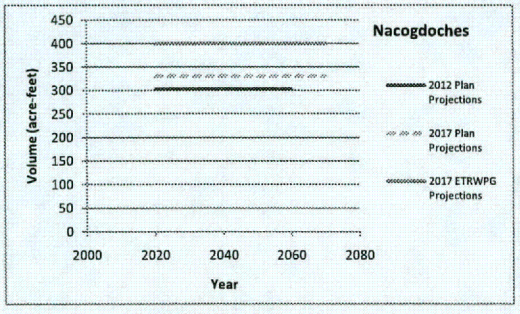












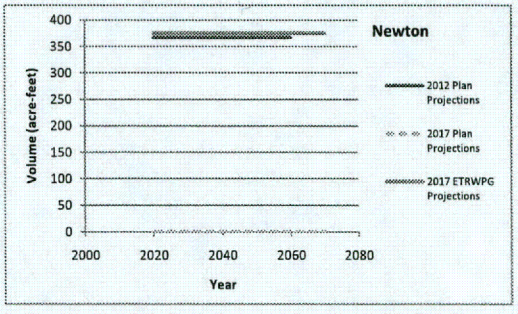
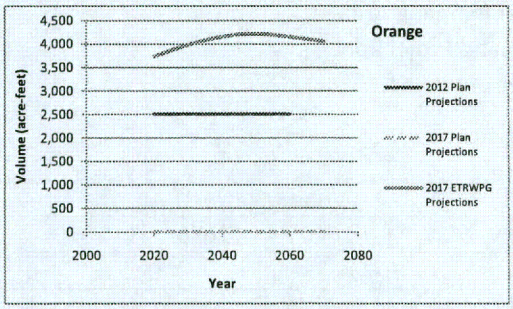
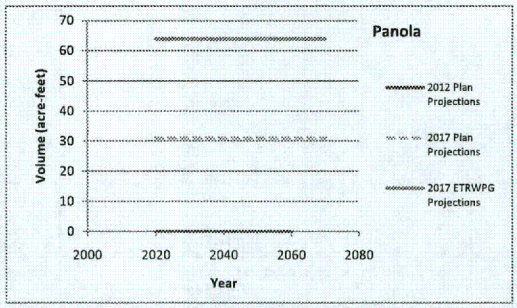
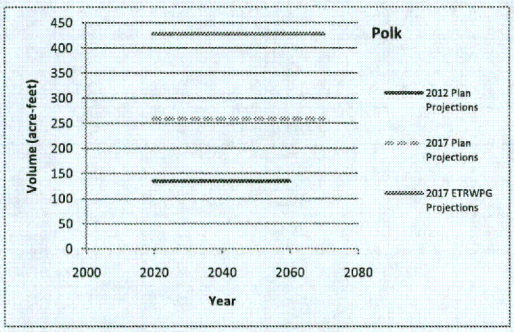


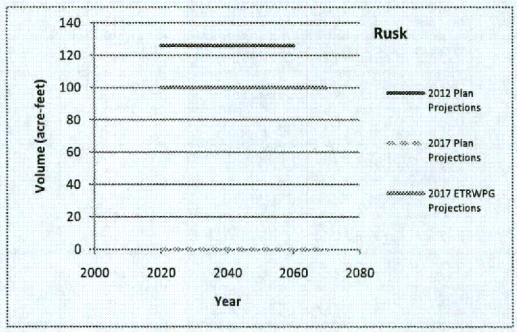
Figure 1

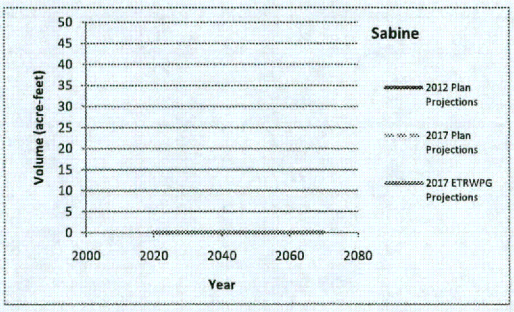
Attachment 1
East Texas Regional Water Planning Area
Comparison of Historical Water Demand Estimates and 2012 and 2017 Projections
Irrigation Water Demands

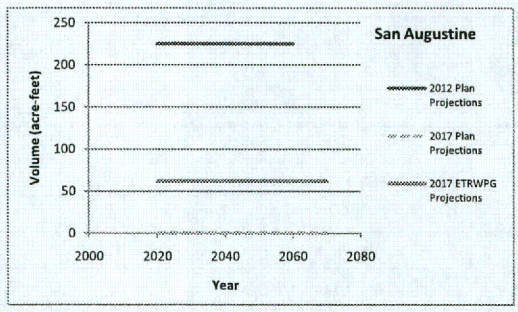


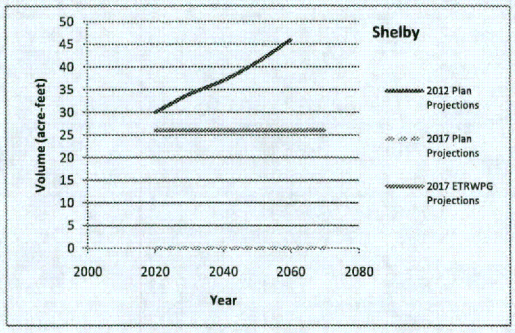


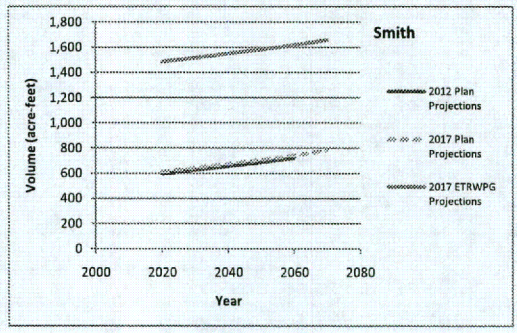


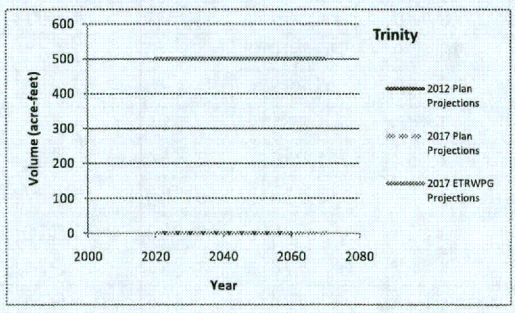












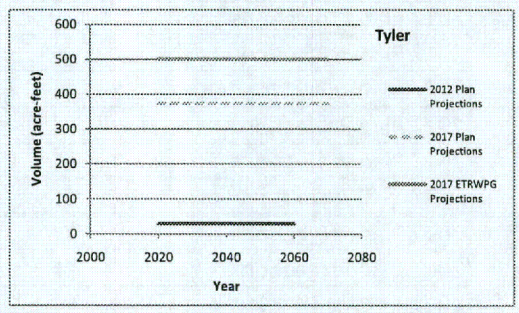


Figure 1 (continued)

Attachment 1
East Texas Regional Water Planning Area
Comparison of Historical Water Demand Estimates and 2012 and 2017 Projections
Irrigation Water Demands

Table 2

Attachment 1
East Texas Regional Water Planning Area
Non-Municipal Water Demand Projections
Manufacturing Water Demands

County	State Water Plan Year	Volume (af/yr)					
		2020	2030	2040	2050	2060	2070
Anderson	2012 Plan Projections[1]	0	0	0	0	0	NA
	2017 Plan Projections[2]	30	40	42	44	46	48
	2017 ETRWPG Projections[3]	30	40	42	44	46	48
Angelina	2012 Plan Projections	23,500	25,980	28,490	30,720	33,100	NA
	2017 Plan Projections	15,249	16,858	18,487	19,934	21,478	23,142
	2017 ETRWPG Projections	15,249	16,858	18,487	19,934	21,478	23,142
Cherokee	2012 Plan Projections	784	839	891	934	1,007	NA
	2017 Plan Projections	413	442	469	492	530	571
	2017 ETRWPG Projections	413	442	469	492	530	571
Hardin	2012 Plan Projections	165	182	200	216	233	NA
	2017 Plan Projections	288	318	349	377	407	439
	2017 ETRWPG Projections	288	318	349	377	407	439
Henderson	2012 Plan Projections	14	16	18	20	22	NA
	2017 Plan Projections	54	62	70	78	86	95
	2017 ETRWPG Projections	54	62	70	78	86	95
Houston	2012 Plan Projections	190	209	227	243	263	NA
	2017 Plan Projections	307	338	367	393	425	460
	2017 ETRWPG Projections	307	338	367	393	425	460
Jasper	2012 Plan Projections	67,649	70,162	72,359	74,006	74,069	NA
	2017 Plan Projections	91,580	94,982	97,956	100,186	100,271	100,356
	2017 ETRWPG Projections	91,580	94,982	97,956	100,186	100,271	100,356
Jefferson	2012 Plan Projections	423,258	603,321	629,171	655,034	680,914	NA
	2017 Plan Projections	423,258	603,321	629,171	655,034	680,914	707,817
	2017 ETRWPG Projections	423,258	603,321	629,171	655,034	680,914	707,817
Nacogdoches	2012 Plan Projections	2,553	2,786	3,016	3,214	3,468	NA
	2017 Plan Projections	2,564	2,798	3,029	3,228	3,483	3,758
	2017 ETRWPG Projections	2,564	2,798	3,029	3,228	3,483	3,758
Newton	2012 Plan Projections	793	899	1,006	1,103	1,196	NA
	2017 Plan Projections	568	644	721	791	858	931
	2017 ETRWPG Projections	568	644	721	791	858	931
Orange	2012 Plan Projections	64,461	70,439	76,399	81,690	87,641	NA
	2017 Plan Projections	64,461	70,439	76,399	81,690	87,641	94,026
	2017 ETRWPG Projections	64,461	70,439	76,399	81,690	87,641	94,026
Panola	2012 Plan Projections	1,437	1,500	1,561	1,614	1,720	NA
	2017 Plan Projections	1,393	1,454	1,513	1,564	1,667	1,777
	2017 ETRWPG Projections	1,393	1,454	1,513	1,564	1,667	1,777
Polk	2012 Plan Projections	725	825	930	1,026	1,110	NA
	2017 Plan Projections	604	687	774	854	924	1,000
	2017 ETRWPG Projections	604	687	774	854	924	1,000

Table 2

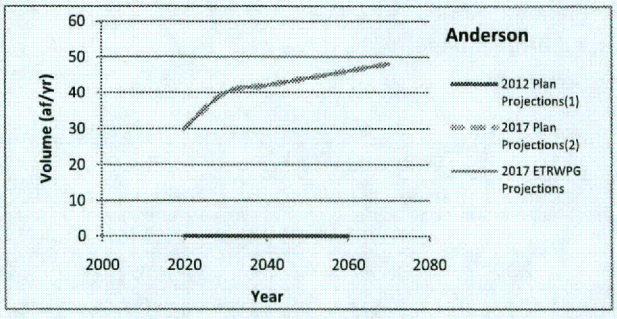
Attachment 1
East Texas Regional Water Planning Area
Non-Municipal Water Demand Projections
Manufacturing Water Demands

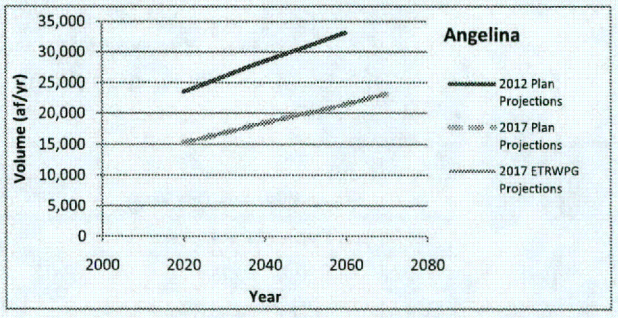
County	State Water Plan Year	Volume (af/yr)					
		2020	2030	2040	2050	2060	2070
Rusk	2012 Plan Projections	90	97	103	108	116	NA
	2017 Plan Projections	317	342	363	381	409	439
	2017 ETRWPG Projections	317	342	363	381	409	439
Sabine	2012 Plan Projections	427	490	554	611	662	NA
	2017 Plan Projections	467	536	606	668	724	785
	2017 ETRWPG Projections	467	536	606	668	724	785
San Augustine	2012 Plan Projections	7	8	9	10	11	NA
	2017 Plan Projections	8	9	10	11	12	13
	2017 ETRWPG Projections	8	9	10	11	12	13
Shelby	2012 Plan Projections	1,508	1,637	1,766	1,880	2,019	NA
	2017 Plan Projections	1,510	1,639	1,768	1,882	2,021	2,170
	2017 ETRWPG Projections	1,510	1,639	1,768	1,882	2,021	2,170
Smith	2012 Plan Projections	4,297	4,697	5,081	5,407	5,854	NA
	2017 Plan Projections	5,120	5,597	6,055	6,443	6,976	7,553
	2017 ETRWPG Projections	5,120	5,597	6,055	6,443	6,976	7,553
Trinity	2012 Plan Projections	0	0	0	0	0	NA
	2017 Plan Projections	0	0	0	0	0	0
	2017 ETRWPG Projections	0	0	0	0	0	0
Tyler	2012 Plan Projections	46	53	60	66	71	NA
	2017 Plan Projections	46	53	60	66	71	76
	2017 ETRWPG Projections	476	483	490	496	501	506
TOTAL	2012 Plan Projections	591,904	784,140	821,841	857,902	893,476	NA
	2017 Plan Projections	608,237	800,559	838,209	874,116	908,943	945,456
	2017 ETRWPG Projections	608,667	800,989	838,639	874,546	909,373	945,886

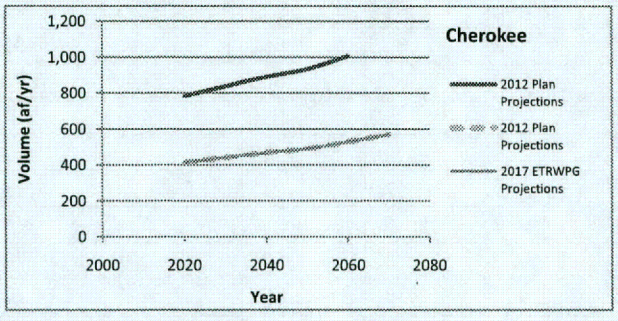
(1) 2012 Plan Projections are from the *2012 State Water Plan* and *2011 Update of the Regional Water Plan* in the East Texas Regional Water Planning Area (ETRWPA) or Region I

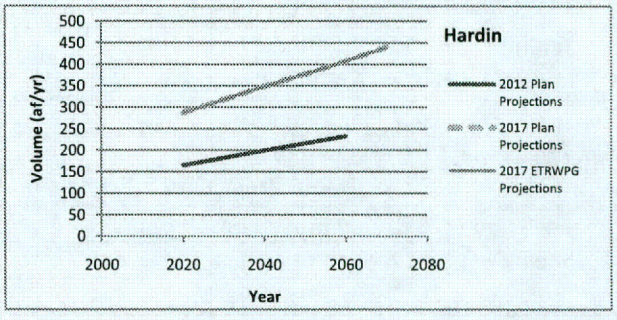
(2) 2017 Plan Projections are from the 2017 database (DB17) provided by the Texas Water Development Board

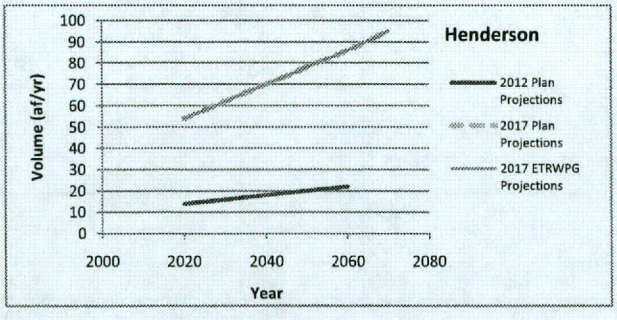
(3) 2017 ETRWPG Projections are those proposed by the East Texas Regional Water Planning Group (ETRWPG)

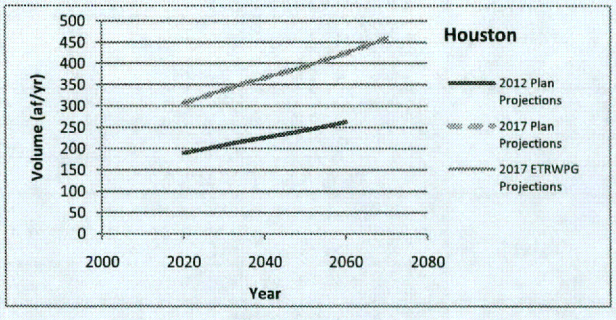


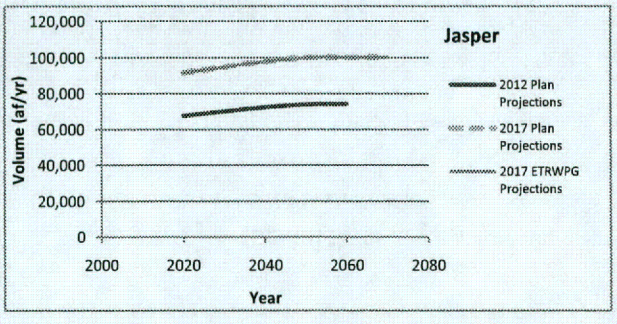


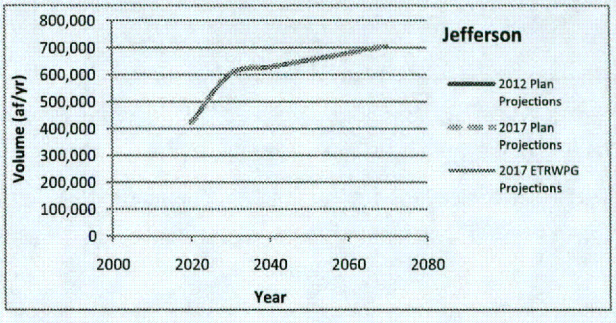


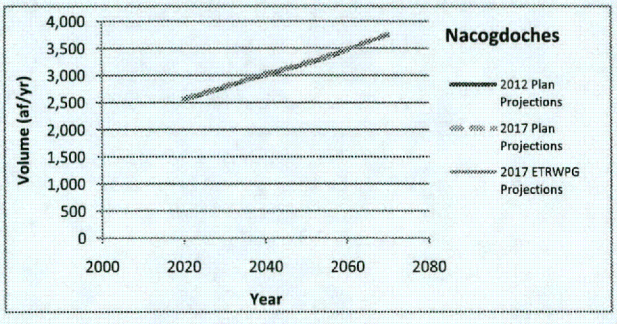












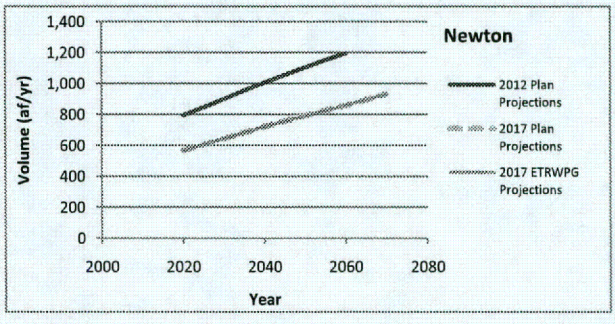
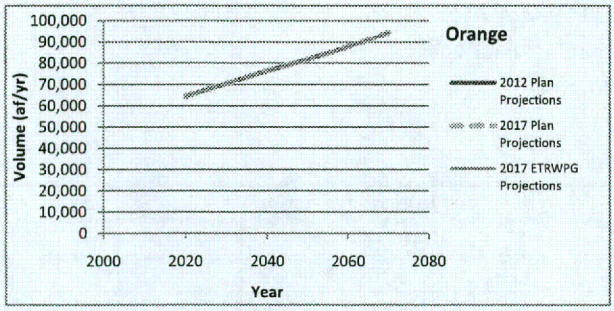
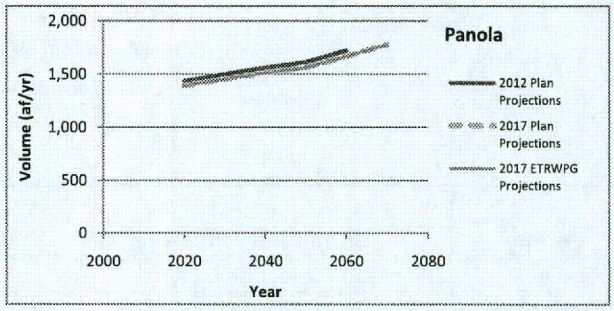
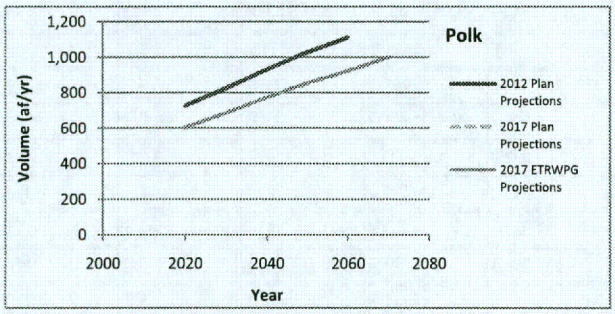


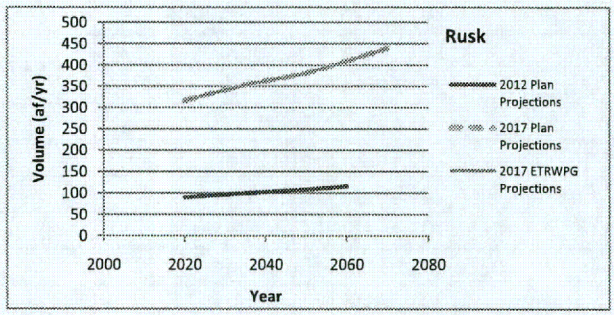
Figure 2

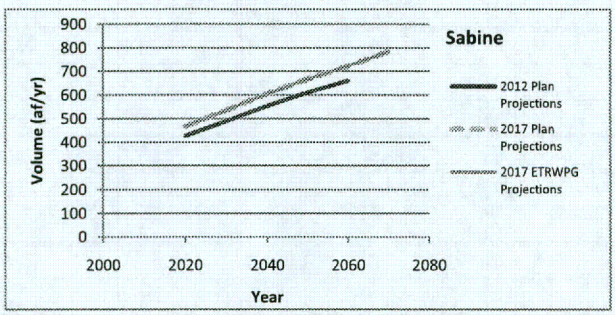
Attachment 1
East Texas Regional Water Planning Area
Comparison of Historical Water Demand Estimates and 2012 and 2017 Projections
Manufacturing Water Demands

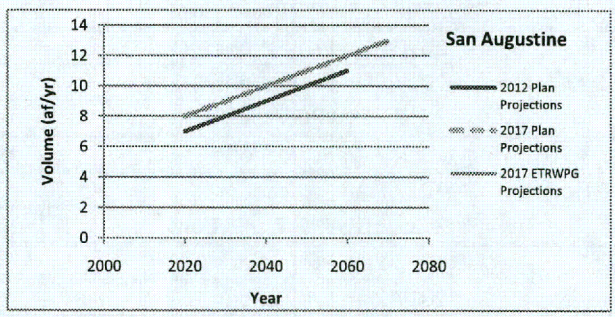


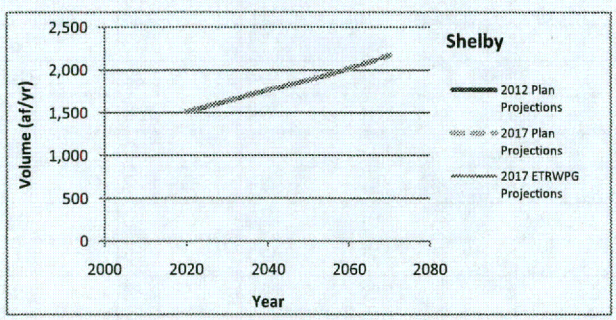


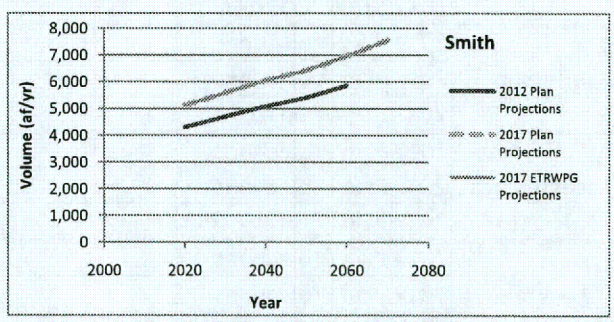


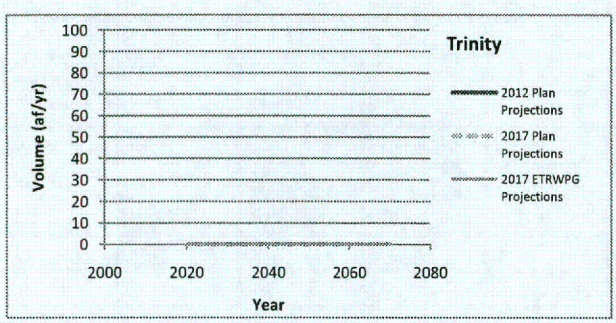












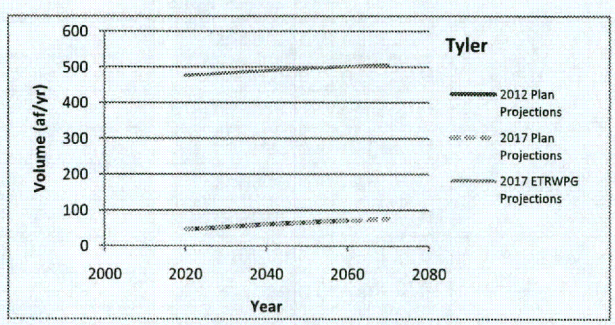


Figure 2 (continued)

Attachment 1
East Texas Regional Water Planning Area
Comparison of Historical Water Demand Estimates and 2012 and 2017 Projections
Manufacturing Water Demands

Table 3

Attachment 1
East Texas Regional Water Planning Area
Non-Municipal Water Demand Projections
Mining Water Demands

County	State Water Plan Year	Volume (af/yr)					
		2020	2030	2040	2050	2060	2070
Anderson	2012 Plan Projections[1]	557	583	608	633	657	NA
	2017 Plan Projections[2]	70	105	83	58	32	23
	2017 ETRWPG Projections[3]	70	105	83	58	32	23
Angelina	2012 Plan Projections	4,017	17	17	17	17	NA
	2017 Plan Projections	486	585	410	236	63	28
	2017 ETRWPG Projections	486	585	410	236	63	28
Cherokee	2012 Plan Projections	1,597	99	101	103	105	NA
	2017 Plan Projections	295	304	203	104	15	15
	2017 ETRWPG Projections	295	304	203	104	15	15
Hardin	2012 Plan Projections	8,648	9,219	9,788	10,361	10,798	NA
	2017 Plan Projections	12	12	12	12	12	12
	2017 ETRWPG Projections	12	12	12	12	12	12
Henderson	2012 Plan Projections	14	14	14	14	14	NA
	2017 Plan Projections	77	86	59	34	8	4
	2017 ETRWPG Projections	77	86	59	34	8	4
Houston	2012 Plan Projections	160	158	156	154	153	NA
	2017 Plan Projections	17	17	17	17	17	17
	2017 ETRWPG Projections	17	17	17	17	17	17
Jasper	2012 Plan Projections	4	4	4	4	4	NA
	2017 Plan Projections	13	13	13	13	13	13
	2017 ETRWPG Projections	13	13	13	13	13	13
Jefferson	2012 Plan Projections	334	341	348	355	360	NA
	2017 Plan Projections	194	216	243	294	328	368
	2017 ETRWPG Projections	194	216	243	294	328	368
Nacogdoches	2012 Plan Projections	7,213	212	211	210	209	NA
	2017 Plan Projections	4,612	3,597	2,435	1,275	127	57
	2017 ETRWPG Projections	7,000	4,500	0	0	0	0
Newton	2012 Plan Projections	32	32	32	32	32	NA
	2017 Plan Projections	269	248	190	155	128	106
	2017 ETRWPG Projections	269	248	190	155	128	106
Orange	2012 Plan Projections	9	9	9	9	9	NA
	2017 Plan Projections	309	314	313	314	319	327
	2017 ETRWPG Projections	309	314	313	314	319	327
Panola	2012 Plan Projections	4,271	4,587	4,905	5,228	5,536	NA
	2017 Plan Projections	3,944	3,906	3,366	2,845	2,413	2,625
	2017 ETRWPG Projections	5,916	5,859	5,049	4,268	3,620	3,938
Polk	2012 Plan Projections	0	0	0	0	0	NA
	2017 Plan Projections	7	7	7	7	7	7
	2017 ETRWPG Projections	7	7	7	7	7	7

Table 3

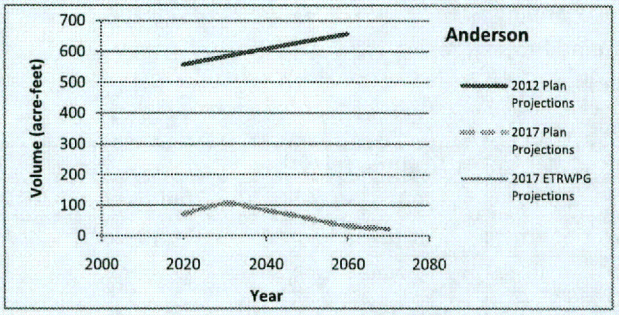
Attachment 1
East Texas Regional Water Planning Area
Non-Municipal Water Demand Projections
Mining Water Demands

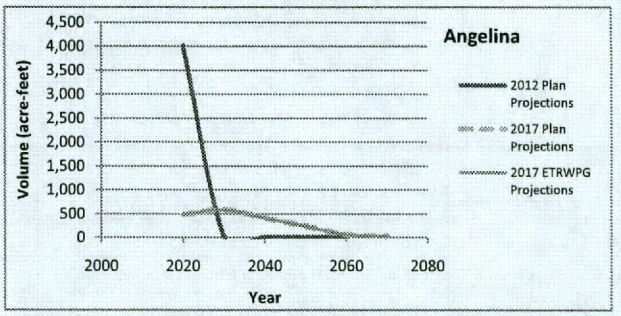
County	State Water Plan Year	Volume (af/yr)					
		2020	2030	2040	2050	2060	2070
Rusk	2012 Plan Projections	1,679	1,761	1,841	1,921	1,996	NA
	2017 Plan Projections	4,410	4,314	3,745	3,196	2,686	2,921
	2017 ETRWPG Projections	1,000	500	0	0	0	0
Sabine	2012 Plan Projections	0	0	0	0	0	NA
	2017 Plan Projections	2,695	2,175	1,597	1,022	448	425
	2017 ETRWPG Projections	1,500	1,000	0	0	0	0
San Augustine	2012 Plan Projections	7,000	0	0	0	0	NA
	2017 Plan Projections	3,167	2,254	1,513	773	76	34
	2017 ETRWPG Projections	4,000	3,000	0	0	0	0
Shelby	2012 Plan Projections	1,500	0	0	0	0	NA
	2017 Plan Projections	4,745	3,482	2,341	1,203	127	52
	2017 ETRWPG Projections	1,500	1,000	0	0	0	0
Smith	2012 Plan Projections	262	295	351	391	424	NA
	2017 Plan Projections	134	139	99	60	20	14
	2017 ETRWPG Projections	134	139	99	60	20	14
Trinity	2012 Plan Projections	0	0	0	0	0	NA
	2017 Plan Projections	5	5	5	5	5	5
	2017 ETRWPG Projections	5	5	5	5	5	5
Tyler	2012 Plan Projections	0	0	0	0	0	NA
	2017 Plan Projections	13	13	13	13	13	13
	2017 ETRWPG Projections	13	13	13	13	13	13
TOTAL	2012 Plan Projections	37,297	17,331	18,385	19,432	20,314	NA
	2017 Plan Projections	25,474	21,792	16,664	11,636	6,857	7,066
	2017 ETRWPG Projections	22,817	17,923	6,716	5,590	4,600	4,890

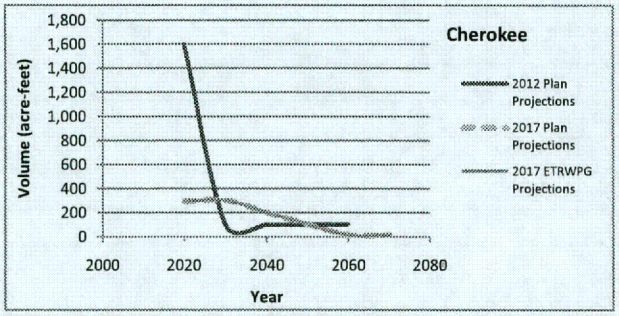
(1) 2012 Plan Projections are from the *2012 State Water Plan* and *2011 Update of the Regional Water Plan* in the East Texas Regional Water Planning Area (ETRWPA) or Region I

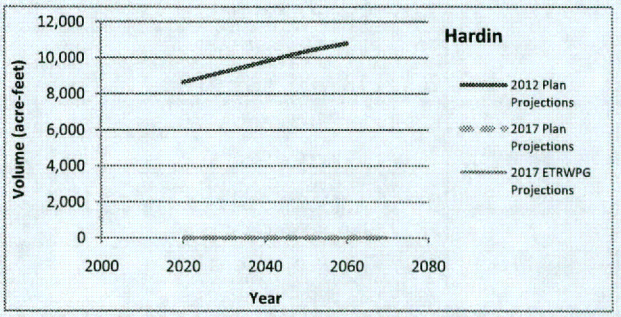
(2) 2017 Plan Projections are from the 2017 database (DB17) provided by the Texas Water Development Board

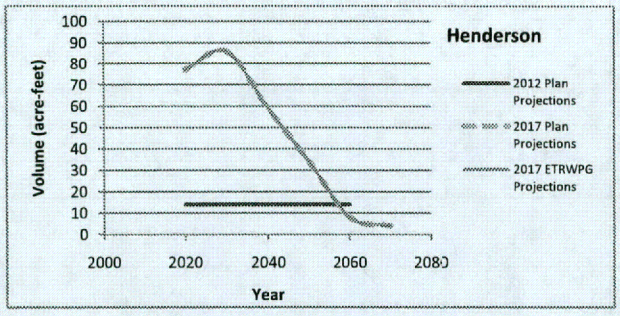
(3) 2017 ETRWPG Projections are those proposed by the East Texas Regional Water Planning Group (ETRWPG)

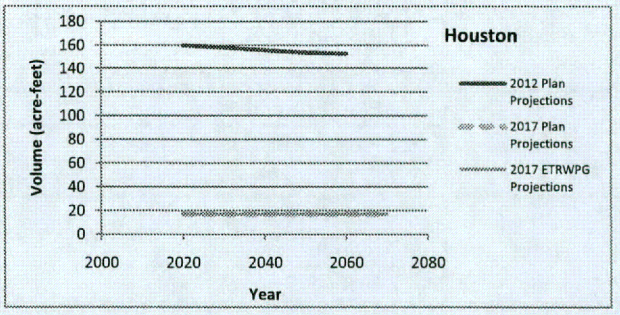


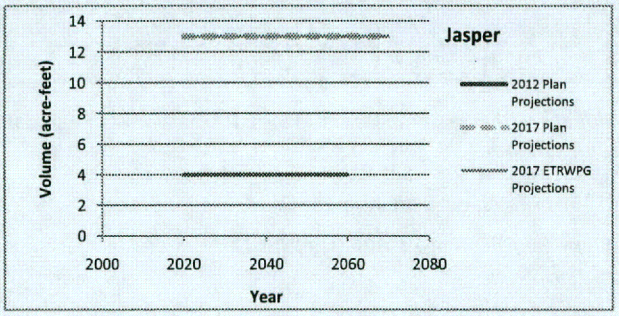


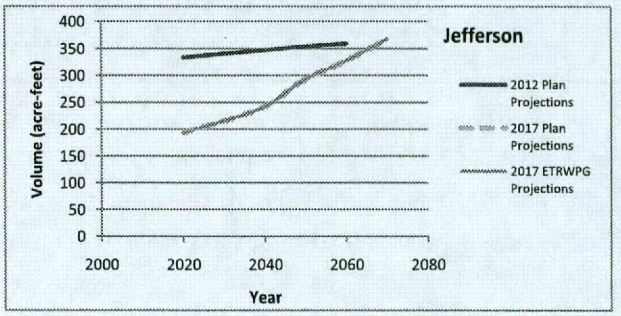


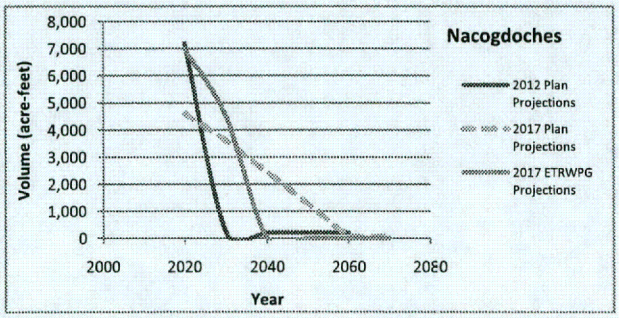












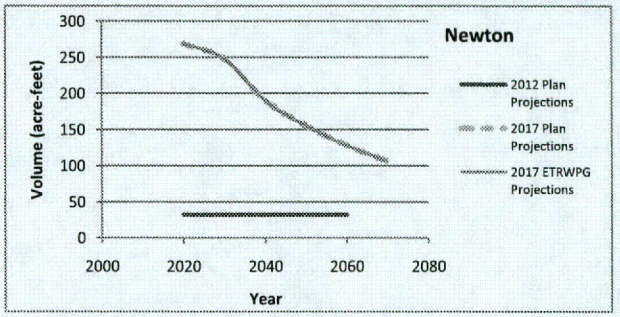
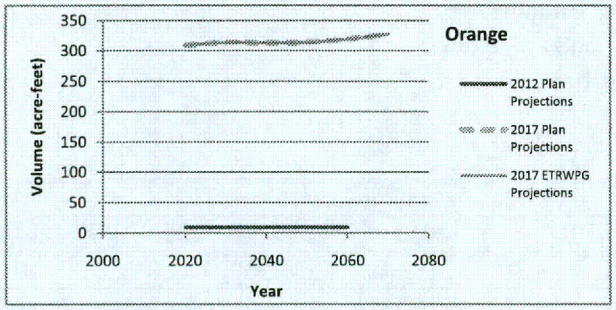
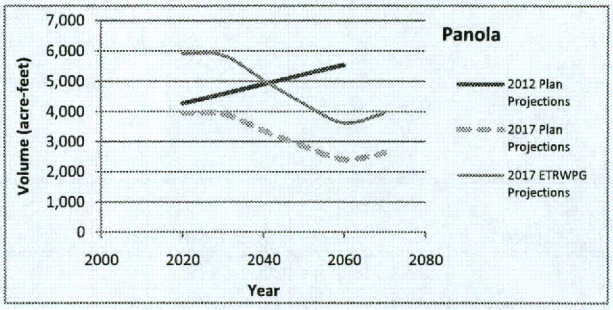
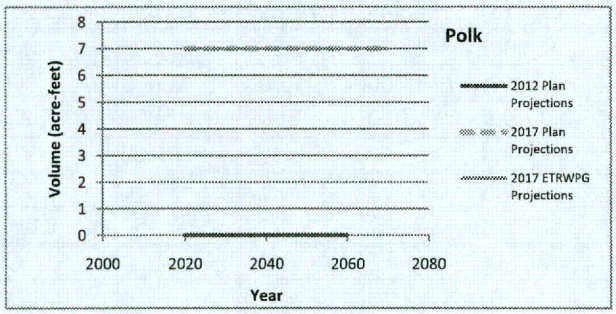


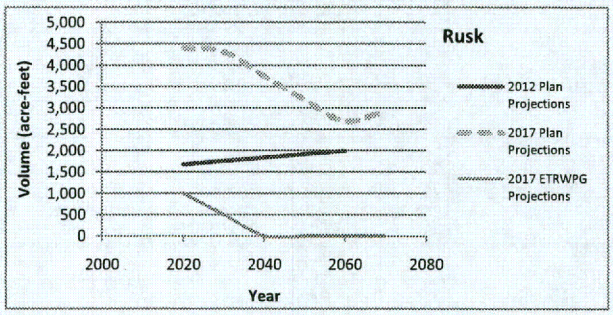
Figure 3

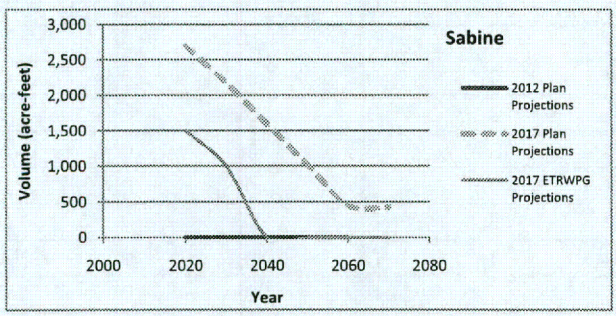
Attachment 1
East Texas Regional Water Planning Area
Revised Non-Municipal Water Demands Projections
Mining Water Demands

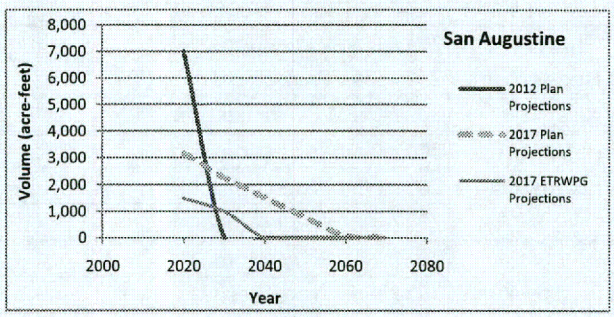


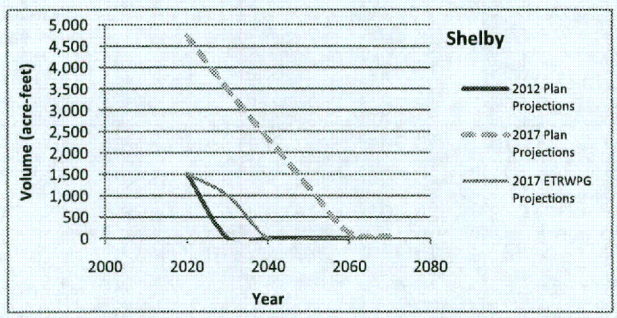


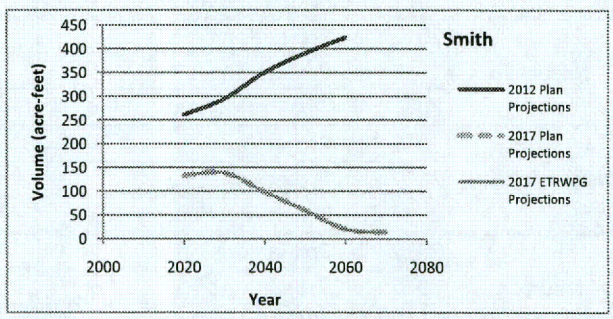


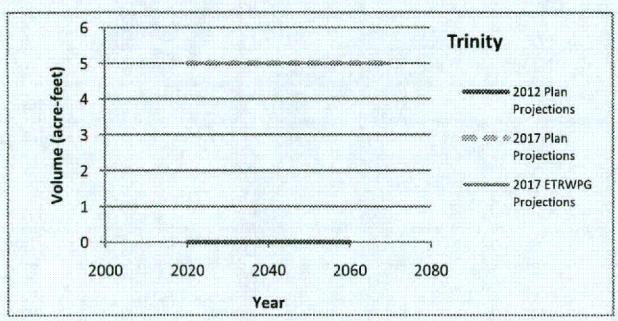












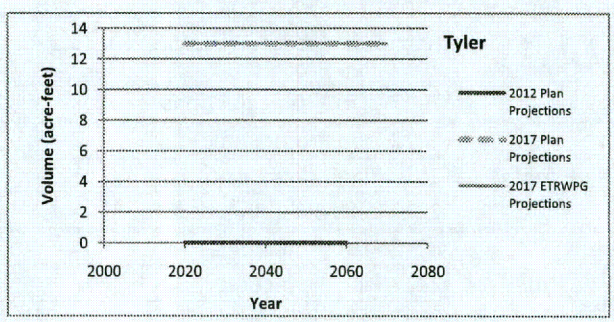


Figure 3 (continued)

Attachment 1
East Texas Regional Water Planning Area
Revised Non-Municipal Water Demands Projections
Mining Water Demands

Table 4

Attachment 1
East Texas Regional Water Planning Area
Non-Municipal Water Demand Projections
Steam Electric Water Demands

County	State Water Plan Year	Volume (af/yr)					
		2020	2030	2040	2050	2060	2070
Anderson	2012 Plan Projections[1]	11,306	13,218	15,549	18,390	21,853	NA
	2017 Plan Projections[2]	11,306	13,218	15,549	18,390	21,853	25,968
	2017 ETRWPG Projections[3]	11,306	13,218	15,549	18,390	21,853	25,968
Angelina	2012 Plan Projections	1,000	1,000	1,000	1,000	1,000	NA
	2017 Plan Projections	1,000	1,000	1,000	1,000	1,000	1,000
	2017 ETRWPG Projections	1,000	1,000	1,000	1,000	1,000	1,000
Cherokee	2012 Plan Projections	1,790	2,093	2,462	2,912	3,460	NA
	2017 Plan Projections	1,790	2,093	2,462	2,912	3,460	3,835
	2017 ETRWPG Projections	1,790	2,093	2,462	2,912	3,460	3,835
Hardin	2012 Plan Projections	0	0	0	0	0	NA
	2017 Plan Projections	0	0	0	0	0	0
	2017 ETRWPG Projections	0	0	0	0	0	0
Henderson	2012 Plan Projections	0	0	0	0	0	NA
	2017 Plan Projections	0	0	0	0	0	0
	2017 ETRWPG Projections	0	0	0	0	0	0
Houston	2012 Plan Projections	0	0	0	0	0	NA
	2017 Plan Projections	0	0	0	0	0	0
	2017 ETRWPG Projections	0	0	0	0	0	0
Jasper	2012 Plan Projections	0	0	0	0	0	NA
	2017 Plan Projections	0	0	0	0	0	0
	2017 ETRWPG Projections	0	0	0	0	0	0
Jefferson	2012 Plan Projections	13,426	15,696	18,464	21,838	25,951	NA
	2017 Plan Projections	13,426	15,696	18,464	21,838	25,951	30,839
	2017 ETRWPG Projections	13,426	15,696	18,464	21,838	25,951	30,839
Nacogdoches	2012 Plan Projections	6,911	8,079	9,504	11,241	13,358	NA
	2017 Plan Projections	6,911	8,079	9,504	11,241	13,358	15,874
	2017 ETRWPG Projections	6,911	8,079	9,504	11,241	13,358	15,874
Newton	2012 Plan Projections	14,132	16,522	19,436	22,987	27,317	NA
	2017 Plan Projections	14,132	16,522	19,436	22,987	27,317	32,463
	2017 ETRWPG Projections	14,132	16,522	19,436	22,987	27,317	32,463
Orange	2012 Plan Projections	4,966	5,805	6,829	8,077	9,598	NA
	2017 Plan Projections	4,966	5,805	6,829	8,077	9,598	10,637
	2017 ETRWPG Projections	4,966	5,805	6,829	8,077	9,598	10,637
Panola	2012 Plan Projections	0	0	0	0	0	NA
	2017 Plan Projections	0	0	0	0	0	0
	2017 ETRWPG Projections	0	0	0	0	0	0
Polk	2012 Plan Projections	0	0	0	0	0	NA
	2017 Plan Projections	0	0	0	0	0	0
	2017 ETRWPG Projections	0	0	0	0	0	0

Table 4

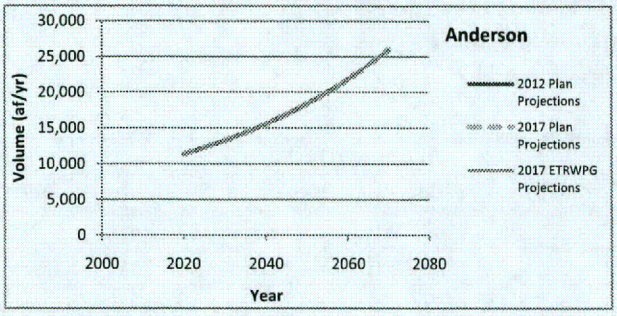
Attachment 1
East Texas Regional Water Planning Area
Non-Municipal Water Demand Projections
Steam Electric Water Demands

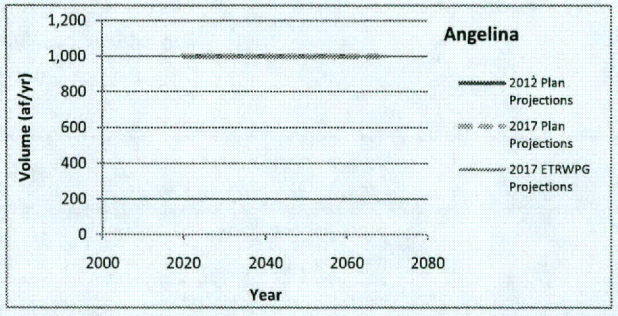
County	State Water Plan Year	Volume (af/yr)					
		2020	2030	2040	2050	2060	2070
Rusk	2012 Plan Projections	27,458	32,102	37,762	44,663	53,074	NA
	2017 Plan Projections	27,458	32,102	37,762	44,663	53,074	63,069
	2017 ETRWPG Projections	27,458	32,102	37,762	44,663	53,074	63,069
Sabine	2012 Plan Projections	0	0	0	0	0	NA
	2017 Plan Projections	0	0	0	0	0	0
	2017 ETRWPG Projections	0	0	0	0	0	0
San Augustine	2012 Plan Projections	0	0	0	0	0	NA
	2017 Plan Projections	0	0	0	0	0	0
	2017 ETRWPG Projections	0	0	0	0	0	0
Shelby	2012 Plan Projections	0	0	0	0	0	NA
	2017 Plan Projections	0	0	0	0	0	0
	2017 ETRWPG Projections	0	0	0	0	0	0
Smith	2012 Plan Projections	0	0	0	0	0	NA
	2017 Plan Projections	0	0	0	0	0	0
	2017 ETRWPG Projections	0	0	0	0	0	0
Trinity	2012 Plan Projections	0	0	0	0	0	NA
	2017 Plan Projections	0	0	0	0	0	0
	2017 ETRWPG Projections	0	0	0	0	0	0
Tyler	2012 Plan Projections	0	0	0	0	0	NA
	2017 Plan Projections	27	32	37	44	52	62
	2017 ETRWPG Projections	1,029	1,029	1,029	1,029	1,029	1,029
TOTAL	2012 Plan Projections	80,989	94,515	111,006	131,108	155,611	NA
	2017 Plan Projections	81,016	94,547	111,043	131,152	155,663	183,747
	2017 ETRWPG Projections	82,018	95,544	112,035	132,137	156,640	184,714

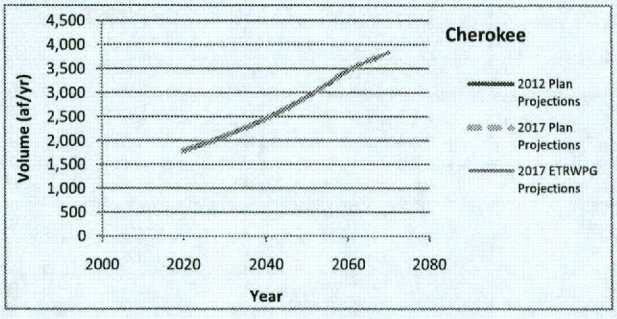
(1) 2012 Plan Projections are from the *2012 State Water Plan* and *2011 Update of the Regional Water Plan* in the East Texas Regional Water Planning Area (ETRWPA) or Region I

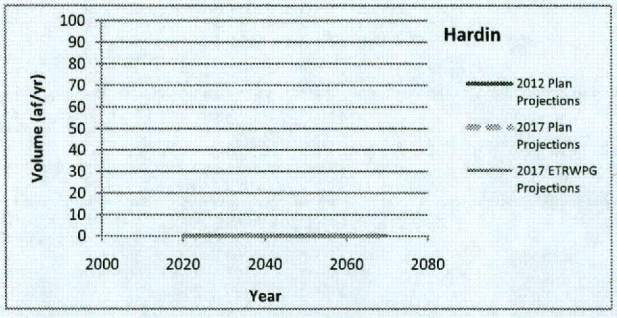
(2) 2017 Plan Projections are from the 2017 database (DB17) provided by the Texas Water Development Board

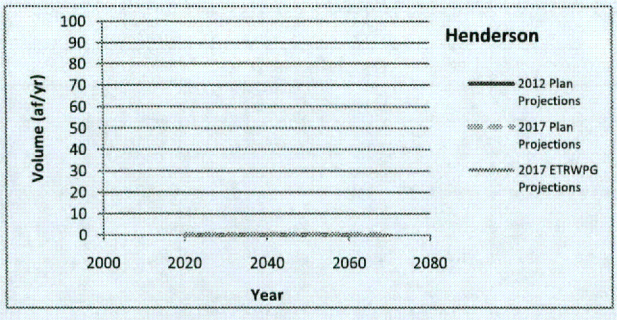
(3) 2017 ETRWPG Projections are those proposed by the East Texas Regional Water Planning Group (ETRWPG)

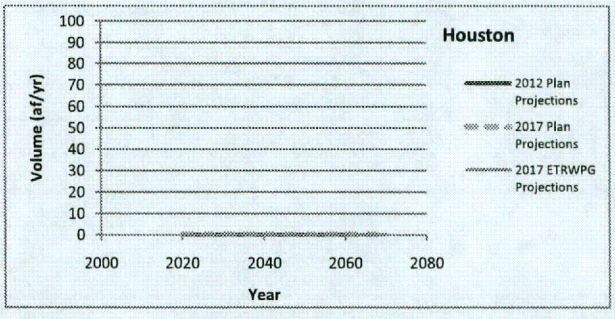


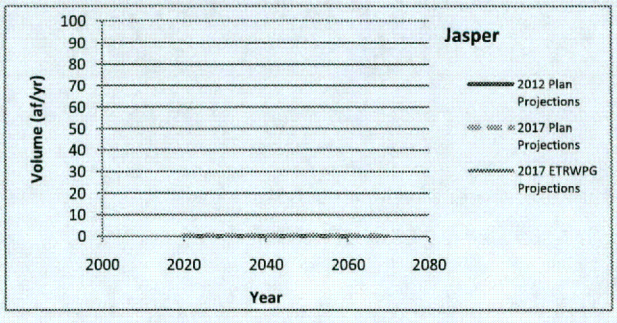


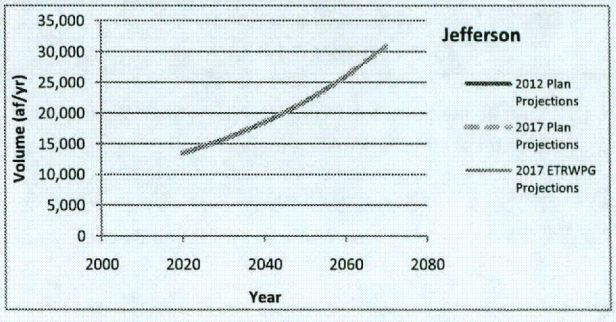


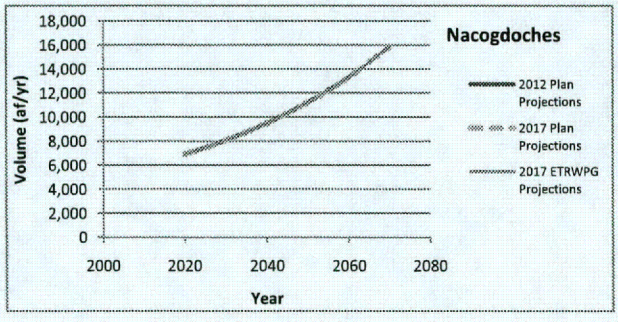












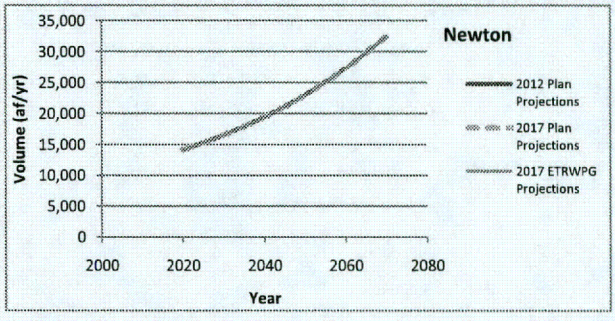
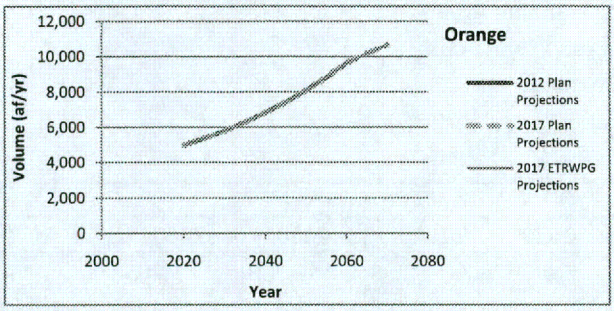
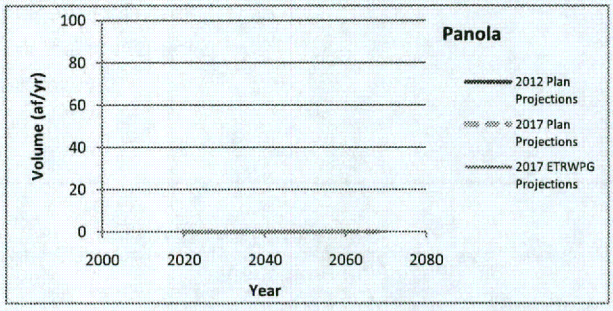
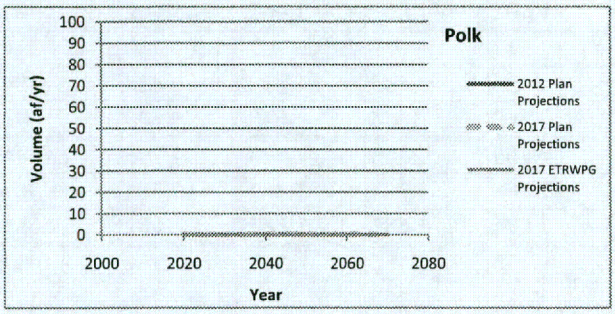


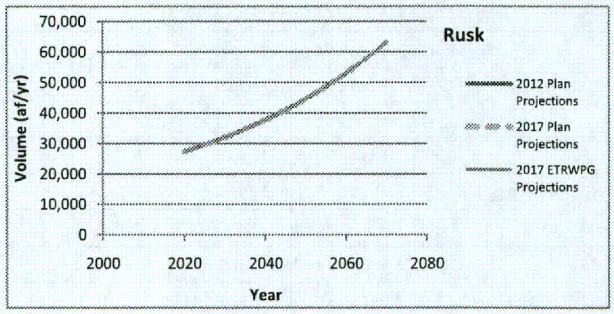
Figure 4

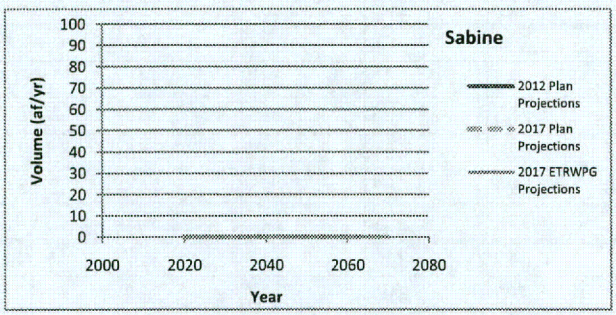
Attachment 1
East Texas Regional Water Planning Area
Revised Non-Municipal Water Demands Projections
Steam Electric Water Demands

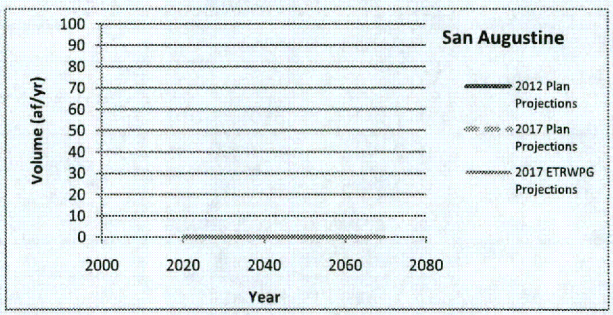


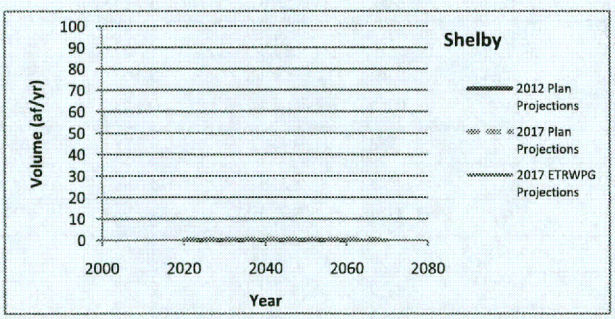


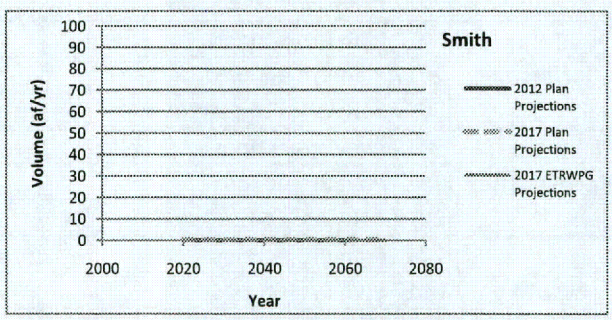


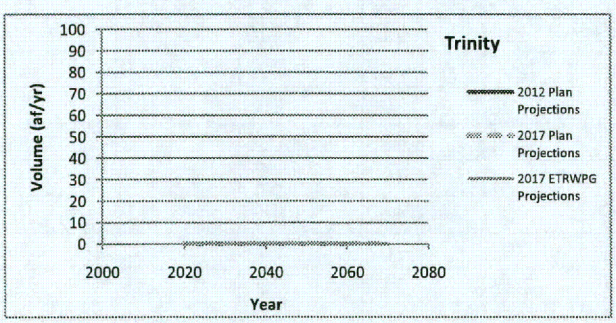












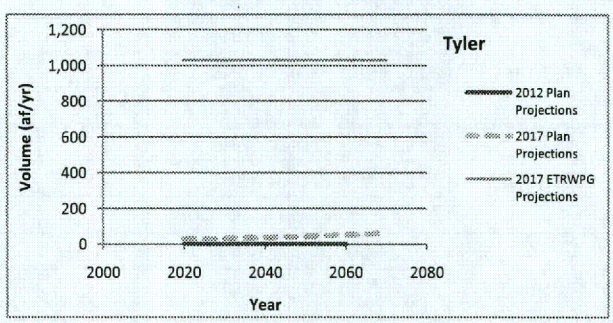


Figure 4 (continued)

Attachment 1
East Texas Regional Water Planning Area
Revised Non-Municipal Water Demands Projections
Steam Electric Water Demands

Table 5

Attachment 1
East Texas Regional Water Planning Area
Non-Municipal Water Demand Projections
Livestock Water Demands

County	State Water Plan Year	Volume (af/yr)					
		2020	2030	2040	2050	2060	2070
Anderson	2012 Plan Projections[1]	1,708	1,708	1,708	1,708	1,708	NA
	2017 Plan Projections[2]	1,410	1,410	1,410	1,410	1,410	1,410
	2017 ETRWPG Projections[3]	1,402	1,402	1,402	1,402	1,402	1,402
Angelina	2012 Plan Projections	620	647	677	712	749	NA
	2017 Plan Projections	434	434	434	434	434	434
	2017 ETRWPG Projections	648	648	648	648	648	648
Cherokee	2012 Plan Projections	1,765	1,765	1,765	1,765	1,765	NA
	2017 Plan Projections	1,361	1,361	1,361	1,361	1,361	1,361
	2017 ETRWPG Projections	1,681	1,681	1,681	1,681	1,681	1,681
Hardin	2012 Plan Projections	156	156	156	156	156	NA
	2017 Plan Projections	165	165	165	165	165	165
	2017 ETRWPG Projections	163	163	163	163	163	163
Henderson	2012 Plan Projections	2,594	2,594	2,594	2,594	2,594	NA
	2017 Plan Projections	937	937	937	937	937	937
	2017 ETRWPG Projections	1,253	1,253	1,253	1,253	1,253	1,253
Houston	2012 Plan Projections	2,291	2,483	2,690	2,915	3,158	NA
	2017 Plan Projections	1,772	1,921	2,081	2,255	2,443	2,684
	2017 ETRWPG Projections	1,630	1,779	1,939	2,113	2,301	2,542
Jasper	2012 Plan Projections	317	317	317	317	317	NA
	2017 Plan Projections	392	392	392	392	392	392
	2017 ETRWPG Projections	362	362	362	362	362	362
Jefferson	2012 Plan Projections	807	807	807	807	807	NA
	2017 Plan Projections	946	946	946	946	946	946
	2017 ETRWPG Projections	943	943	943	943	943	943
Nacogdoches	2012 Plan Projections	1,954	2,227	2,544	2,911	3,332	NA
	2017 Plan Projections	1,380	1,573	1,797	2,056	2,353	2,795
	2017 ETRWPG Projections	4,364	4,557	4,781	5,040	5,337	5,779
Newton	2012 Plan Projections	110	110	110	110	110	NA
	2017 Plan Projections	122	122	122	122	122	122
	2017 ETRWPG Projections	121	121	121	121	121	121
Orange	2012 Plan Projections	210	210	210	210	210	NA
	2017 Plan Projections	209	209	209	209	209	209
	2017 ETRWPG Projections	208	208	208	208	208	208
Panola	2012 Plan Projections	3,096	3,096	3,096	3,096	3,096	NA
	2017 Plan Projections	3,197	3,197	3,197	3,197	3,197	3,197
	2017 ETRWPG Projections	1,480	1,480	1,480	1,480	1,480	1,480
Polk	2012 Plan Projections	202	202	202	202	202	NA
	2017 Plan Projections	215	215	215	215	215	215
	2017 ETRWPG Projections	357	357	357	357	357	357

Table 5

Attachment 1
East Texas Regional Water Planning Area
Non-Municipal Water Demand Projections
Livestock Water Demands

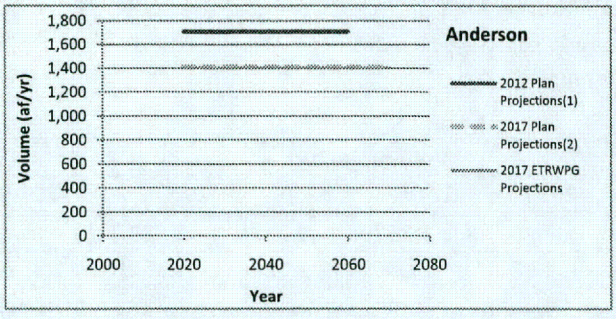
County	State Water Plan Year	Volume (af/yr)					
		2020	2030	2040	2050	2060	2070
Rusk	2012 Plan Projections	1,188	1,207	1,231	1,257	1,283	NA
	2017 Plan Projections	1,067	1,084	1,106	1,129	1,152	1,152
	2017 ETRWPG Projections	1,207	1,224	1,246	1,269	1,292	1,292
Sabine	2012 Plan Projections	710	759	816	882	954	NA
	2017 Plan Projections	843	901	969	1,047	1,132	1,132
	2017 ETRWPG Projections	159	217	285	363	448	448
San Augustine	2012 Plan Projections	1,082	1,173	1,278	1,400	1,534	NA
	2017 Plan Projections	1,148	1,245	1,356	1,485	1,627	1,627
	2017 ETRWPG Projections	903	1,000	1,111	1,240	1,382	1,382
Shelby	2012 Plan Projections	5,176	6,310	7,691	9,376	11,430	NA
	2017 Plan Projections	4,599	5,607	6,834	8,331	10,156	10,156
	2017 ETRWPG Projections	5,265	6,273	7,500	8,997	10,822	10,822
Smith	2012 Plan Projections	660	660	660	660	660	NA
	2017 Plan Projections	673	673	673	673	673	673
	2017 ETRWPG Projections	1,115	1,115	1,115	1,115	1,115	1,115
Trinity	2012 Plan Projections	194	194	194	194	194	NA
	2017 Plan Projections	230	230	230	230	230	230
	2017 ETRWPG Projections	478	478	478	478	478	478
Tyler	2012 Plan Projections	274	274	274	274	274	NA
	2017 Plan Projections	289	289	289	289	289	289
	2017 ETRWPG Projections	288	288	288	288	288	288
TOTAL	2012 Plan Projections	25,114	26,899	29,020	31,546	34,533	NA
	2017 Plan Projections	21,389	22,911	24,723	26,883	29,443	30,126
	2017 ETRWPG Projections	24,027	25,549	27,361	29,521	32,081	32,764

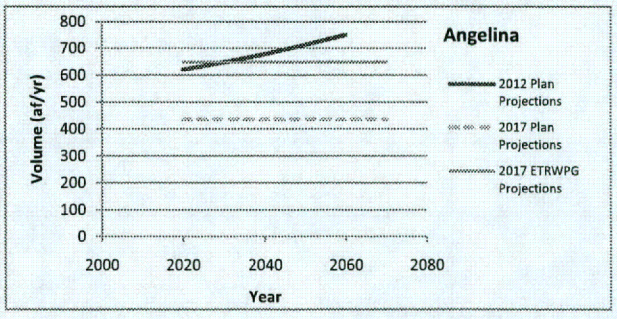
(1) 2012 Plan Projections are from the *2012 State Water Plan* and *2011 Update of the Regional Water Plan* in the East Texas Regional Water Planning Area (ETRWPA) or Region I

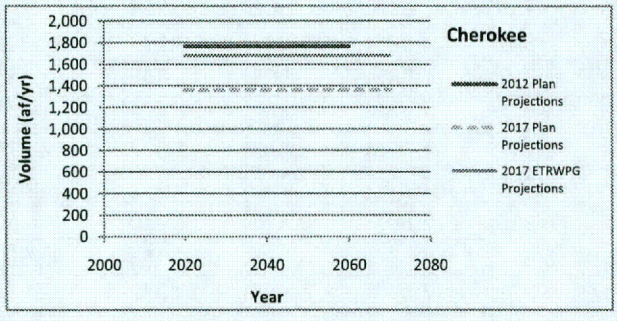
(2) 2017 Plan Projections are from the 2017 database (DB17) provided by the Texas Water Development Board

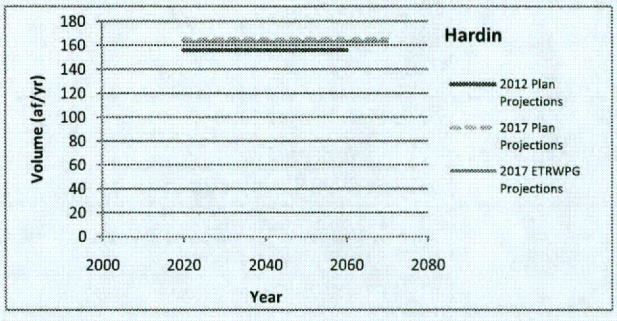
(3) 2017 ETRWPG Projections are those proposed by the East Texas Regional Water Planning Group (ETRWPG)

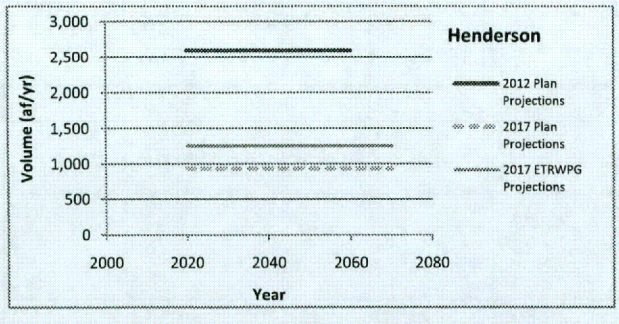
(4) NC denotes that no change is proposed from 2017 Plan Projections

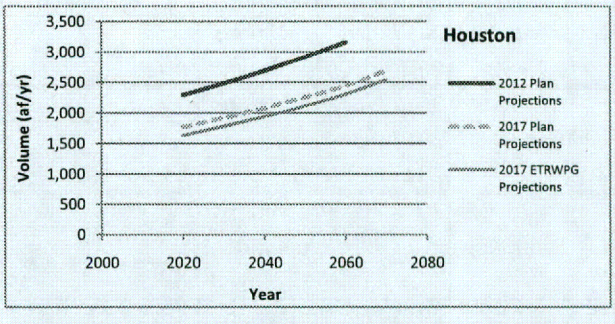


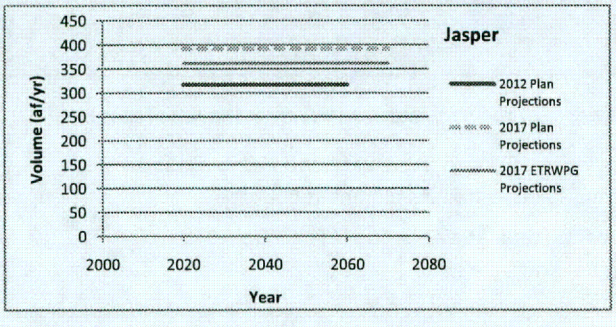


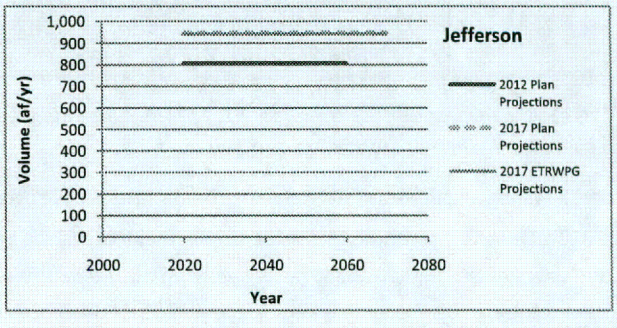


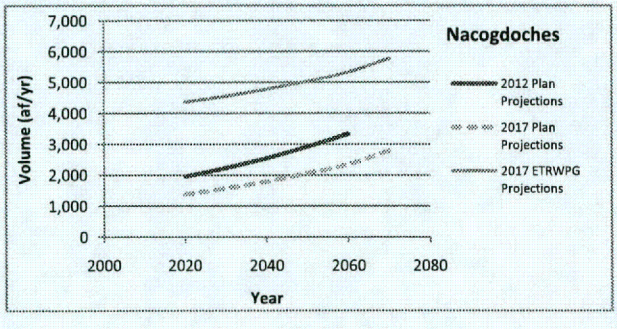












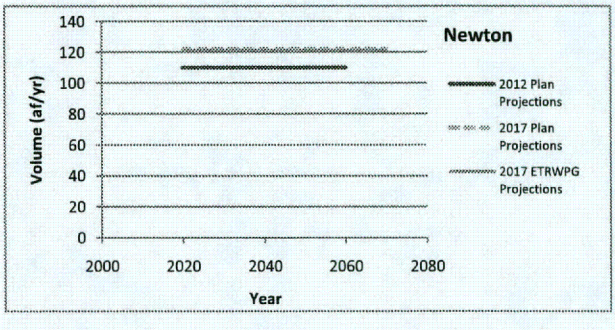
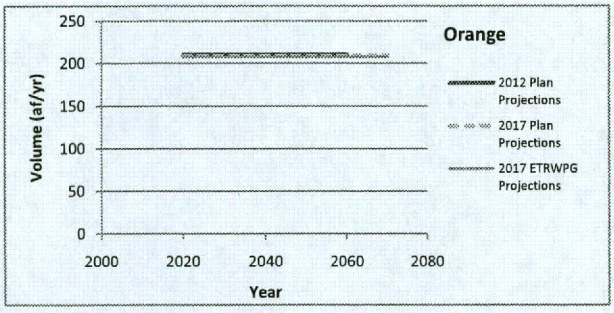
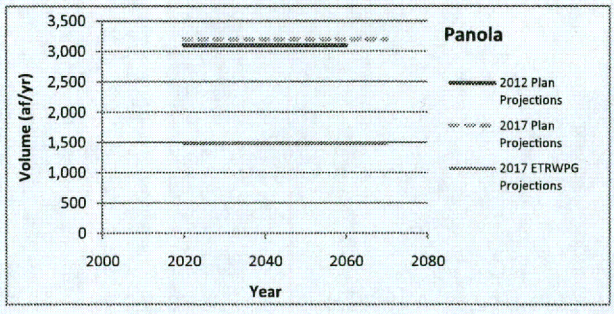
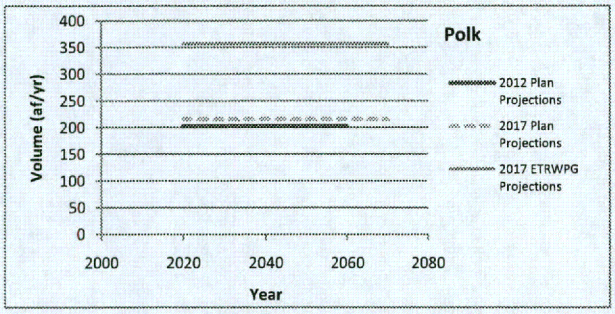


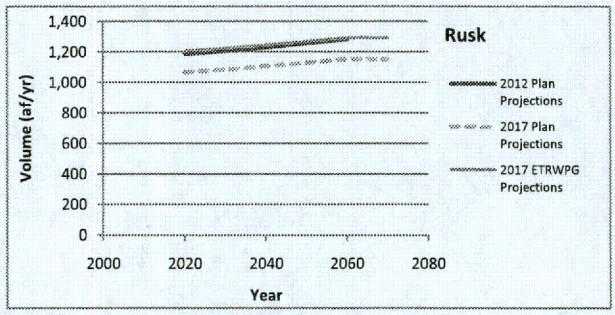
Figure 5

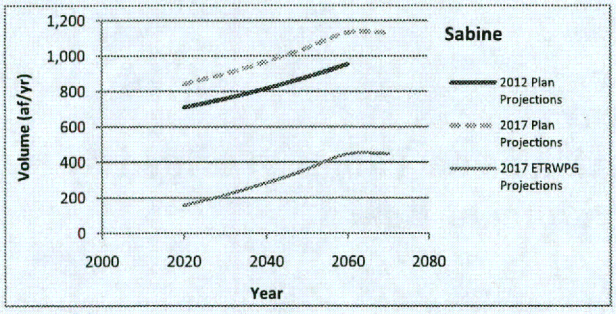
Attachment 1
East Texas Regional Water Planning Area
Revised Non-Municipal Water Demands Projections
Livestock Water Demands

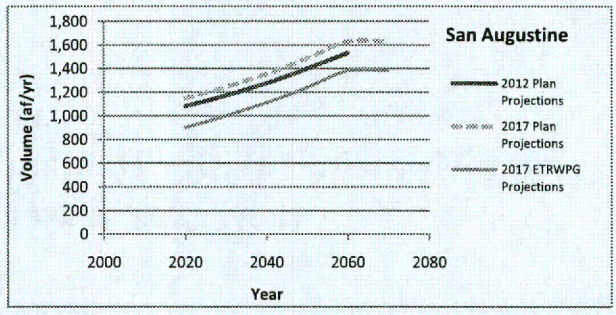


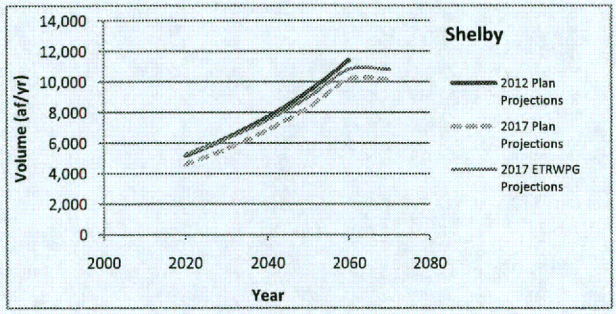


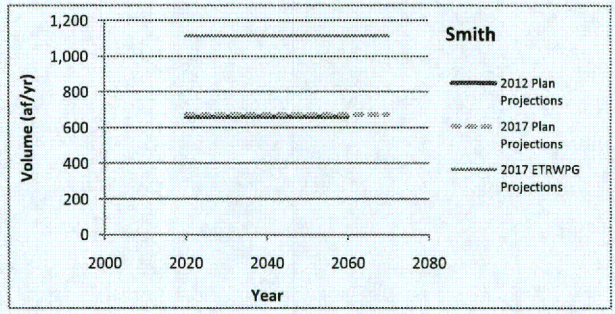


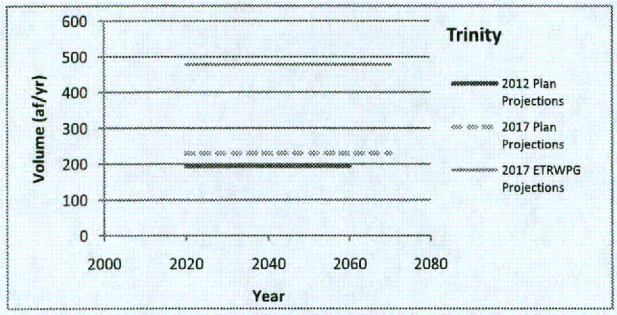












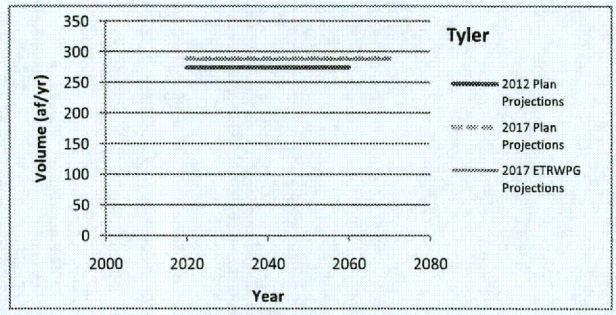


Figure 5 (continued)

Attachment 1
East Texas Regional Water Planning Area
Revised Non-Municipal Water Demands Projections
Livestock Water Demands

Attachment 2
Non-Municipal Water Demands Revisions on Tables Provided by the Texas Water Development Board

Table 1

Attachment 2
East Texas Regional Water Planning Area
Revised Non-Municipal Water Demand Projections
Irrigation Water Demands

Draft Projections for 2017 Projections (af/yr) SWP						
County Name	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
Anderson	403	403	403	403	403	403
Angelina	294	294	294	294	294	294
Cherokee	294	294	294	294	294	294
Hardin	1,349	1,349	1,349	1,349	1,349	1,349
Henderson	284	284	284	284	284	284
Houston	2,333	2,579	2,847	3,145	3,474	3,922
Jasper	0	0	0	0	0	0
Jefferson	82,814	82,814	82,814	82,814	82,814	82,814
Nacogdoches	330	330	330	330	330	330
Newton	0	0	0	0	0	0
Orange	0	0	0	0	0	0
Panola	31	31	31	31	31	31
Polk	259	259	259	259	259	259
Rusk	0	0	0	0	0	0
Sabine	0	0	0	0	0	0
San Augustine	0	0	0	0	0	0
Shelby	0	0	0	0	0	0
Smith	610	642	674	707	742	783
Trinity	0	0	0	0	0	0
Tyler	374	374	374	374	374	374
Total	89,375	89,653	89,953	90,284	90,648	91,137

2012 Projection (af/yr) SWP Projections						
County Name	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
Anderson	212	212	212	212	212	NA
Angelina	30	30	30	30	30	NA
Cherokee	321	321	321	321	321	NA
Hardin	3,502	3,502	3,502	3,502	3,502	NA
Henderson	10	10	10	10	10	NA
Houston	3,024	3,343	3,691	4,077	4,503	NA
Jasper	0	0	0	0	0	NA
Jefferson	140,000	140,000	140,000	140,000	140,000	NA
Nacogdoches	302	302	302	302	302	NA
Newton	367	367	367	367	367	NA
Orange	2,509	2,509	2,509	2,509	2,509	NA
Panola	0	0	0	0	0	NA
Polk	135	135	135	135	135	NA
Rusk	126	126	126	126	126	NA
Sabine	0	0	0	0	0	NA
San Augustine	225	225	225	225	225	NA
Shelby	30	34	37	41	46	NA
Smith	595	626	657	689	723	NA
Trinity	0	0	0	0	0	NA
Tyler	29	29	29	29	29	NA
Total	151,417	151,771	152,153	152,575	153,040	NA

Table 1 (continued)

Attachment 2
East Texas Regional Water Planning Area
Revised Non-Municipal Water Demand Projections
Irrigation Water Demands

RWPG Revisions							
County Name	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**	**RWPG Comments**
Anderson	462	462	462	462	462	462	See Attachment 3
Angelina	481	481	481	481	481	481	See Attachment 3
Cherokee	355	355	355	355	355	355	See Attachment 3
Hardin	3,414	3,645	3,804	3,861	3,802	3,712	See Attachment 4
Henderson	384	384	384	384	384	384	See Attachment 3
Houston	2,989	3,235	3,503	3,801	4,130	4,578	See Attachment 3
Jasper	36	36	36	36	36	36	See Attachment 3
Jefferson	161,952	171,165	177,490	179,735	177,394	173,833	See Attachments 4 & 5
Nacogdoches	400	400	400	400	400	400	See Attachment 3
Newton	375	375	375	375	375	375	See Attachment 3
Orange	3,730	3,983	4,156	4,218	4,153	4,056	See Attachment 4
Panola	64	64	64	64	64	64	See Attachment 3
Polk	428	428	428	428	428	428	See Attachment 3
Rusk	100	100	100	100	100	100	See Attachment 3
Sabine	0	0	0	0	0	0	No Changes
San Augustine	62	62	62	62	62	62	See Attachment 3
Shelby	26	26	26	26	26	26	See Attachment 3
Smith	1,486	1,518	1,550	1,583	1,618	1,659	See Attachment 3
Trinity	500	500	500	500	500	500	See Attachment 3
Tyler	675	675	675	675	675	675	See Attachment 3
Total	177,919	187,894	194,851	197,546	195,445	192,186	

Table 2

Attachment 2
East Texas Regional Water Planning Area
Revised Non-Municipal Water Demand Projections
Manufacturing Water Demands

Draft Projections for 2017 Projections (af/yr) SWP						
County Name	2020	2030	2040	2050	2060	2070
Anderson	30	40	42	44	46	48
Angelina	15,249	16,858	18,487	19,934	21,478	23,142
Cherokee	413	442	469	492	530	571
Hardin	288	318	349	377	407	439
Henderson	54	62	70	78	86	95
Houston	307	338	367	393	425	460
Jasper	91,580	94,982	97,956	100,186	100,271	100,356
Jefferson	423,258	603,321	629,171	655,034	680,914	707,817
Nacogdoches	2,564	2,798	3,029	3,228	3,483	3,758
Newton	568	644	721	791	858	931
Orange	64,461	70,439	76,399	81,690	87,641	94,026
Panola	1,393	1,454	1,513	1,564	1,667	1,777
Polk	604	687	774	854	924	1,000
Rusk	317	342	363	381	409	439
Sabine	467	536	606	668	724	785
San Augustine	8	9	10	11	12	13
Shelby	1,510	1,639	1,768	1,882	2,021	2,170
Smith	5,120	5,597	6,055	6,443	6,976	7,553
Trinity	0	0	0	0	0	0
Tyler	46	53	60	66	71	76
Total	608,237	800,559	838,209	874,116	908,943	945,456

2012 SWP Projections						
County Name	2020	2030	2040	2050	2060	
Anderson	0	0	0	0	0	NA
Angelina	23,500	25,980	28,490	30,720	33,100	NA
Cherokee	784	839	891	934	1,007	NA
Hardin	165	182	200	216	233	NA
Henderson	14	16	18	20	22	NA
Houston	190	209	227	243	263	NA
Jasper	67,649	70,162	72,359	74,006	74,069	NA
Jefferson	423,258	603,321	629,171	655,034	680,914	NA
Nacogdoches	2,553	2,786	3,016	3,214	3,468	NA
Newton	793	899	1,006	1,103	1,196	NA
Orange	64,461	70,439	76,399	81,690	87,641	NA
Panola	1,437	1,500	1,561	1,614	1,720	NA
Polk	725	825	930	1,026	1,110	NA
Rusk	90	97	103	108	116	NA
Sabine	427	490	554	611	662	NA
San Augustine	7	8	9	10	11	NA
Shelby	1,508	1,637	1,766	1,880	2,019	NA
Smith	4,297	4,697	5,081	5,407	5,854	NA
Trinity	0	0	0	0	0	NA
Tyler	46	53	60	66	71	NA
Total	591,904	784,140	821,841	857,902	893,476	NA

Table 2 (continued)

Attachment 2
East Texas Regional Water Planning Area
Revised Non-Municipal Water Demand Projections
Manufacturing Water Demands

RWPG Revisions							
County Name	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**	**RWPG Comments**
Anderson	30	40	42	44	46	48	No Changes
Angelina	15,249	16,858	18,487	19,934	21,478	23,142	No Changes
Cherokee	413	442	469	492	530	571	No Changes
Hardin	288	318	349	377	407	439	No Changes
Henderson	54	62	70	78	86	95	No Changes
Houston	307	338	367	393	425	460	No Changes
Jasper	91,580	94,982	97,956	100,186	100,271	100,356	No Changes
Jefferson	423,258	603,321	629,171	655,034	680,914	707,817	No Changes
Nacogdoches	2,564	2,798	3,029	3,228	3,483	3,758	No Changes
Newton	568	644	721	791	858	931	No Changes
Orange	64,461	70,439	76,399	81,690	87,641	94,026	No Changes
Panola	1,393	1,454	1,513	1,564	1,667	1,777	No Changes
Polk	604	687	774	854	924	1,000	No Changes
Rusk	317	342	363	381	409	439	No Changes
Sabine	467	536	606	668	724	785	No Changes
San Augustine	8	9	10	11	12	13	No Changes
Shelby	1,510	1,639	1,768	1,882	2,021	2,170	No Changes
Smith	5,120	5,597	6,055	6,443	6,976	7,553	No Changes
Trinity	0	0	0	0	0	0	No Changes
Tyler	476	483	490	496	501	506	See Attachment 6
Total	608,667	800,989	838,639	874,546	909,373	945,886	

Table 3

Attachment 2
East Texas Regional Water Planning Area
Revised Non-Municipal Water Demand Projections
Mining Water Demands

Draft Projections for 2017 Projections (af/yr) SWP						
County Name	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
Anderson	70	105	83	58	32	23
Angelina	486	585	410	236	63	28
Cherokee	295	304	203	104	15	15
Hardin	12	12	12	12	12	12
Henderson	77	86	59	34	8	4
Houston	17	17	17	17	17	17
Jasper	13	13	13	13	13	13
Jefferson	194	216	243	294	328	368
Nacogdoches	4,612	3,597	2,435	1,275	127	57
Newton	269	248	190	155	128	106
Orange	309	314	313	314	319	327
Panola	3,944	3,906	3,366	2,845	2,413	2,625
Polk	7	7	7	7	7	7
Rusk	4,410	4,314	3,745	3,196	2,686	2,921
Sabine	2,695	2,175	1,597	1,022	448	425
San Augustine	3,167	2,254	1,513	773	76	34
Shelby	4,745	3,482	2,341	1,203	127	52
Smith	134	139	99	60	20	14
Trinity	5	5	5	5	5	5
Tyler	13	13	13	13	13	13
Total	25,474	21,792	16,664	11,636	6,857	7,066

2012 SWP Projections						
County Name	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
Anderson	557	583	608	633	657	NA
Angelina	4,017	17	17	17	17	NA
Cherokee	1,597	99	101	103	105	NA
Hardin	8,648	9,219	9,788	10,361	10,798	NA
Henderson	14	14	14	14	14	NA
Houston	160	158	156	154	153	NA
Jasper	4	4	4	4	4	NA
Jefferson	334	341	348	355	360	NA
Nacogdoches	7,213	212	211	210	209	NA
Newton	32	32	32	32	32	NA
Orange	9	9	9	9	9	NA
Panola	4,271	4,587	4,905	5,228	5,536	NA
Polk	0	0	0	0	0	NA
Rusk	1,679	1,761	1,841	1,921	1,996	NA
Sabine	0	0	0	0	0	NA
San Augustine	7,000	0	0	0	0	NA
Shelby	1,500	0	0	0	0	NA
Smith	262	295	351	391	424	NA
Trinity	0	0	0	0	0	NA
Tyler	0	0	0	0	0	NA
Total	37,297	17,331	18,385	19,432	20,314	NA

Table 3 (continued)

Attachment 2
East Texas Regional Water Planning Area
Revised Non-Municipal Water Demand Projections
Mining Water Demands

RWPG Revisions							
County Name	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**	**RWPG Comments**
Anderson	70	105	83	58	32	23	No Changes
Angelina	486	585	410	236	63	28	No Changes
Cherokee	295	304	203	104	15	15	No Changes
Hardin	12	12	12	12	12	12	No Changes
Henderson	77	86	59	34	8	4	No Changes
Houston	17	17	17	17	17	17	No Changes
Jasper	13	13	13	13	13	13	No Changes
Jefferson	194	216	243	294	328	368	No Changes
Nacogdoches	7,000	4,500	0	0	0	0	See Attachment 7
Newton	269	248	190	155	128	106	No Changes
Orange	309	314	313	314	319	327	No Changes
Panola	5,916	5,859	5,049	4,268	3,620	3,938	Per Request from Leah Adams, GM of Panola County GCD
Polk	7	7	7	7	7	7	No Changes
Rusk	1,000	500	0	0	0	0	See Attachment 7
Sabine	1,500	1,000	0	0	0	0	See Attachment 7
San Augustine	4,000	3,000	0	0	0	0	See Attachment 7
Shelby	1,500	1,000	0	0	0	0	See Attachment 7
Smith	134	139	99	60	20	14	No Changes
Trinity	5	5	5	5	5	5	No Changes
Tyler	13	13	13	13	13	13	No Changes
Total	22,817	17,923	6,716	5,590	4,600	4,890	

Table 4

Attachment 2
East Texas Regional Water Planning Area
Revised Non-Municipal Water Demand Projections
Steam Electric Water Demands

Draft Projections for 2017 Projections (af/yr) SWP						
County Name	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
Anderson	11,306	13,218	15,549	18,390	21,853	25,968
Angelina	1,000	1,000	1,000	1,000	1,000	1,000
Cherokee	1,790	2,093	2,462	2,912	3,460	3,835
Hardin	0	0	0	0	0	0
Henderson	0	0	0	0	0	0
Houston	0	0	0	0	0	0
Jasper	0	0	0	0	0	0
Jefferson	13,426	15,696	18,464	21,838	25,951	30,839
Nacogdoches	6,911	8,079	9,504	11,241	13,358	15,874
Newton	14,132	16,522	19,436	22,987	27,317	32,463
Orange	4,966	5,805	6,829	8,077	9,598	10,637
Panola	0	0	0	0	0	0
Polk	0	0	0	0	0	0
Rusk	27,458	32,102	37,762	44,663	53,074	63,069
Sabine	0	0	0	0	0	0
San Augustine	0	0	0	0	0	0
Shelby	0	0	0	0	0	0
Smith	0	0	0	0	0	0
Trinity	0	0	0	0	0	0
Tyler	27	32	37	44	52	62
Total	81,016	94,547	111,043	131,152	155,663	183,747

2012 SWP Projections						
County Name	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
Anderson	11,306	13,218	15,549	18,390	21,853	NA
Angelina	1,000	1,000	1,000	1,000	1,000	NA
Cherokee	1,790	2,093	2,462	2,912	3,460	NA
Hardin	0	0	0	0	0	NA
Henderson	0	0	0	0	0	NA
Houston	0	0	0	0	0	NA
Jasper	0	0	0	0	0	NA
Jefferson	13,426	15,696	18,464	21,838	25,951	NA
Nacogdoches	6,911	8,079	9,504	11,241	13,358	NA
Newton	14,132	16,522	19,436	22,987	27,317	NA
Orange	4,966	5,805	6,829	8,077	9,598	NA
Panola	0	0	0	0	0	NA
Polk	0	0	0	0	0	NA
Rusk	27,458	32,102	37,762	44,663	53,074	NA
Sabine	0	0	0	0	0	NA
San Augustine	0	0	0	0	0	NA
Shelby	0	0	0	0	0	NA
Smith	0	0	0	0	0	NA
Trinity	0	0	0	0	0	NA
Tyler	0	0	0	0	0	NA
Total	80,989	94,515	111,006	131,108	155,611	NA

Table 4 (continued)

Attachment 2
East Texas Regional Water Planning Area
Revised Non-Municipal Water Demand Projections
Steam Electric Water Demands

RWPG Revisions							
County Name	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**	**RWPG Comments**
Anderson	11,306	13,218	15,549	18,390	21,853	25,968	No Changes
Angelina	1,000	1,000	1,000	1,000	1,000	1,000	No Changes
Cherokee	1,790	2,093	2,462	2,912	3,460	3,835	No Changes
Hardin	0	0	0	0	0	0	No Changes
Henderson	0	0	0	0	0	0	No Changes
Houston	0	0	0	0	0	0	No Changes
Jasper	0	0	0	0	0	0	No Changes
Jefferson	13,426	15,696	18,464	21,838	25,951	30,839	No Changes
Nacogdoches	6,911	8,079	9,504	11,241	13,358	15,874	No Changes
Newton	14,132	16,522	19,436	22,987	27,317	32,463	No Changes
Orange	4,966	5,805	6,829	8,077	9,598	10,637	No Changes
Panola	0	0	0	0	0	0	No Changes
Polk	0	0	0	0	0	0	No Changes
Rusk	27,458	32,102	37,762	44,663	53,074	63,069	No Changes
Sabine	0	0	0	0	0	0	No Changes
San Augustine	0	0	0	0	0	0	No Changes
Shelby	0	0	0	0	0	0	No Changes
Smith	0	0	0	0	0	0	No Changes
Trinity	0	0	0	0	0	0	No Changes
Tyler	1,029	1,029	1,029	1,029	1,029	1,029	See Attachment 6
Total	82,018	95,544	112,035	132,137	156,640	184,714	

Table 5

Attachment 2
East Texas Regional Water Planning Area
Revised Non-Municipal Water Demand Projections
Livestock Water Demands

Draft Projections for 2017 Projections (af/yr) SWP						
County Name	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
Anderson	1,410	1,410	1,410	1,410	1,410	1,410
Angelina	434	434	434	434	434	434
Cherokee	1,361	1,361	1,361	1,361	1,361	1,361
Hardin	165	165	165	165	165	165
Henderson	937	937	937	937	937	937
Houston	1,772	1,921	2,081	2,255	2,443	2,684
Jasper	392	392	392	392	392	392
Jefferson	946	946	946	946	946	946
Nacogdoches	1,380	1,573	1,797	2,056	2,353	2,795
Newton	122	122	122	122	122	122
Orange	209	209	209	209	209	209
Panola	3,197	3,197	3,197	3,197	3,197	3,197
Polk	215	215	215	215	215	215
Rusk	1,067	1,084	1,106	1,129	1,152	1,152
Sabine	843	901	969	1,047	1,132	1,132
San Augustine	1,148	1,245	1,356	1,485	1,627	1,627
Shelby	4,599	5,607	6,834	8,331	10,156	10,156
Smith	673	673	673	673	673	673
Trinity	230	230	230	230	230	230
Tyler	289	289	289	289	289	289
Total	21,389	22,911	24,723	26,883	29,443	30,126

2012 SWP Projections						
County Name	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
Anderson	1,708	1,708	1,708	1,708	1,708	NA
Angelina	620	647	677	712	749	NA
Cherokee	1,765	1,765	1,765	1,765	1,765	NA
Hardin	156	156	156	156	156	NA
Henderson	2,594	2,594	2,594	2,594	2,594	NA
Houston	2,291	2,483	2,690	2,915	3,158	NA
Jasper	317	317	317	317	317	NA
Jefferson	807	807	807	807	807	NA
Nacogdoches	1,954	2,227	2,544	2,911	3,332	NA
Newton	110	110	110	110	110	NA
Orange	210	210	210	210	210	NA
Panola	3,096	3,096	3,096	3,096	3,096	NA
Polk	202	202	202	202	202	NA
Rusk	1,188	1,207	1,231	1,257	1,283	NA
Sabine	710	759	816	882	954	NA
San Augustine	1,082	1,173	1,278	1,400	1,534	NA
Shelby	5,176	6,310	7,691	9,376	11,430	NA
Smith	660	660	660	660	660	NA
Trinity	194	194	194	194	194	NA
Tyler	274	274	274	274	274	NA
Total	25,114	26,899	29,020	31,546	34,533	NA

Table 5 (continued)

Attachment 2
East Texas Regional Water Planning Area
Revised Non-Municipal Water Demand Projections
Livestock Water Demands

RWPG Revisions							
County Name	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**	**RWPG Comments**
Anderson	1,402	1,402	1,402	1,402	1,402	1,402	See Attachment 6
Angelina	648	648	648	648	648	648	See Attachment 6
Cherokee	1,681	1,681	1,681	1,681	1,681	1,681	See Attachment 6
Hardin	163	163	163	163	163	163	See Attachment 6
Henderson	1253	1,253	1,253	1,253	1,253	1,253	See Attachment 6
Houston	1,630	1,779	1,939	2,113	2,301	2,542	See Attachment 6
Jasper	362	362	362	362	362	362	See Attachment 6
Jefferson	943	943	943	943	943	943	See Attachment 6
Nacogdoches	4,364	4,557	4,781	5,040	5,337	5,779	See Attachment 6
Newton	121	121	121	121	121	121	See Attachment 6
Orange	208	208	208	208	208	208	See Attachment 6
Panola	1,480	1,480	1,480	1,480	1,480	1,480	See Attachment 6
Polk	357	357	357	357	357	357	See Attachment 6
Rusk	1,207	1,224	1,246	1,269	1,292	1,292	See Attachment 6
Sabine	159	217	285	363	448	448	See Attachment 6
San Augustine	903	1,000	1,111	1,240	1,382	1,382	See Attachment 6
Shelby	5,265	6,273	7,500	8,997	10,822	10,822	See Attachment 6
Smith	1,115	1,115	1,115	1,115	1,115	1,115	See Attachment 6
Trinity	478	478	478	478	478	478	See Attachment 6
Tyler	288	288	288	288	288	288	See Attachment 6
Total	24,027	25,549	27,361	29,521	32,081	32,764	

Attachment 3
Irrigation Water Demands Evaluation

Table 1

Attachment 3
East Texas Regional Water Planning Area
Revised Non-Municipal Water Demand Projections
Irrigation Water Demands

	Volume (af/yr)								
	Historical Water Use Estimates							2017 Plan Projections 2020 Base Year[1]	2017 ETRWPG Projections 2020 Base Year[2]
Counties	2005	2006	2007	2008	2009	Average	Maximum		
Anderson	367	305	444	462	435	403	462	403	462
Angelina	309	233	481	94	350	293	481	294	481
Cherokee	251	253	355	309	300	294	355	294	355
Hardin	339	976	1,937	2,428	1,058	1,348	2,428	1,349	3,414[3]
Henderson	342	384	243	281	170	284	384	284	384
Houston	2,627	2,989	1,358	1,895	1,685	2,111	2,989	2,333	2,989
Jasper	0	36	30	30	0	32	36	0	36
Jefferson	84,883	90,243	91,889	87,971	59,084	82,814	91,889	82,814	161,952[3]
Nacogdoches	390	400	146	338	375	330	400	330	400
Newton	375	375	366	0	0	372	375	0	375
Orange	4,333	6,250	3,125	0	0	4,569	6,250	0	3,730[3]
Panola	0	18	30	64	29	35	64	31	64
Polk	100	100	341	325	428	259	428	259	428
Rusk	92	100	25	29	0	62	100	0	100
Sabine	0	0	0	0	0	0	0	0	0
San Augustine	50	62	0	0	0	56	62	0	62
Shelby	23	26	20	25		24	26	0	26
Smith	1,300	1,486	525	708	810	966	1,486	610	1,486
Trinity	488	500	335	0	0	441	500	0	500
Tyler	500	500	175	18	675	374	675	374	675
Total	**96,769**	**105,236**	**101,825**	**94,977**	**65,399**	**95,065**	**109,390**	**89,375**	**177,116**

[1] 2017 Plan Projections are from the 2017 database (DB17) provided by the Texas Water Development Board. In most cases, the base year was based upon the average of the historical water use estimates (2005-2009).

[2] 2017 ETRWPG Projections are those proposed by the East Texas Regional Water Planning Group (ETRWPG)

[3] Irrigation values for Hardin, Jefferson, and Orange Counties were calculated based on a technical memorandum prepared by the consulting team in August 2012 entitled, "Draft Rice Water Demand Projections Revisions."

Attachment 4
Rice Irrigation Demands Projections Technical Memorandum

ALAN PLUMMER ASSOCIATES, INC.
ENVIRONMENTAL ENGINEERS • DESIGNERS • SCIENTISTS

TECHNICAL MEMORANDUM

East Texas Regional Water Planning Group
Rice Water Demand Projections Revisions

Date: August 21, 2012

Prepared For: East Texas Regional Water Planning Group

Prepared By: Rex H. Hunt, P.E. and Lauren E. Gonzalez, Alan Plummer Associates, Inc.

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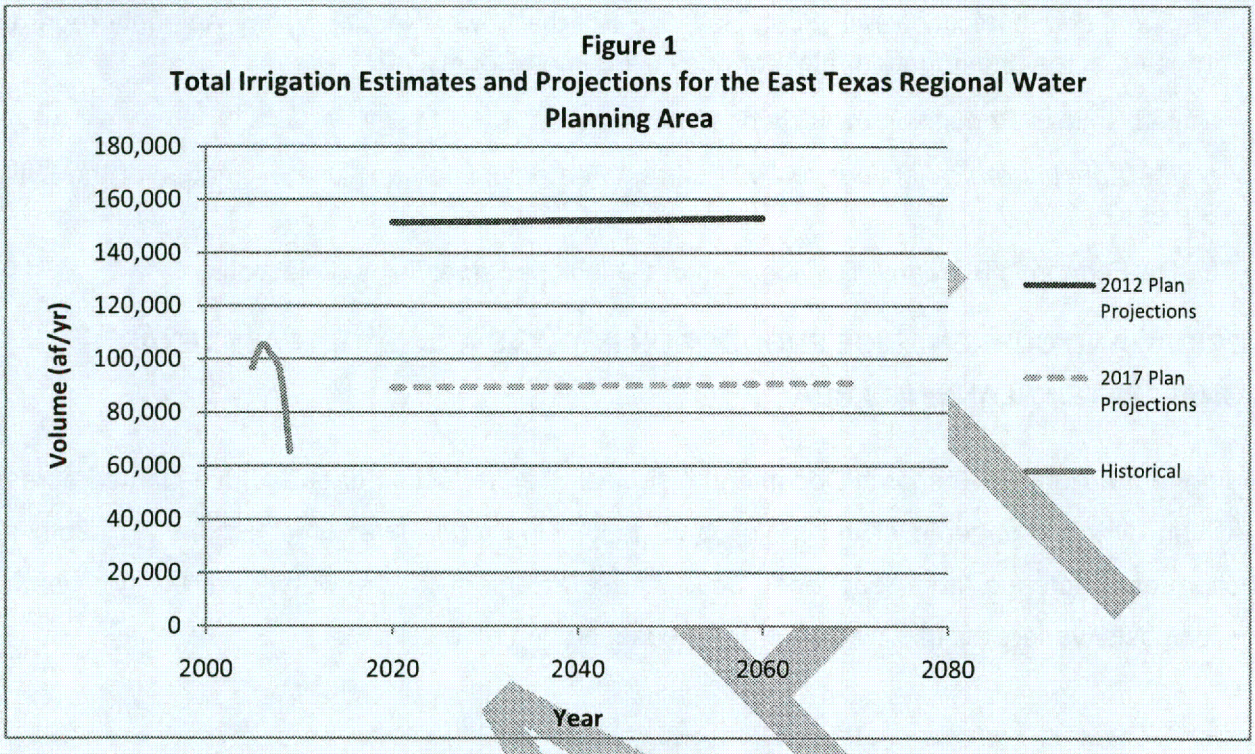
The Texas Water Development Board (TWDB) requires regional water planning groups to project water demands for non-municipal purposes on a 50-year planning cycle. Non-municipal water demands include the following categories: irrigation, manufacturing, mining, steam-electric and livestock. The TWDB has provided proposed non-municipal water demand projections for the *2017 State Water Plan* for each decade from 2020 to 2070 for the East Texas Regional Water Planning Area (ETRWPA) or Region I, hereafter referred to as the 2017 Plan Projections. The TWDB advised the East Texas Regional Water Planning Group (ETRWPG) that modifications to the 2017 Plan Projections would be considered if appropriate justification were provided. This technical memorandum presents a model, developed to project irrigation demands for rice in Hardin, Jefferson, and Orange Counties from 2020 to 2070 and provides documentation to justify the revised projections. Revisions to rice irrigation demands are based on factors that include historical and current rice production in Texas, global rice supply and demand, and estimates of global population growth.

BACKGROUND

The 2017 Plan Projections indicate that the ETRWPA will experience a 41 percent (%) decrease in irrigation demand over the *2012 State Water Plan* projections (2012 Plan Projections) for each decade beginning in 2020 through 2070 (See Figure 1). This decrease represents a reduction of over 60,000 acre-feet per year (af/yr) in irrigation demand. A major component of the projected decrease in irrigation water demands is related to projections of rice production in Hardin, Jefferson, and Orange Counties. Although the estimation of irrigation water demand 50 years into the future is a coarse and inexact science, this significant decrease in irrigation water demand may not be indicative of future conditions in the ETRWPA. Future water demands related to rice production were significantly underestimated for Hardin, Jefferson, and Orange Counties. After review of available data, rice production in the ETRWPA may actually increase in the future.

Figure 1
Total Irrigation Estimates and Projections for the East Texas Regional Water Planning Area



DATA SOURCES UTILIZED

For purposes of this evaluation, the following data sources were utilized to evaluate rice production trends in the ETRWPA:

- Texas Water Development Board Non-Municipal Water Demands Spreadsheet for Irrigation (2017 Plan Projections). A copy of this spreadsheet is provided in Attachment A.
- *2012 State Water Plan* Projections and *2011 Update of the Regional Water Plan* for Irrigation demands (2012 Plan Projections).
- Texas Water Development Board Irrigation Basis Spreadsheet with crop acreage and corresponding water demands for each acre in af/yr. Reported crop acreage was based on data from the United States Department of Agriculture (USDA) Farm Service Agency (FSA). A copy of this spreadsheet is provided in Attachment B.
- Texas AgriLife Research and Extension Center at Beaumont document entitled, *2012 Texas Rice Production Guidelines* (AgriLife Research Document). Reported crop acreage was based on data from the USDA FSA. A copy of page 74 of the AgriLife Research Document is provided in Attachment C.
- Personal communication with Dr. Lloyd T. (Ted) Wilson from the Texas A&M University System AgriLife Research & Extension Center in Beaumont, Texas.

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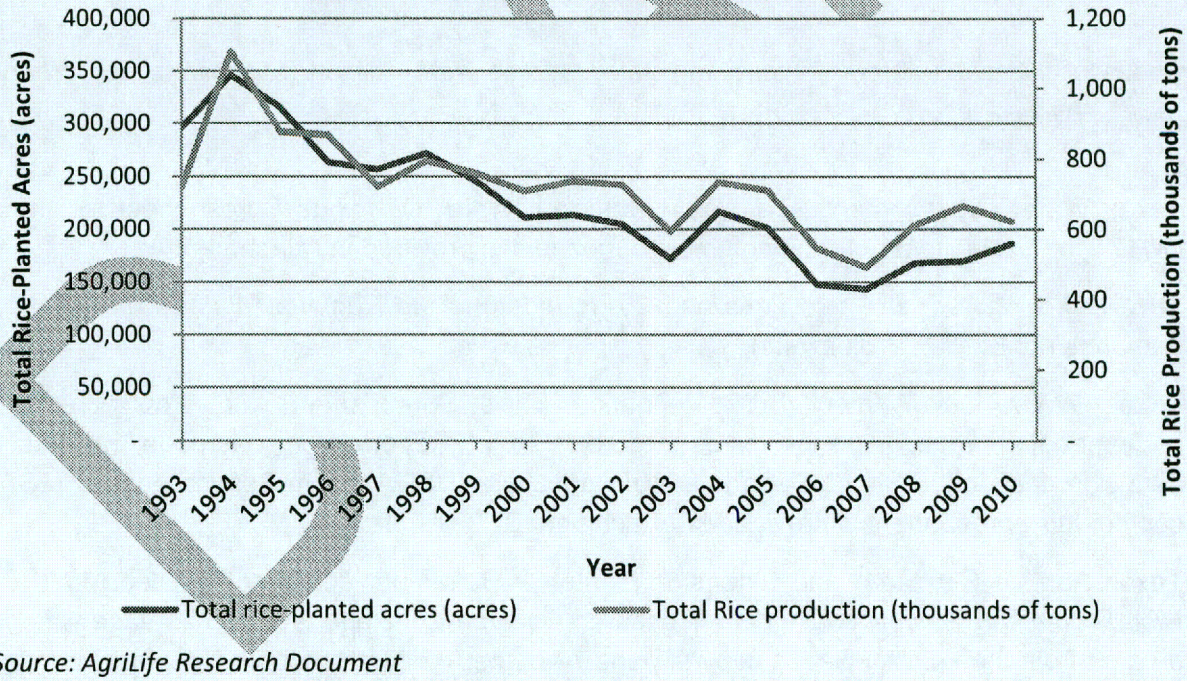
- Personal communication with Scott Hall, P.E., of the Lower Neches Valley Authority regarding irrigated acres and irrigation rates for rice in Jefferson County.
- United Nations Population Projections through 2070.
- *USDA Agricultural Projections to 2021* current rice production and use estimates for the United States.
- USDA Economic Research Service Market Outlook per acre yields projections.

HISTORICAL AND CURRENT RICE PRODUCTION IN TEXAS AND IN THE EAST TEXAS REGIONAL WATER PLANNING AREA

According to the AgriLife Research Document, historical rice production data and rice-planted acreage data exhibit dynamic patterns of increasing and decreasing totals over time (Figure 2). Both rice production and acreage are dependent on various factors such as water availability, weather, production costs, variety availability, and crop disease, among others.

Figure 2
Rice Production and Rice-Planted Acreage in Texas



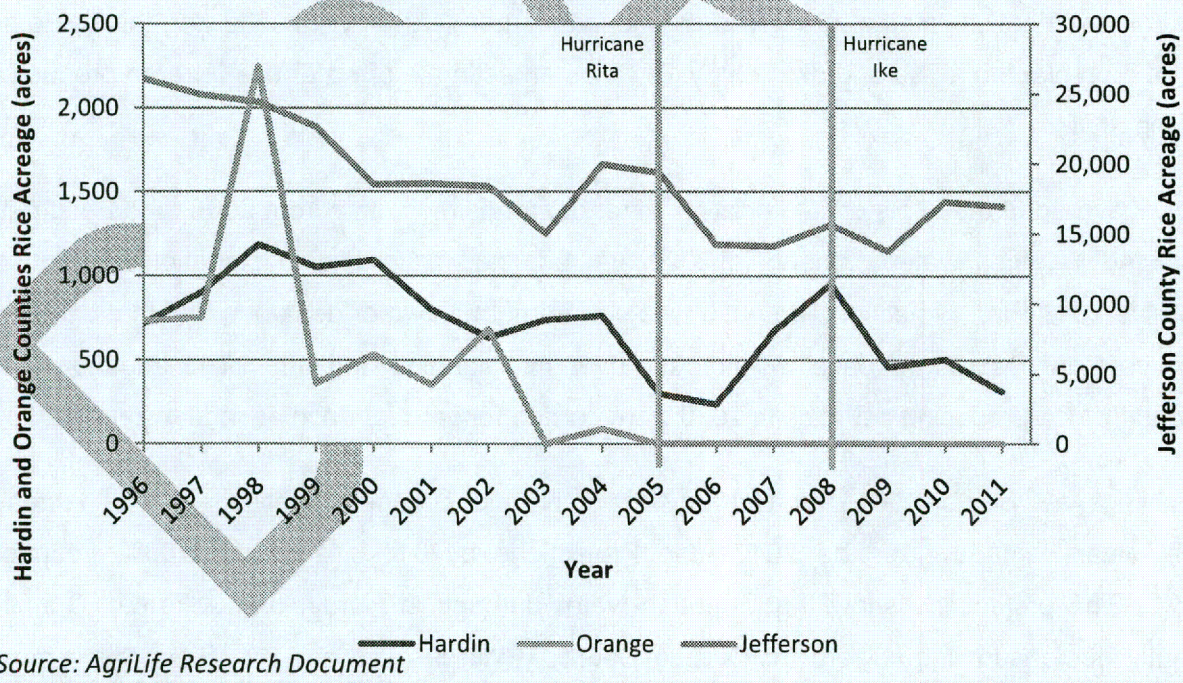
Source: AgriLife Research Document

The rice-producing counties in Region I, which are Hardin, Jefferson, and Orange Counties, exhibit similar patterns of varying increased and decreased rice-planted acreage (Figure 3). Both the TWDB and the AgriLife Research Document provide historical rice acreage estimates for these counties, which

are based on USDA FSA reported acreage data. In addition, information provided by the Lower Neches Valley Authority (LNVA) indicated rice acreage in Jefferson County is somewhat higher than the USDA FSA estimates. Similar to the Texas-wide reported crop acreage estimates in Figure 2, Hardin and Jefferson Counties exhibit temporary decreased rice-planted acreage that may be due to extreme weather events (Figure 3). Sharp declines in acreage occurred in 2005 which may be due to Hurricane Rita and another decline in 2007 may be attributed to Hurricane Ike.

While rice-related water demands account for the majority of the total irrigation demands in Hardin, Jefferson, and Orange Counties, other agricultural demands are also included in the development of total irrigation water demands. Irrigation water demands include water demand estimates for the growth of crops such as vegetables, grapes, hay, orchards, corn, cotton, sorghum, peanuts, rice, and wheat. Irrigation water demands also include water demands for golf courses. A summary of the historical total irrigation demands and the percentage of rice-related water demands for Hardin, Jefferson, and Orange Counties are provided in Table 1.

Figure 3
Historical Rice Acreage Trends by County



Source: AgriLife Research Document

Table 1
Historical Total Irrigation Water Use (af/yr) for Rice-Producing Counties in the East Texas Regional Water Planning Area

Counties	Volume (af/yr)					Average	Average Percent of Rice-Related Demands
	2005	2006	2007	2008	2009		
Hardin	339	976	1,937	2,428	1,058	1,348	70%
Jefferson	84,883	90,243	91,889	87,971	59,084	82,814	99%
Orange	4,333	6,250	3,125	0	0	2,742	100%

Source: TWDB Irrigation Basis and 2017 Plan Projections

PROJECTED RICE PRODUCTION AND IRRIGATION IN THE EAST TEXAS REGIONAL WATER PLANNING AREA

As described previously, development of irrigation projections over a 50-year planning horizon is inexact due to a multitude of variables that affect trends. The TWDB developed the 2017 Plan Projections by assessing historical crop acreage from 2005 to 2009, which was impacted by two unique weather events. In order to calculate water demands associated with each crop's acreage, the TWDB assigned gross irrigation rates of any given crop in inches per year (in/yr). Multiplying this value by the number of crop-planted acres and dividing by 12 yields an estimate of water use for crop production for that year in af/yr.

The TWDB averaged these historical irrigation water demands by county from 2005 to 2009 to develop the projected irrigation water demand in 2020 and adjusted according to stakeholder input to the TWDB. The 2017 Plan Projections do not indicate that irrigation water demands for Hardin, Jefferson, and Orange Counties will increase or decrease over the planning horizon. The irrigation demand projections for rice-producing counties in 2020 were carried forward for each decade through 2070.

The resulting TWDB projections for Hardin, Jefferson, and Orange Counties show a decrease in irrigation water demand from the 2012 Plan Projections by 61%, 41%, and 100%, respectively (Table 2). The projections show that irrigation water demand in Hardin and Jefferson Counties is significantly decreased and is zero for Orange County (Figures 4, 5, and 6). Since the majority of irrigation demands for Hardin, Jefferson, and Orange Counties are due to rice production, a model-based evaluation of future rice production was conducted.

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Table 2
Projected Irrigation Water Demands Developed for the *2012 State Water Plan* and *2017 State Water Plan*

County	State Water Plan Year	Volume (af/yr)					
		2020	2030	2040	2050	2060	2070
Hardin	2012 Plan Projections	3,502	3,502	3,502	3,502	3,502	NA
	2017 Plan Projections	1,349	1,349	1,349	1,349	1,349	1,349
	Difference	-2,153	-2,153	-2,153	-2,153	-2,153	NA
	% Difference	-61%	-61%	-61%	-61%	-61%	NA
Jefferson	2012 Plan Projections	140,000	140,000	140,000	140,000	140,000	NA
	2017 Plan Projections	82,814	82,814	82,814	82,814	82,814	82,814
	Difference	-57,186	-57,186	-57,186	-57,186	-57,186	NA
	% Difference	-41%	-41%	-41%	-41%	-41%	NA
Orange	2012 Plan Projections	2,509	2,509	2,509	2,509	2,509	NA
	2017 Plan Projections	0	0	0	0	0	0
	Difference	-2,509	-2,509	-2,509	-2,509	-2,509	NA
	% Difference	-100%	-100%	-100%	-100%	-100%	NA

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Figure 4
Hardin County Historical and Projected Irrigation Water Demands

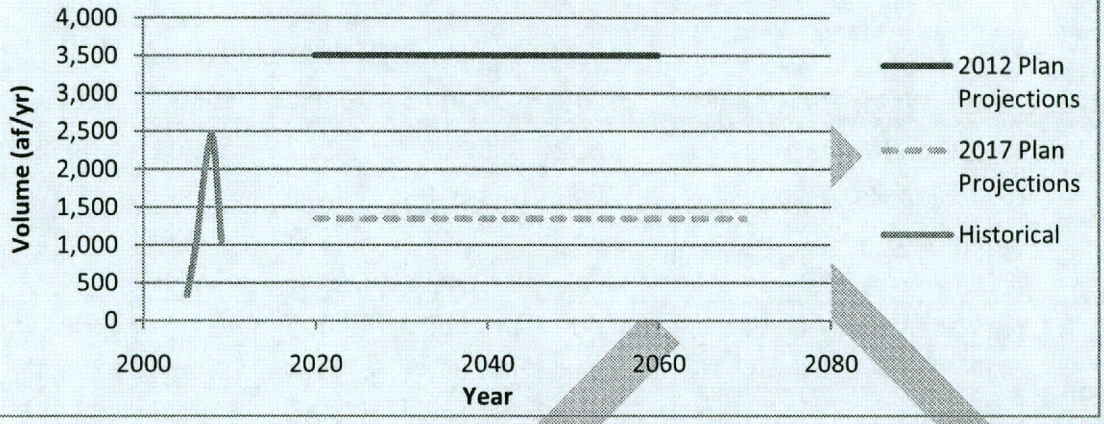


Figure 5
Jefferson County Historical and Projected Irrigation Water Demands

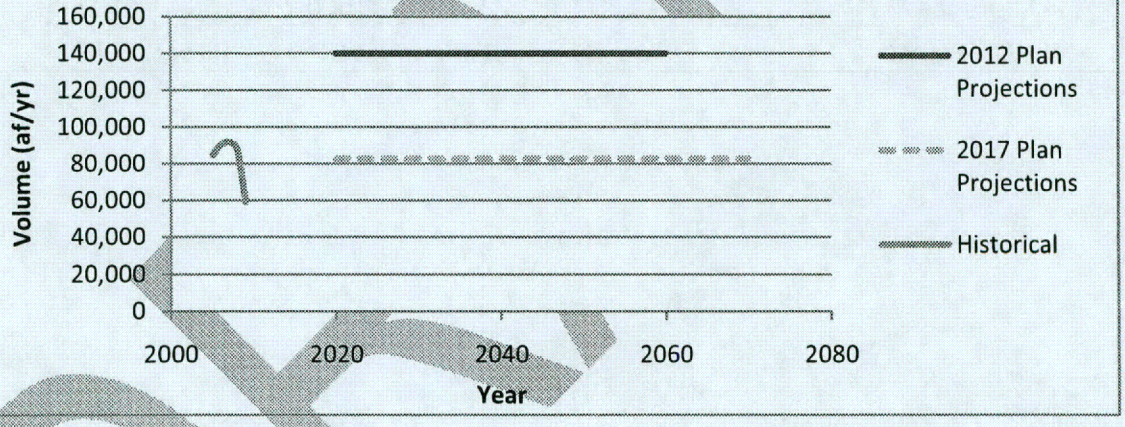
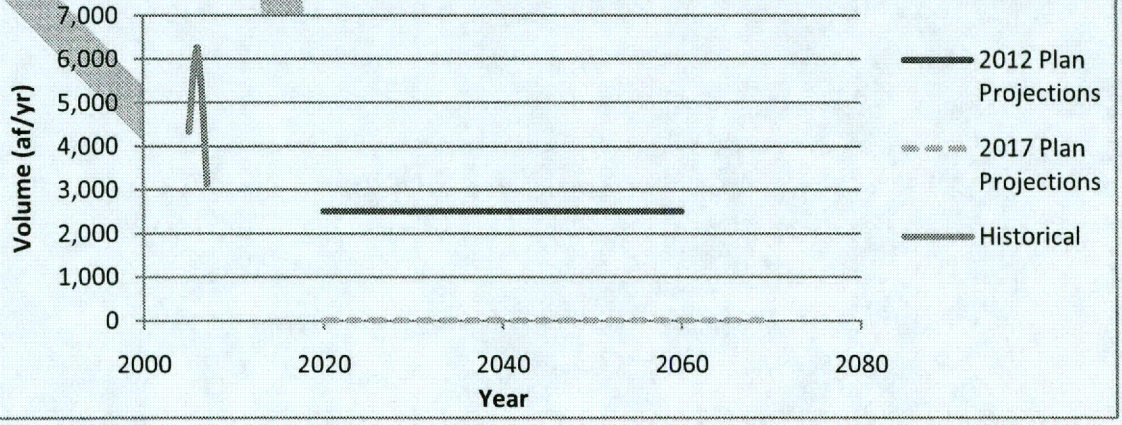


Figure 6
Orange County Historical and Projected Irrigation Water Demands



AN APPROACH TO PROJECTING RICE-RELATED WATER DEMANDS IN THE EAST TEXAS REGIONAL WATER PLANNING AREA

In order to evaluate rice irrigation in the ETRWPA, it is necessary to examine rice irrigation projections throughout Texas. Rice production in Texas is primarily from Orange County on the upper coast to Wharton, Matagorda and Victoria Counties in the middle portion of the coast. A small amount of rice is also grown in Bowie, Lamar, and Red River Counties in northeast Texas, as well as Robertson County in central Texas. Table 3 presents a list of Texas counties in which rice is produced or has historically been produced.

Table 3
Rice-Producing Counties in Texas

County	Region	County	Region
Bowie	D	**Hardin***	**I**
Lamar	D	**Jefferson***	**I**
Red River	D	**Orange***	**I**
Robertson	G	Colorado	K
Austin	H	Matagorda	K
Brazoria	H	Wharton	K
Chambers*	**H**	Calhoun	L
Fort Bend	H	Victoria	L
Galveston	H	Jackson	P
Harris	H	Lavaca	P
Liberty*	**H**	Wharton	P
Waller	H		

** Southeastern Texas Counties*

The five counties shown in bold letters with an asterisk are those located east of Harris County in southeast Texas and along the Texas coast, hereafter referred to as Southeastern Rice-Producing Counties. All other counties that are not in bold letters will hereafter be referred to as Western and Other Rice-Producing Counties. The Southeastern Rice-Producing Counties are likely to experience an increase in rice production in the coming years, based on the model-based approach proposed in this memorandum.

In the model, global population projections and rice production trends were evaluated in order to assess likely global population-based rice production by the United States and Texas for the global market over

the next 50 years. Using this projected rice production by decade, combined with the 2017 Plan Projections for irrigation and rice trends for Western and Other Rice-Producing Counties, projections of the estimated water use for Southeastern Rice-Producing Counties were revised.

Attachment D provides a spreadsheet model of the proposed irrigation demands for the ETRWPA. Assumptions and data sources used to develop the irrigation demand projections for Hardin, Jefferson, and Orange Counties are also provided in Attachment D.

The model considers a variety of global and regional variables to develop proposed projections of rice irrigation demand. These variables are conservative and reasonable, but some can have a significant impact on the outcome, if changed. Figures 7, 8, and 9 depict the historical, current TWDB, and proposed ETRWPA rice water demand projections for Hardin, Jefferson, and Orange Counties. As may be seen in the figures, rice irrigation is projected to increase in Hardin, Jefferson, and Orange Counties over the planning period to meet growing global rice demand. In each case, irrigation increases by decade until around 2050, at which point it levels off. For each county, the 2060 and 2070 rice irrigation projections decrease slightly from the previous decade.

The gradual slowing of the growth in irrigation demand in each decade is primarily a function of two variables in the model. Global population is expected to increase with each decade over the planning horizon (see Line 4 of the Attachment D table). However, the rate of increase slows significantly from one decade to the next. For example, global population is expected to increase by some 715 million persons from 2010 to 2020, but by only 320 million from 2060 to 2070. This factor will have a significant impact on the increase in rice demand over time.

The yield on a per-acre basis for rice is expected to increase by approximately 60% by year 2070 as a result of rice farmers adopting higher yielding long-grain varieties. While resulting in increased rice production per acre (see Line 5 of the Attachment D table), this increase will also theoretically result in a commensurate decrease in irrigation demand on a per-acre basis needed to grow the same amount of rice. This, coupled with slowing population growth, results in an eventual peaking of rice irrigation water demands in 2050 and a slight decrease in the following decades.

Another significant factor in the model is the assumption that Texas' role in global rice production will grow with global rice demand. Hence, Texas currently produces approximately 0.1% of rice produced globally; and it is assumed that this production percentage will remain constant throughout the planning

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Figure 7
Hardin County Historical, Projected, and Proposed Rice Water Demands

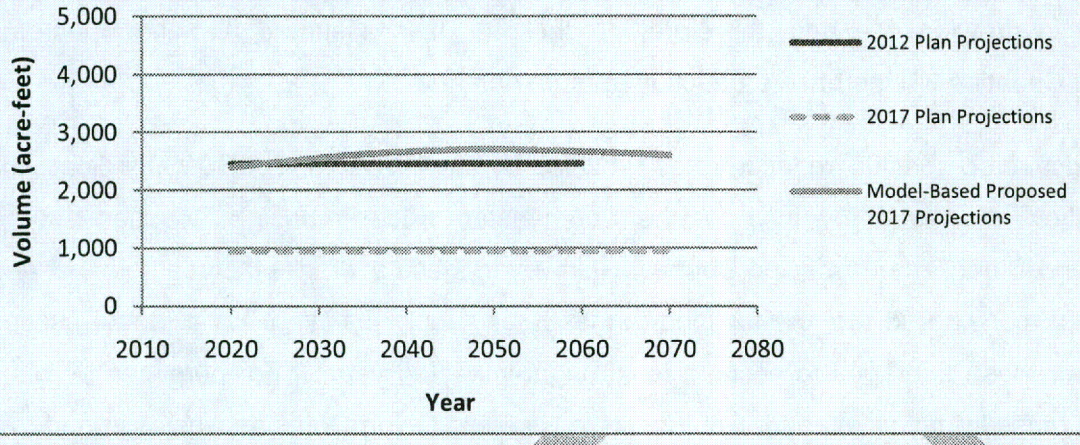


Figure 8
Jefferson County Historical, Projected, and Proposed Rice Water Demands

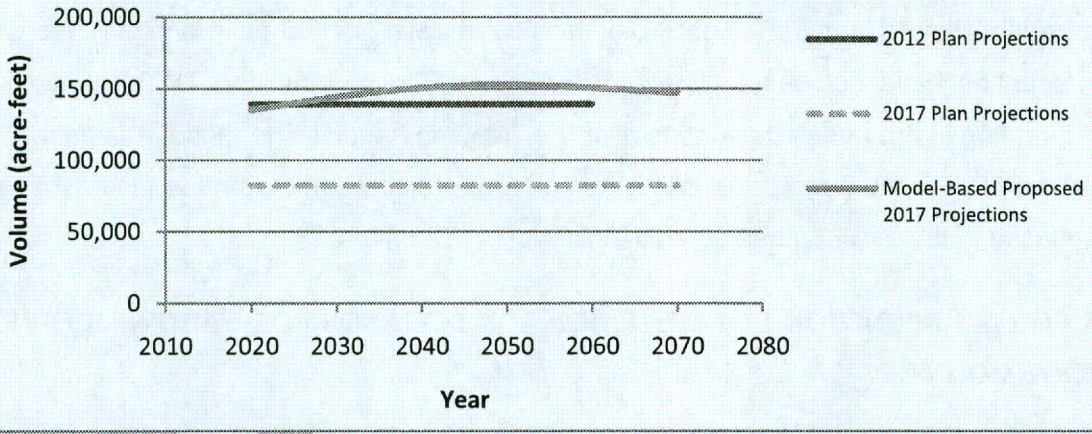
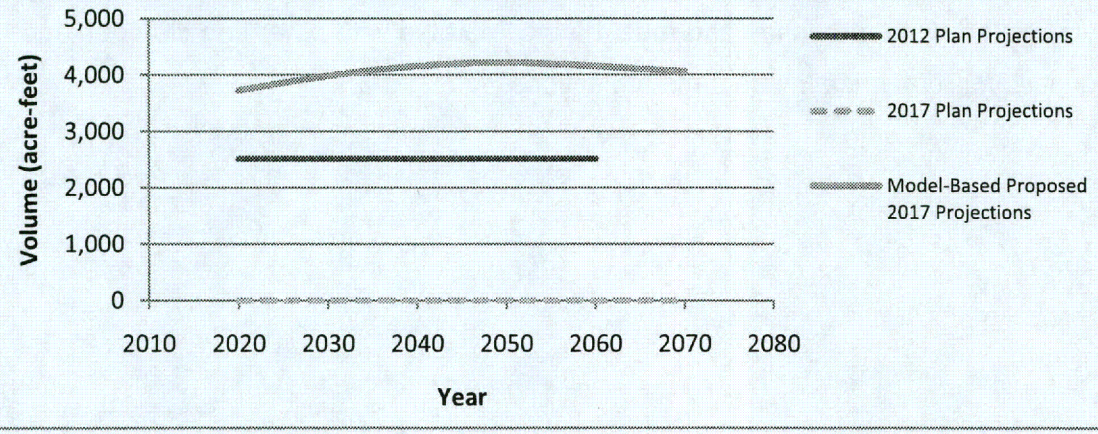


Figure 9
Orange County Historical, Projected, and Proposed Rice Water Demands



period. However, a key factor in this model is the assumption that over time, water restrictions and population encroachment on many areas west (or down coast) of Houston will restrict acreage dedicated to growing rice and, therefore, production. It is assumed that the Southeastern Rice-Producing Counties will increase production to meet demand.

The historical crop-specific irrigation rates provided by the TWDB for 2005-2009 indicate that average rice irrigation rates were 54 in/yr for the Southeastern Rice-Producing Counties and 51 in/yr for Western and Other Rice-Producing Counties. However, these averages include both wet and dry years and may be considered too low for long-range water supply planning. The model assumed a 10% increase for these averages to account for drought-impacted years. For purposes of this model, the estimated gross irrigation rates for Southeastern Rice-Producing Counties was assumed to be 60 in/yr (see Line 17 of the Attachment D table) and the Western and Other Rice-Producing Counties was 56 in/yr (see Line 11 of the Attachment D table).

It is also important to note that 2017 Plan Projections for irrigation demands in Western and Other Rice-Producing Counties have not been altered in this model. In general, the TWDB projections show declines in irrigation in the affected counties over the planning period. The model retains the 2012 Plan Projections and 2017 Plan Projections and assumes that projected rice demand increases will be met by rice production in the five Southeastern Rice-Producing Counties.

REQUEST FOR MODIFICATION OF RICE IRRIGATION DEMANDS FOR HARDIN, JEFFERSON, AND ORANGE COUNTIES

Based on the model developed for projecting rice irrigation demands in Southeastern Rice-Producing Counties, it is recommended that the ETRWPG request that rice irrigation demands be modified as indicated in Table 4 for Hardin, Jefferson, and Orange Counties. These proposed modifications only relate to rice-related water demands and must be incorporated with other irrigation demands identified in these counties for total irrigation demand projections.

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Table 4
Historical, Projected, and Proposed Rice-Related Water Demands for the East Texas Regional Water Planning Area

County	State Water Plan Year	Volume (af/yr) Year 2020	2030	2040	2050	2060	2070
Hardin	2012 Plan Projections	2,455	2,455	2,455	2,455	2,455	NA
	2017 Plan Projections	946	946	946	946	946	946
	Model-Based Proposed 2017 Plan Projections	2,393	2,555	2,666	2,706	2,665	2,602
	Difference of Proposed from 2012	-62	100	212	251	210	NA
	% Difference	-3%	4%	9%	10%	9%	NA
Jefferson	2012 Plan Projections	139,173	139,173	139,173	139,173	139,173	NA
	2017 Plan Projections	82,325	82,325	82,325	82,325	82,325	82,325
	Model-Based Proposed 2017 Plan Projections	135,149	144,307	150,596	152,827	150,500	146,960
	Difference of Proposed from 2012	-4,025	5,134	11,423	13,653	11,327	NA
	% Difference	-3%	4%	8%	10%	8%	NA
Orange	2012 Plan Projections	2,509	2,509	2,509	2,509	2,509	NA
	2017 Plan Projections	0	0	0	0	0	0
	Model-Based Proposed 2017 Plan Projections	3,730	3,983	4,156	4,218	4,153	4,056
	Difference of Proposed from 2012	1,221	1,474	1,647	1,709	1,644	NA
	% Difference	49%	59%	66%	68%	66%	NA

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TECHNICAL MEMORANDUM
East Texas Regional Water Planning Group
Rice Water Demand Projections Revisions

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ATTACHMENT A
2017 PLAN PROJECTIONS SPREADSHEET PROVIDED BY THE TEXAS WATER DEVELOPMENT BOARD

Attachment A
2017 Plan Projections Spreadsheet Provided by the
Texas Water Development Board

Draft Irrigation Projections for 2017 SWP							
		Volume (af/yr)					
Region	County Name	2020	2030	2040	2050	2060	2070
D	Bowie	6,221	6,221	6,060	5,657	5,281	5,121
D	Lamar	5,945	5,879	5,813	5,748	5,684	5,622
D	Red River	5,156	5,103	5,050	4,998	4,945	4,895
G	Robertson	63,420	61,607	59,841	58,127	56,460	55,124
H	Austin	3,932	3,932	3,932	3,932	3,932	3,932
H	Brazoria	77,121	74,258	72,532	72,532	72,532	70,465
H	Chambers	55,059	55,059	55,059	55,059	55,059	55,059
H	Fort Bend	32,091	32,091	32,091	32,091	32,091	32,091
H	Galveston	3,565	3,565	3,565	3,565	3,565	3,565
H	Harris	3,397	3,397	3,397	3,397	3,397	3,397
H	Liberty	43,632	43,632	43,632	43,632	43,632	43,632
H	Waller	19,197	19,197	19,197	19,197	19,197	19,197
I	Hardin	1,349	1,349	1,349	1,349	1,349	1,349
I	Jefferson	82,814	82,814	82,814	82,814	82,814	82,814
K	Colorado	120,618	115,551	110,647	105,878	101,314	97,363
K	Matagorda	117,462	113,220	109,157	105,247	101,477	98,081
K	Wharton	126,140	121,626	117,277	113,083	97,165	92,166
L	Calhoun	13,472	11,935	10,894	10,148	9,453	8,726
L	Victoria	3,255	2,809	2,424	2,092	1,806	1,618
P	Jackson	38,967	38,967	38,967	38,967	38,967	38,967
P	Lavaca	4,387	4,387	4,387	4,387	4,387	4,387
P	Wharton	102,785	102,785	102,785	102,785	102,785	102,785

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ATTACHMENT B
IRRIGATION BASIS SPREADSHEET PROVIDED BY THE TEXAS WATER DEVELOPMENT BOARD

Attachment B
Irrigation Basis Spreadsheet Provided by the
Texas Water Development Board

Year	Region	County Name	Crop Name	Reported Acreage (acres)	Rate (in/yr)	Water Use (af/yr)
2005	D	BOWIE	rice	2,100	30	5,250
2006	D	BOWIE	rice	608	33	1,672
2007	D	BOWIE	rice	283	33	778
2008	D	BOWIE	RICE	569	35	1,659
2009	D	BOWIE	RICE	517	28	1,206
2010	D	BOWIE	RICE	881	33	2,422
2007	D	LAMAR	RICE	105	28	245
2008	D	LAMAR	RICE	203	35	592
2009	D	LAMAR	RICE	215	26	465
2005	D	RED RIVER	RICE	750	36	2,250
2006	D	RED RIVER	RICE	440	36	1,320
2007	D	RED RIVER	RICE	620	36	1,860
2008	D	RED RIVER	RICE	800	51	3,400
2005	G	ROBERTSON	RICE	200	46	766
2006	G	ROBERTSON	RICE	162	46	621
2007	G	ROBERTSON	RICE	322	46	1,234
2008	G	ROBERTSON	RICE	240	46	920
2009	G	ROBERTSON	RICE	1,000	46	3,833
2010	G	ROBERTSON	RICE	1,000	46	3,833
2005	H	AUSTIN	RICE	2,400	32	6,400
2006	H	AUSTIN	RICE	904	40	3,013
2007	H	AUSTIN	RICE	1,003	40	3,343
2008	H	AUSTIN	RICE	959	45	3,595
2009	H	AUSTIN	RICE	1,036	33	2,848
2010	H	AUSTIN	RICE	1,111	42	3,888
2005	H	BRAZORIA	RICE	16,000	80	106,666
2006	H	BRAZORIA	RICE	13,138	75	82,112
2007	H	BRAZORIA	RICE	11,460	75	71,625
2008	H	BRAZORIA	RICE	15,174	60	75,869
2009	H	BRAZORIA	RICE	17,000	48	68,000
2010	H	BRAZORIA	RICE	17,366	52	75,252
2005	H	CHAMBERS	RICE	12,800	79	84,266
2006	H	CHAMBERS	RICE	8,088	81	54,594
2007	H	CHAMBERS	RICE	9,896	81	66,798
2008	H	CHAMBERS	RICE	13,072	48	52,288
2009	H	CHAMBERS	RICE	2,750	60	13,750
2010	H	CHAMBERS	RICE	11,250	64	60,000
2005	H	FORT BEND	RICE	6,900	80	46,000
2006	H	FORT BEND	RICE	4,482	75	28,012
2007	H	FORT BEND	RICE	4,925	70	28,729
2008	H	FORT BEND	RICE	4,794	60	23,967
2009	H	FORT BEND	RICE	6,400	57	30,400
2010	H	FORT BEND	RICE	5,500	57	26,125
2005	H	GALVESTON	RICE	900	84	6,300
2006	H	GALVESTON	RICE	310	80	2,071
2007	H	GALVESTON	RICE	300	80	2,000
2008	H	GALVESTON	RICE	654	45	2,452
2009	H	GALVESTON	RICE	1,500	40	5,000
2010	H	GALVESTON	RICE	500	55	2,291
2005	H	HARRIS	RICE	1,200	60	6,000
2006	H	HARRIS	RICE	195	80	1,300
2007	H	HARRIS	RICE	192	80	1,280
2008	H	HARRIS	RICE	395	45	1,480
2005	H	LIBERTY	RICE	9,400	77	59,925
2006	H	LIBERTY	RICE	5,436	81	36,693

Attachment B
Irrigation Basis Spreadsheet Provided by the
Texas Water Development Board

Year	Region	County Name	Crop Name	Reported Acreage (acres)	Rate (in/yr)	Water Use (af/yr)
2007	H	LIBERTY	RICE	6,445	81	43,503
2008	H	LIBERTY	RICE	7,579	60	37,893
2009	H	LIBERTY	RICE	7,500	54	33,750
2010	H	LIBERTY	RICE	7,850	65	42,520
2005	H	WALLER	RICE	7,700	32	20,533
2006	H	WALLER	RICE	6,264	33	17,226
2007	H	WALLER	RICE	6,038	33	16,604
2008	H	WALLER	RICE	6,208	35	18,105
2009	H	WALLER	RICE	6,379	33	17,543
2010	H	WALLER	RICE	6,300	38	19,950
2006	I	HARDIN	RICE	238	33	654
2007	I	HARDIN	RICE	670	33	1,842
2008	I	HARDIN	RICE	950	30	2,375
2009	I	HARDIN	RICE	460	25	958
2010	I	HARDIN	RICE	500	36	1,500
2005	I	JEFFERSON	RICE	19,300	52	83,633
2006	I	JEFFERSON	RICE	14,239	75	88,993
2007	I	JEFFERSON	RICE	14,596	75	91,225
2008	I	JEFFERSON	RICE	17,578	60	87,888
2009	I	JEFFERSON	RICE	13,875	51	58,968
2010	I	JEFFERSON	RICE	17,200	60	86,000
2005	I	ORANGE	RICE	1,000	52	4,333
2006	I	ORANGE	RICE	1,000	75	6,250
2007	I	ORANGE	RICE	500	75	3,125
2005	K	COLORADO	RICE	31,000	45	116,250
2006	K	COLORADO	RICE	25,395	53	112,161
2007	K	COLORADO	RICE	26,516	53	117,112
2008	K	COLORADO	RICE	31,687	51	134,667
2009	K	COLORADO	RICE	32,000	54	144,000
2010	K	COLORADO	RICE	32,115	56	149,870
2005	K	MATAGORDA	RICE	21,900	55	100,375
2006	K	MATAGORDA	RICE	18,075	55	82,843
2007	K	MATAGORDA	RICE	15,100	39	49,452
2008	K	MATAGORDA	RICE	19,671	45	73,766
2009	K	MATAGORDA	RICE	25,000	48	100,000
2010	K	MATAGORDA	RICE	25,103	58	121,331
2005	K	WHARTON	RICE	50,700	55	232,375
2006	K	WHARTON	RICE	35,417	55	162,327
2007	K	WHARTON	RICE	17,101	63	89,780
2010	K, P	WHARTON	RICE	45,000	48	180,000
2008	K,P	WHARTON	RICE	38,179	58	184,531
2009	K,P	WHARTON	RICE	46,400	48	185,600
2005	L	CALHOUN	RICE	2,440	89	18,096
2006	L	CALHOUN	RICE	2,636	69	15,157
2007	L	CALHOUN	RICE	2,086	69	11,994
2008	L	CALHOUN	RICE	2,803	60	14,015
2009	L	CALHOUN	RICE	2,400	72	14,400
2010	L	CALHOUN	RICE	2,177	56	10,159
2005	L	VICTORIA	RICE	1,700	32	4,533
2006	L	VICTORIA	RICE	564	36	1,692
2007	L	VICTORIA	RICE	300	36	900
2008	L	VICTORIA	RICE	1,081	35	3,152
2009	L	VICTORIA	RICE	1,771	32	4,723
2010	L	VICTORIA	RICE	1,922	42	6,727
2008	M	CAMERON	RICE	187	50	779

Attachment B
Irrigation Basis Spreadsheet Provided by the
Texas Water Development Board

Year	Region	County Name	Crop Name	Reported Acreage (acres)	Rate (in/yr)	Water Use (af/yr)
2005	P	JACKSON	RICE	12,700	40	42,333
2006	P	JACKSON	RICE	9,929	40	33,096
2007	P	JACKSON	RICE	10,114	40	33,713
2008	P	JACKSON	RICE	9,926	45	37,222
2009	P	JACKSON	RICE	11,400	46	43,700
2010	P	JACKSON	RICE	11,200	43	40,133
2005	P	LAVACA	RICE	1,800	42	6,300
2006	P	LAVACA	RICE	1,039	42	3,636
2007	P	LAVACA	RICE	1,029	42	3,601
2008	P	LAVACA	RICE	1,377	45	5,164
2009	P	LAVACA	RICE	1,057	32	2,819
2010	P	LAVACA	RICE	1,401	46	5,370

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ATTACHMENT C
AGRILIFE RESEARCH DOCUMENT EXCERPT

Historical Texas Rice Production Statistics

Table 40. 18-year Texas rice acreage, yields and production comparison.

Crop year	Planted acres*	Main crop** Yield (lb/A)	Ratoon crop** Yield (lb/A)	% MC ratooned**	Total** Yield (lb/A)	Production*** cwt	
1993	296,193	5,054	1,168	34	5,451	14,383,037	
1994	345,680	5,944	984	43	6,195	22,089,662	
1995	315,108	5,505	165	32	5,558	17,513,703	
1996	263,407	6,022	1,228	46	6,587	17,350,830	
1997	256,944	5,232	895	42	5,608	14,408,971	
1998	271,989	5,413	796	54	5,843	15,891,008	
1999	246,228	5,818	1,361	26	6,172	15,196,150	
2000	211,241	6,360	948	37	6,711	14,176,944	
2001	213,704	6,291	1,264	48	6,898	14,741,250	
2002	204,880	6,744	1,017	34	7,090	14,526,940	
2003	171,953	6,055	2,247	38	6,909	11,880,000	#
2004	216,810	6,231	1,557	35	6,776	14,690,000	#
2005	201,024	6,542	1,955	27	7,070	14,212,274	
2006	147,549	6,913	1,248	39	7,400	10,918,626	##
2007	143,299	6,179	1,948	35	6,860	9,830,311	*
2008	168,039	6,314	1,830	53	7,283	12,238,280	*
2009	169,990	6,531	2,264	58	7,844	13,334,015	*
2010	186,522	5,430	2,315	54	6,680	12,459,669	*
Avg. 1993–2010	223,920	5,951	1,297	40	6,473	15,041,149	
2011	181,761	6,440	1,607	77	6,969	12,667,079	

* 10,271,940 (2007 sales) * 8,722,088 (2008 sales) *10,488,859 (2009 sales) *12,429,033 (2010 sales)
* USDA-FSA certified planted acres ** TAMUS AgriLife Research Beaumont Crop survey data *** Texas Rice Research Foundation check-off collections
# Modified to account for carryover stocks ## Estimated

Table 41. 16-year Texas rice-planted acres* comparison.

County	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Chambers	20,906	20,411	21,672	17,197	11,432	13,438	13,202	10,937	16,024	12,792	8,088	8,180	13,048	1,262	11,191	11,555
Brazoria	16,818	21,888	18,718	19,241	17,163	15,279	14,077	10,395	15,748	15,976	12,997	11,461	14,833	16,452	17,366	17,604
Jackson	25,235	20,521	20,128	18,355	16,208	14,953	14,005	13,057	14,734	12,713	9,929	10,115	9,519	11,350	11,042	11,739
Jefferson	26,102	24,947	24,422	22,655	18,519	18,575	18,389	15,037	19,954	19,355	14,234	14,112	15,641	13,749	17,264	16,949
Wharton	58,930	50,737	57,530	55,253	52,205	50,520	49,958	41,664	53,413	50,678	35,417	34,928	38,699	43,064	45,024	41,656
Liberty	11,071	14,074	18,706	14,328	8,740	12,705	9,714	7,949	10,475	9,381	5,440	4,387	7,579	7,227	7,812	7,030
Colorado	36,200	36,091	35,698	33,522	31,136	32,110	30,734	28,572	33,273	30,903	25,465	26,517	30,776	31,587	32,116	34,281
Harris	6,654	6,484	6,187	4,875	2,957	1,975	2,083	1,664	1,522	1,067	195	192	395			
Calhoun	4,760	2,511	3,851	3,164	1,568	1,468	1,498	1,897	2,488	2,439	2,767	2,086	2,803	2,154	2,177	2,249
Fort Bend	9,418	10,680	10,179	9,006	8,894	8,652	8,615	6,071	7,933	6,409	4,496	4,925	4,358	5,589	4,857	4,869
Matagorda	26,692	26,814	30,518	28,598	23,036	24,958	24,516	18,878	23,672	21,863	18,075	16,913	17,979	24,594	25,103	21,479
Victoria	2,775	2,941	3,302	2,401	1,937	1,977	1,748	1,247	1,356	1,705	564		1,081	1,771	1,922	1,851
Lavaca	3,703	2,682	2,452	2,006	2,523	1,746	1,790	1,582	2,189	1,804	1,039	1,029	1,255	1,057	1,401	1,280
Galveston	2,144	2,110	1,993	1,590	1,360	768	1,166	781	847	833	314	300	654	1,527	463	951
Orange	732	750	2,248	362	531	354	682	0	90							
Austin	2,479	2,878	2,673	2,702	2,435	2,601	1,694	1,684	2,313	2,359	904	1,003	959	1,036	1,111	1,166
Bowie	1,600	1,136	1,329	1,538	1,030	1,435	1,287	1,332	1,510	2,054	608	284	569	517	881	429
Red River	47	951	941	1,100	709	965	1,017	587	639	639	440					
Waller	5,677	6,741	6,694	6,142	6,206	6,951	7,038	7,168	7,868	7,672	6,260	6,038	6,508	6,379	6,288	6,051
Hardin	714	899	1,185	1,052	1,093	801	633	738	762	298	235	670	950	460	504	313
Hopkins	750	700	1,563	1,141	1,562	1,473	1,034	713	0					0		105
Robertson										87	81	159	200			
Lamar													203	215		204
Cameron													30			
Total	263,407	256,944	271,989	246,227	211,241	213,703	204,880	171,953	216,810	201,024	147,549	143,298	168,038	169,989	186,523	181,763

*USDA–FSA certified planted acres

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ATTACHMENT D
MODEL TO CALCULATE RICE WATER USE AND TOTAL IRRIGATION FOR SOUTHEASTERN RICE-PRODUCING COUNTIES

Attachment 5
Meeting Summary of Non-Municipal Water Demands in Jefferson County

ALAN PLUMMER ASSOCIATES, INC.
ENVIRONMENTAL ENGINEERS • DESIGNERS • SCIENTISTS

MEETING SUMMARY

East Texas Regional Water Planning Area (Region I)
Discussion of Non-Municipal Water Demands in Jefferson County
Meeting Summary

Prepared For: East Texas Regional Water Planning Group

Prepared By: Rex Hunt, P.E., Alan Plummer Associates

Date: September 16, 2012

This is a follow-up to both the RWPG meeting and the subsequent meeting in Beaumont on Thursday, where various non-municipal irrigation projections were discussed. First is a summary of the Thursday meeting, followed by additional suggestions on where we might need to head with respect to the non-municipal projections.

SUMMARY OF MEETING AT LNVA OFFICES ON SEPTEMBER 13

The meeting was coordinated by Scott Hall, although it was essentially carried out not by him but by several of the local farmers. The purpose of the meeting was to discuss several aspects of ongoing irrigation in Jefferson County and adjoining counties. The following were in attendance:

- Representing the farmers:
  - Bill Dishman, Jr.
  - Herb Dishman
  - Mike Douget
  - Tina Blake
  - Ted Wilson, Texas Agrilife Research Center
  - Pete Kafalas, BP Biofuels North America, LLC
- Representing the Texas Water Development Board
  - Dan Hardin
  - Doug Shaw
- Others present:
  - Scott Hall, LNVA
  - Mike Daws, LNVA
  - Dawn Pilcher, LNVA
  - Jerry Clark, Sabine River Authority

The farmers opened the meeting with a discussion of the status and future of irrigation and livestock water demands in the area in and around Jefferson County. They reported a steady growth and stabilization of rice farming in the area, with prospects that it will continue to grow (for similar reasons to those addressed in the APAI rice memorandum). Row crops are on the increase, especially energy cane

and specialty crops. Attached is a pdf of three handouts provided by the delegation of farmers for the meeting.

Rice

Organic rice is a niche market, but steadily increasing. Genetically engineered see rice is also on the increase. It is beginning to move out of areas to the west of Houston and into the Jefferson County area, and is doing better in this area than anyone expected. It should be expected that irrigation demand for rice will increase in the region. The economic impact of rice in this area goes beyond the production and sale of rice. Rice irrigation provides habitat for ducks, and other waterfowl, which supports additional recreational revenue for the region. The habitat also provides replacement for losses of natural wetlands due to population growth and encroachment.

Energy Cane

Energy cane is being grown under contracts with BP, who is planning to develop ethanol refineries. The energy cane is a high cellulose crop that grows quickly. The refinery will be developed to deal with the high-cellulose material to develop the ethanol. Approximately 1,000 acres of energy cane are being cultivated at this time; approximately 4,000 acres next year; and 6,000 to 8,000 acres in 2014. Pete Kafalas estimated that by 2020, there could be approximately 52,000 acres of energy cane crops in eastern Jefferson and western Chambers Counties being grown. The farmers indicated that this would not be land that is being used, or would be expected to be used, for rice farming. All water for these crops would be supplied by LNVA. The amount of water needed to grow the energy cane would typically be around 1 foot per year. In dry years, it could be 1.5 feet. The energy cane crops will support a 75 to 92 million gallon per year ethanol refinery to be constructed by BP nearby. In all, BP is planning 6 to 10 such plants along the Gulf Coast from Texas to Florida.

It does not appear that BP is looking at areas in Texas other than this portion of Jefferson and Chambers, although Kafalas did not rule it out. Other energy companies (e.g., Valero or Chevron) may be looking at other counties, such as Orange.

Specialty Crops

A number of specialty crops are being grown, or experimented with at this time in the area. These include blueberries, olives, soy beans, eucalyptus, crawfish, etc. Specific irrigation numbers were not provided, but it should be anticipated that there will continue to be an irrigation water demand for such crops.

Cattle

Tina Blake is the cattle rancher in the group. Her handout provides specifics of her discussion. Her primary point was that the cattle industry in this area is important to the area and to Texas from an economic perspective.

Attachment 6
John Martin Correspondence Regarding Manufacturing and Steam-Electric Demands in Tyler County

Gonzalez,Lauren

From: Hunt, Rex
Sent: Sunday, September 16, 2012 3:25 PM
To: Gonzalez,Lauren
Subject: FW: Non-municipal demand

Follow Up Flag: Follow up
Flag Status: Completed

Rex Hunt
Alan Plummer Associates, Inc.
512.826,1568 (cell)
512.452.5905 (office)
512.687.2155 (office-direct)

From: jmartin@setgcd.org [mailto:jmartin@setgcd.org]
Sent: Friday, September 14, 2012 10:54 AM
To: 'Lila Fuller'; Hunt, Rex; MichaelHarbordt@suddenlink.net
Subject: Non-municipal demand

Hello All,

After having made several phones, the only modifications that I will suggest are for Tyler County, as follows:

East Texas Electric Cooperative is currently building a facility will use an estimated 1,029 acre feet for steam electric production. The facility is expected to come online in late 2014. Please note that it is expect that approximately 1,000 acre feet of that water demand will come from recycling the effluent from the City of Woodville; and

German Pellets of Texas is a manufacturing facility that has a groundwater permit for 430 acre feet per year. This facility is expected to come online in 2013 or early 2014.

Should you have any questions, please do not hesitate to call.

John M. Martin
Southeast Texas Groundwater Conservation District
P.O. Box 1407
Jasper, TX 75951
(409) 383-1577

Attachment 7
Kelley Holcomb Correspondence Regarding Mining Demands

ANRA

ANGELINA & NECHES RIVER AUTHORITY

September 19, 2012

Mr. Rex Hunt, APAI
Region I, East Texas Regional Water Planning Group
Alan Plummer Associates, Inc.
6300 La Calma, Suite 400
Austin, Texas 78752

Re: Revised Mining Water Demand Projections for the 2016 Region I Water Plan

Dear Mr. Hunt:

The Angelina & Neches River Authority (ANRA) has contractual water demands for mining purposes in Nacogdoches, Rusk, Sabine, Shelby and San Augustine counties for the portions that lie within the Neches River Basin. Therefore, ANRA would like to revise its water demand projections for inclusion in the 2016 Region I Water Plan. These projections would be above and beyond ANRA's previously stated projections for our Lake Columbia Participants.

These demands are the result of oil & gas operations activities associated with the Haynesville Shale and its outcrop areas within the counties stated above. ANRA has working relationship with two energy companies who have interests in these counties. Their intent is to continue drilling activities based on market demands over the next 20 to 30 year period.

I have attached a table that delineates estimated water demand by county within ANRA's jurisdictional service area. ANRA intends to meet these demands via surface water rights permits and contracts with current water rights holders within those counties. As part of the process of meeting these demands, ANRA will also evaluate the potential for amending its water rights permit for Lake Columbia to reflect these consumptive uses at some point in the future after the reservoir is completed.

If you have any questions, please contact me at 936-633-7543.

Respectfully,

Kelley Holcomb
General Manager

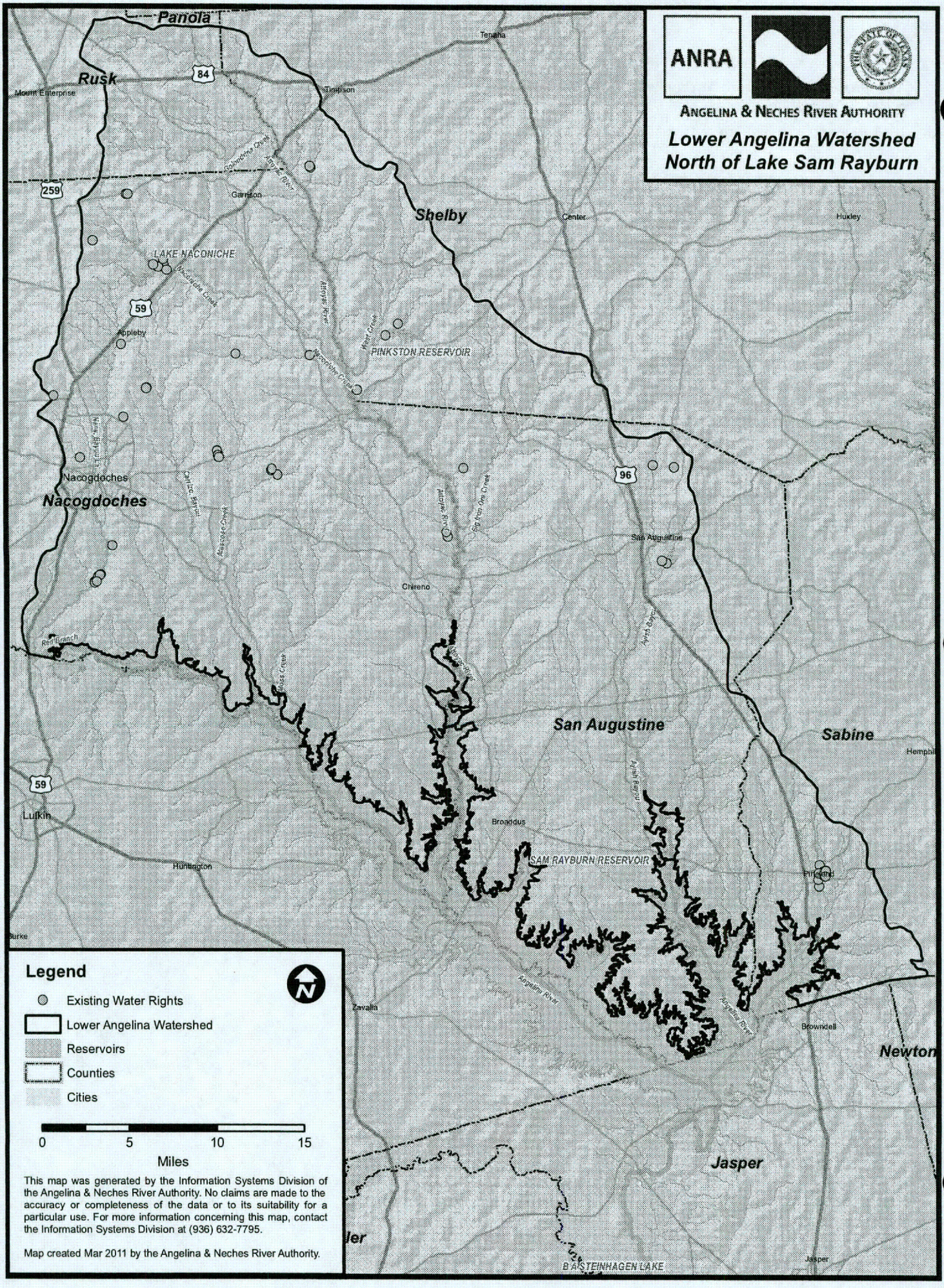
attachment

Post Office Box 387 / 210 Lufkin Avenue / Lufkin, Texas 75902 / 936-632-7795 / Fax 936-632-2564

Serving the 17 county area of the Angelina & Neches River basins in East Texas

Angelina & Neches River Authority
Proposed Mining Demands
2016 Region I Water Plan

	Proposed Mining Water Demands (acre-feet per year)					
County/WUG	2010	2020	2030	2040	2050	2060
Nacogdoches	7,000	4,500	0	0	0	0
Rusk	1,000	500	0	0	0	0
Sabine	1,500	1,000				
Shelby	1,500	1,000	0	0	0	0
San Augustine	4,000	3,000				
Total	15,000	10,000	0	0	0	0


ANRA
ANGELINA & NECHES RIVER AUTHORITY
Lower Angelina Watershed
North of Lake Sam Rayburn
Panola
Rusk
Mount Enterprise
Tenaha
Timpson
Garrison
Shelby
Center
Huxley
LAKE NACONICHE
Appleby
PINKSTON RESERVOIR
Nacogdoches
Chireno
San Augustine
Sabine
Broaddus
SAM RAYBURN RESERVOIR
Lufkin
Huntington
Zavalla
Brownsell
Newton
Jasper
BASTEINHAGEN LAKE
Burke
84
259
59
96
Legend
Existing Water Rights
Lower Angelina Watershed
Reservoirs
Counties
Cities
0
5
10
15
Miles
This map was generated by the Information Systems Division of the Angelina & Neches River Authority. No claims are made to the accuracy or completeness of the data or to its suitability for a particular use. For more information concerning this map, contact the Information Systems Division at (936) 632-7795.
Map created Mar 2011 by the Angelina & Neches River Authority.

Appendix 2-B

Population Projections DB17 Report

The following appendix includes a copy of the Population Projections data from the TWDB Data Web Interface known as the DB17. The summary is divided by Water User Group, county, and river basin.

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Water User Group (WUG) Population

REGION I	WUG POPULATION					
	2020	2030	2040	2050	2060	2070
ANDERSON COUNTY						
NECHES BASIN						
BRUSHY CREEK WSC	1,751	1,808	1,829	1,829	1,829	1,829
FRANKSTON	1,263	1,305	1,320	1,320	1,320	1,320
PALESTINE	10,022	10,351	10,471	10,471	10,471	10,471
WALSTON SPRINGS WSC	2,860	2,954	2,988	2,988	2,988	2,988
COUNTY-OTHER	6,218	6,421	6,495	6,495	6,495	6,495
NECHES BASIN TOTAL POPULATION	**22,114**	**22,839**	**23,103**	**23,103**	**23,103**	**23,103**
TRINITY BASIN						
BRUSHY CREEK WSC	1,028	1,062	1,074	1,074	1,074	1,074
ELKHART	1,431	1,478	1,496	1,496	1,496	1,496
FOUR PINES WSC	3,595	3,713	3,756	3,756	3,756	3,756
PALESTINE	9,509	9,821	9,934	9,934	9,934	9,934
THE CONSOLIDATED WSC	1,669	1,724	1,744	1,744	1,744	1,744
WALSTON SPRINGS WSC	1,142	1,180	1,193	1,193	1,193	1,193
COUNTY-OTHER	20,528	21,200	21,446	21,446	21,446	21,446
TRINITY BASIN TOTAL POPULATION	**38,902**	**40,178**	**40,643**	**40,643**	**40,643**	**40,643**
ANDERSON COUNTY TOTAL POPULATION	**61,016**	**63,017**	**63,746**	**63,746**	**63,746**	**63,746**
ANGELINA COUNTY						
NECHES BASIN						
ANGELINA WSC	2,999	3,209	3,385	3,546	3,689	3,817
BURKE	793	849	895	938	976	1,009
CENTRAL WCID OF ANGELINA COUNTY	6,876	7,357	7,761	8,129	8,459	8,751
DIBOLL	5,137	5,496	5,798	6,073	6,320	6,538
FOUR WAY SUD	5,666	6,062	6,395	6,699	6,971	7,211
HUDSON	5,088	5,444	5,743	6,016	6,260	6,476
HUDSON WSC	6,045	6,469	6,824	7,148	7,438	7,695
HUNTINGTON	2,278	2,438	2,571	2,694	2,803	2,900
LUFKIN	37,713	40,352	42,567	44,589	46,398	48,000
REDLAND WSC	2,594	2,776	2,928	3,067	3,192	3,302
ZAVALLA	767	821	866	907	944	976
COUNTY-OTHER	17,360	18,575	19,596	20,526	21,358	22,097
NECHES BASIN TOTAL POPULATION	**93,316**	**99,848**	**105,329**	**110,332**	**114,808**	**118,772**
ANGELINA COUNTY TOTAL POPULATION	**93,316**	**99,848**	**105,329**	**110,332**	**114,808**	**118,772**
CHEROKEE COUNTY						
NECHES BASIN						
ALTO	1,341	1,470	1,597	1,749	1,907	2,079
ALTO RURAL WSC	3,272	3,588	3,898	4,267	4,655	5,074
BULLARD	52	57	62	68	74	80
CRAFT-TURNEY WSC	5,195	5,696	6,188	6,775	7,390	8,055
JACKSONVILLE	15,914	17,451	18,959	20,756	22,640	24,677
NEW SUMMERFIELD	1,216	1,334	1,449	1,586	1,730	1,886
NORTH CHEROKEE WSC	4,901	5,375	5,839	6,392	6,973	7,600

Water User Group (WUG) Population

REGION I	WUG POPULATION					
	2020	2030	2040	2050	2060	2070
CHEROKEE COUNTY						
NECHES BASIN						
RUSK	6,074	6,661	7,236	7,922	8,641	9,419
RUSK RURAL WSC	3,592	3,938	4,279	4,684	5,109	5,569
SOUTHERN UTILITIES COMPANY	2,805	3,076	3,341	3,658	3,990	4,349
TROUP	67	74	80	88	95	104
WELLS	865	948	1,030	1,128	1,230	1,341
WRIGHT CITY WSC	601	659	716	784	855	932
COUNTY-OTHER	9,739	10,678	11,603	12,703	13,859	15,104
NECHES BASIN TOTAL POPULATION	**55,634**	**61,005**	**66,277**	**72,560**	**79,148**	**86,269**
CHEROKEE COUNTY TOTAL POPULATION	**55,634**	**61,005**	**66,277**	**72,560**	**79,148**	**86,269**
HARDIN COUNTY						
NECHES BASIN						
KOUNTZE	2,129	2,135	2,139	2,142	2,145	2,147
LUMBERTON	14,314	16,522	18,093	19,252	20,158	20,838
LUMBERTON MUD	8,547	9,053	9,413	9,679	9,887	10,043
NORTH HARDIN WSC	7,821	8,344	8,716	8,991	9,206	9,367
SILSBEE	6,772	6,922	7,029	7,108	7,170	7,217
SOUR LAKE	1,921	2,022	2,094	2,147	2,189	2,220
WEST HARDIN WSC	3,999	4,020	4,035	4,046	4,055	4,062
COUNTY-OTHER	13,642	14,611	15,300	15,807	16,201	16,498
NECHES BASIN TOTAL POPULATION	**59,145**	**63,629**	**66,819**	**69,172**	**71,011**	**72,392**
TRINITY BASIN						
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	134	152	165	175	183	189
WEST HARDIN WSC	53	53	53	53	53	53
COUNTY-OTHER	145	152	157	160	163	164
TRINITY BASIN TOTAL POPULATION	**332**	**357**	**375**	**388**	**399**	**406**
HARDIN COUNTY TOTAL POPULATION	**59,477**	**63,986**	**67,194**	**69,560**	**71,410**	**72,798**
HENDERSON COUNTY						
NECHES BASIN						
ATHENS	275	295	312	334	353	372
BERRYVILLE	1,088	1,191	1,277	1,390	1,488	1,583
BETHEL-ASH WSC	3,186	3,602	3,949	4,407	4,803	5,187
BROWNSBORO	1,366	1,664	1,913	2,241	2,525	2,800
BRUSHY CREEK WSC	758	814	861	923	977	1,028
CHANDLER	3,589	4,370	5,020	5,878	6,620	7,339
FRANKSTON	44	67	86	111	133	154
MURCHISON	596	598	600	602	604	606
R-P-M WSC	703	839	952	1,102	1,231	1,356
VIRGINIA HILL WSC	1,825	2,095	2,320	2,617	2,874	3,123

Water User Group (WUG) Population

REGION I	WUG POPULATION					
	2020	2030	2040	2050	2060	2070
HENDERSON COUNTY						
NECHES BASIN						
COUNTY-OTHER	11,374	11,109	10,887	10,594	10,340	10,096
NECHES BASIN TOTAL POPULATION	**24,804**	**26,644**	**28,177**	**30,199**	**31,948**	**33,644**
HENDERSON COUNTY TOTAL POPULATION	**24,804**	**26,644**	**28,177**	**30,199**	**31,948**	**33,644**
HOUSTON COUNTY						
NECHES BASIN						
GRAPELAND	597	600	601	601	601	601
THE CONSOLIDATED WSC	3,710	3,742	3,742	3,742	3,742	3,742
COUNTY-OTHER	188	173	172	172	172	172
NECHES BASIN TOTAL POPULATION	**4,495**	**4,515**	**4,515**	**4,515**	**4,515**	**4,515**
TRINITY BASIN						
CROCKETT	7,073	7,105	7,105	7,105	7,105	7,105
GRAPELAND	922	927	927	927	927	927
LOVELADY	681	690	690	690	690	690
THE CONSOLIDATED WSC	10,121	10,187	10,188	10,188	10,188	10,188
COUNTY-OTHER	859	836	835	835	835	835
TRINITY BASIN TOTAL POPULATION	**19,656**	**19,745**	**19,745**	**19,745**	**19,745**	**19,745**
HOUSTON COUNTY TOTAL POPULATION	**24,151**	**24,260**	**24,260**	**24,260**	**24,260**	**24,260**
JASPER COUNTY						
NECHES BASIN						
JASPER	7,839	8,012	8,045	8,045	8,045	8,045
COUNTY-OTHER	14,226	14,541	14,601	14,601	14,601	14,601
NECHES BASIN TOTAL POPULATION	**22,065**	**22,553**	**22,646**	**22,646**	**22,646**	**22,646**
SABINE BASIN						
JASPER COUNTY WCID #1	2,995	3,062	3,074	3,074	3,074	3,074
KIRBYVILLE	2,213	2,262	2,271	2,271	2,271	2,271
MAURICEVILLE SUD	429	439	440	440	440	440
COUNTY-OTHER	9,176	9,379	9,418	9,418	9,418	9,418
SABINE BASIN TOTAL POPULATION	**14,813**	**15,142**	**15,203**	**15,203**	**15,203**	**15,203**
JASPER COUNTY TOTAL POPULATION	**36,878**	**37,695**	**37,849**	**37,849**	**37,849**	**37,849**
JEFFERSON COUNTY						
NECHES BASIN						
BEAUMONT	42,378	45,111	47,983	51,321	55,003	59,125
BEVIL OAKS	1,351	1,438	1,529	1,636	1,753	1,884
CHINA	22	24	25	27	29	31
GROVES	500	500	500	500	500	500
JEFFERSON COUNTY WCID #10	856	911	969	1,036	1,111	1,194
MEEKER MUD	836	889	946	1,012	1,084	1,166
NEDERLAND	670	713	758	811	869	934
NOME	399	424	451	482	517	556

Water User Group (WUG) Population

REGION I	WUG POPULATION					
	2020	2030	2040	2050	2060	2070
JEFFERSON COUNTY						
NECHES BASIN						
PORT ARTHUR	171	173	173	173	173	173
PORT NECHES	7,183	7,646	8,133	8,699	9,323	10,022
COUNTY-OTHER	784	877	978	1,091	1,217	1,359
NECHES BASIN TOTAL POPULATION	**55,150**	**58,706**	**62,445**	**66,788**	**71,579**	**76,944**
NECHES-TRINITY BASIN						
BEAUMONT	83,002	88,354	93,980	100,517	107,727	115,802
CHINA	1,208	1,285	1,368	1,462	1,567	1,685
GROVES	15,644	15,644	15,644	15,644	15,644	15,644
JEFFERSON COUNTY WCID #10	4,268	4,543	4,833	5,169	5,539	5,955
MEEKER MUD	2,497	2,659	2,828	3,024	3,241	3,484
NEDERLAND	17,928	19,084	20,300	21,712	23,269	25,014
NOME	225	240	255	273	292	314
PORT ARTHUR	56,866	57,582	57,582	57,582	57,582	57,582
PORT NECHES	6,638	7,067	7,516	8,039	8,615	9,261
WEST JEFFERSON COUNTY MWD	8,554	9,105	9,685	10,359	11,102	11,934
COUNTY-OTHER	15,399	20,351	26,308	33,233	40,873	49,422
NECHES-TRINITY BASIN TOTAL POPULATION	**212,229**	**225,914**	**240,299**	**257,014**	**275,451**	**296,097**
JEFFERSON COUNTY TOTAL POPULATION	**267,379**	**284,620**	**302,744**	**323,802**	**347,030**	**373,041**
NACOGDOCHES COUNTY						
NECHES BASIN						
APPLEBY WSC	3,638	4,087	4,530	5,001	5,499	6,020
CUSHING	685	769	852	941	1,035	1,133
D&M WSC	6,239	7,009	7,768	8,575	9,430	10,323
GARRISON	1,001	1,125	1,246	1,376	1,513	1,656
LILLY GROVE SUD	3,075	3,454	3,828	4,226	4,648	5,088
MELROSE WSC	3,468	3,897	4,318	4,767	5,242	5,739
NACOGDOCHES	36,889	41,442	45,930	50,706	55,758	61,040
SWIFT WSC	2,795	3,140	3,480	3,842	4,225	4,625
WODEN WSC	2,694	3,026	3,354	3,702	4,071	4,457
COUNTY-OTHER	11,652	13,091	14,509	16,019	17,614	19,283
NECHES BASIN TOTAL POPULATION	**72,136**	**81,040**	**89,815**	**99,155**	**109,035**	**119,364**
NACOGDOCHES COUNTY TOTAL POPULATION	**72,136**	**81,040**	**89,815**	**99,155**	**109,035**	**119,364**
NEWTON COUNTY						
SABINE BASIN						
MAURICEVILLE SUD	390	390	390	390	390	390
NEWTON	2,478	2,478	2,478	2,478	2,478	2,478
SOUTH NEWTON WSC	2,622	2,622	2,622	2,622	2,622	2,622
COUNTY-OTHER	8,955	8,955	8,955	8,955	8,955	8,955
SABINE BASIN TOTAL POPULATION	**14,445**	**14,445**	**14,445**	**14,445**	**14,445**	**14,445**
NEWTON COUNTY TOTAL POPULATION	**14,445**	**14,445**	**14,445**	**14,445**	**14,445**	**14,445**

Water User Group (WUG) Population

REGION I	WUG POPULATION					
	2020	2030	2040	2050	2060	2070
ORANGE COUNTY						
NECHES BASIN						
BRIDGE CITY	1,208	1,262	1,301	1,327	1,347	1,361
MAURICEVILLE SUD	701	733	756	771	782	791
ORANGEFIELD WSC	2,029	2,120	2,185	2,229	2,262	2,286
PORT ARTHUR	5	5	5	5	5	5
ROSE CITY	530	554	571	582	591	597
VIDOR	9,017	9,425	9,712	9,907	10,056	10,163
COUNTY-OTHER	13,937	14,569	15,012	15,313	15,543	15,710
NECHES BASIN TOTAL POPULATION	**27,427**	**28,668**	**29,542**	**30,134**	**30,586**	**30,913**
NECHES-TRINITY BASIN						
BRIDGE CITY	968	1,011	1,042	1,063	1,079	1,091
COUNTY-OTHER	30	33	33	34	34	34
NECHES-TRINITY BASIN TOTAL POPULATION	**998**	**1,044**	**1,075**	**1,097**	**1,113**	**1,125**
SABINE BASIN						
BRIDGE CITY	6,095	6,372	6,565	6,697	6,797	6,870
MAURICEVILLE SUD	8,407	8,787	9,055	9,236	9,375	9,475
ORANGE	19,616	20,503	21,128	21,552	21,875	22,109
ORANGEFIELD WSC	3,174	3,318	3,419	3,488	3,540	3,578
PINEHURST	2,213	2,313	2,383	2,431	2,467	2,494
SOUTH NEWTON WSC	1,475	1,542	1,589	1,621	1,645	1,663
VIDOR	2,143	2,240	2,308	2,354	2,389	2,415
WEST ORANGE	3,632	3,797	3,912	3,991	4,051	4,094
COUNTY-OTHER	11,147	11,649	12,008	12,247	12,431	12,562
SABINE BASIN TOTAL POPULATION	**57,902**	**60,521**	**62,367**	**63,617**	**64,570**	**65,260**
ORANGE COUNTY TOTAL POPULATION	**86,327**	**90,233**	**92,984**	**94,848**	**96,269**	**97,298**
PANOLA COUNTY						
CYPRESS BASIN						
COUNTY-OTHER	55	58	60	61	62	63
CYPRESS BASIN TOTAL POPULATION	**55**	**58**	**60**	**61**	**62**	**63**
SABINE BASIN						
BECKVILLE	968	1,084	1,155	1,221	1,271	1,310
CARTHAGE	6,925	7,066	7,152	7,232	7,292	7,339
GILL WSC	734	756	770	783	793	801
TATUM	333	397	436	472	499	520
COUNTY-OTHER	16,096	17,017	17,581	18,104	18,495	18,799
SABINE BASIN TOTAL POPULATION	**25,056**	**26,320**	**27,094**	**27,812**	**28,350**	**28,769**
PANOLA COUNTY TOTAL POPULATION	**25,111**	**26,378**	**27,154**	**27,873**	**28,412**	**28,832**
POLK COUNTY						
NECHES BASIN						
CORRIGAN	1,821	2,035	2,202	2,345	2,462	2,556

Water User Group (WUG) Population

REGION I	WUG POPULATION					
	2020	2030	2040	2050	2060	2070
POLK COUNTY						
NECHES BASIN						
COUNTY-OTHER	7,138	7,973	8,632	9,192	9,650	10,018
NECHES BASIN TOTAL POPULATION	**8,959**	**10,008**	**10,834**	**11,537**	**12,112**	**12,574**
POLK COUNTY TOTAL POPULATION	**8,959**	**10,008**	**10,834**	**11,537**	**12,112**	**12,574**
RUSK COUNTY						
NECHES BASIN						
HENDERSON	12,984	14,473	15,920	17,474	19,089	20,763
NEW LONDON	615	685	753	827	904	983
OVERTON	285	318	349	384	419	456
WRIGHT CITY WSC	497	554	610	669	731	795
COUNTY-OTHER	15,639	17,432	19,174	21,045	22,991	25,007
NECHES BASIN TOTAL POPULATION	**30,020**	**33,462**	**36,806**	**40,399**	**44,134**	**48,004**
SABINE BASIN						
CHALK HILL SUD	3,695	4,118	4,530	4,972	5,432	5,908
CROSS ROADS SUD	2,872	3,202	3,522	3,865	4,223	4,593
EASTON	58	65	71	78	85	93
ELDERVILLE WSC	1,757	1,958	2,153	2,364	2,582	2,809
HENDERSON	2,256	2,514	2,765	3,035	3,316	3,607
KILGORE	3,349	3,733	4,106	4,507	4,924	5,355
NEW LONDON	495	552	607	666	727	791
OVERTON	2,354	2,623	2,886	3,167	3,460	3,764
TATUM	1,243	1,386	1,524	1,673	1,827	1,987
WEST GREGG SUD	188	210	231	253	277	301
COUNTY-OTHER	10,985	12,244	13,468	14,784	16,151	17,568
SABINE BASIN TOTAL POPULATION	**29,252**	**32,605**	**35,863**	**39,364**	**43,004**	**46,776**
RUSK COUNTY TOTAL POPULATION	**59,272**	**66,067**	**72,669**	**79,763**	**87,138**	**94,780**
SABINE COUNTY						
NECHES BASIN						
G M WSC	1,427	1,433	1,434	1,434	1,434	1,434
PINELAND	881	883	883	883	883	883
COUNTY-OTHER	94	93	92	92	92	92
NECHES BASIN TOTAL POPULATION	**2,402**	**2,409**	**2,409**	**2,409**	**2,409**	**2,409**
SABINE BASIN						
G M WSC	5,891	5,914	5,914	5,914	5,914	5,914
HEMPHILL	1,295	1,304	1,304	1,304	1,304	1,304
COUNTY-OTHER	1,629	1,622	1,622	1,622	1,622	1,622
SABINE BASIN TOTAL POPULATION	**8,815**	**8,840**	**8,840**	**8,840**	**8,840**	**8,840**
SABINE COUNTY TOTAL POPULATION	**11,217**	**11,249**	**11,249**	**11,249**	**11,249**	**11,249**

Water User Group (WUG) Population

REGION I	WUG POPULATION					
	2020	2030	2040	2050	2060	2070
SAN AUGUSTINE COUNTY						
NECHES BASIN						
SAN AUGUSTINE	2,121	2,121	2,121	2,121	2,121	2,121
COUNTY-OTHER	6,020	6,020	6,020	6,020	6,020	6,020
NECHES BASIN TOTAL POPULATION	**8,141**	**8,141**	**8,141**	**8,141**	**8,141**	**8,141**
SABINE BASIN						
G M WSC	714	714	714	714	714	714
COUNTY-OTHER	62	62	62	62	62	62
SABINE BASIN TOTAL POPULATION	**776**	**776**	**776**	**776**	**776**	**776**
SAN AUGUSTINE COUNTY TOTAL POPULATION	**8,917**	**8,917**	**8,917**	**8,917**	**8,917**	**8,917**
SHELBY COUNTY						
NECHES BASIN						
TIMPSON	44	47	50	53	55	58
COUNTY-OTHER	2,864	3,081	3,271	3,452	3,621	3,777
NECHES BASIN TOTAL POPULATION	**2,908**	**3,128**	**3,321**	**3,505**	**3,676**	**3,835**
SABINE BASIN						
CENTER	5,604	6,027	6,400	6,754	7,085	7,390
JOAQUIN	890	957	1,016	1,072	1,125	1,173
TENAHA	1,252	1,347	1,430	1,509	1,583	1,651
TIMPSON	1,203	1,294	1,374	1,450	1,521	1,586
COUNTY-OTHER	15,604	16,779	17,821	18,805	19,725	20,578
SABINE BASIN TOTAL POPULATION	**24,553**	**26,404**	**28,041**	**29,590**	**31,039**	**32,378**
SHELBY COUNTY TOTAL POPULATION	**27,461**	**29,532**	**31,362**	**33,095**	**34,715**	**36,213**
SMITH COUNTY						
NECHES BASIN						
ARP	1,017	1,066	1,115	1,168	1,222	1,278
BULLARD	3,299	4,233	5,170	6,179	7,206	8,259
CRYSTAL SYSTEMS INC	832	1,068	1,305	1,560	1,820	2,086
DEAN WSC	4,736	4,917	5,099	5,294	5,493	5,697
JACKSON WSC	2,158	2,381	2,605	2,846	3,091	3,342
LINDALE	2,099	2,704	3,311	3,964	4,629	5,311
LINDALE RURAL WSC	2,831	3,079	3,328	3,596	3,869	4,149
NEW CHAPEL HILL	622	652	682	714	746	779
NOONDAY	953	1,139	1,326	1,527	1,731	1,941
OVERTON	151	191	231	274	318	363
R-P-M WSC	292	331	370	412	455	499
SOUTHERN UTILITIES COMPANY	36,455	38,555	40,661	42,928	45,235	47,603
TROUP	2,005	2,212	2,420	2,644	2,872	3,105
TYLER	104,786	114,056	123,354	133,362	143,548	154,002
WALNUT GROVE WSC	8,208	9,695	11,187	12,793	14,427	16,104
WHITEHOUSE	9,209	10,848	12,492	14,261	16,061	17,909
WRIGHT CITY WSC	2,381	2,669	2,958	3,269	3,585	3,910

Water User Group (WUG) Population

REGION I	WUG POPULATION					
	2020	2030	2040	2050	2060	2070
SMITH COUNTY						
NECHES BASIN						
COUNTY-OTHER	6,986	8,783	10,582	12,521	14,495	16,522
NECHES BASIN TOTAL POPULATION	**189,020**	**208,579**	**228,196**	**249,312**	**270,803**	**292,859**
SMITH COUNTY TOTAL POPULATION	**189,020**	**208,579**	**228,196**	**249,312**	**270,803**	**292,859**
TRINITY COUNTY						
NECHES BASIN						
GROVETON	540	584	589	572	599	627
COUNTY-OTHER	3,208	3,470	3,495	3,397	3,554	3,719
NECHES BASIN TOTAL POPULATION	**3,748**	**4,054**	**4,084**	**3,969**	**4,153**	**4,346**
TRINITY COUNTY TOTAL POPULATION	**3,748**	**4,054**	**4,084**	**3,969**	**4,153**	**4,346**
TYLER COUNTY						
NECHES BASIN						
COLMESNEIL	611	614	614	614	614	614
IVANHOE	909	913	913	913	913	913
IVANHOE NORTH	551	554	554	554	554	554
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	65	65	65	65	65	65
TYLER COUNTY WSC	5,684	5,711	5,711	5,711	5,711	5,711
WOODVILLE	2,649	2,661	2,661	2,661	2,661	2,661
COUNTY-OTHER	11,819	11,878	11,878	11,878	11,878	11,878
NECHES BASIN TOTAL POPULATION	**22,288**	**22,396**	**22,396**	**22,396**	**22,396**	**22,396**
TYLER COUNTY TOTAL POPULATION	**22,288**	**22,396**	**22,396**	**22,396**	**22,396**	**22,396**
REGION I TOTAL POPULATION	**1,151,556**	**1,233,973**	**1,309,681**	**1,388,867**	**1,469,843**	**1,553,652**

Appendix 2-C

Water User Group Demand Projections DB17 Report

The following appendix includes a copy of the Water Demand Projections data from the TWDB Data Web Interface known as the DB17. The summary is divided by Water User Group, county, and river basin.

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Water User Group (WUG) Demand

REGION I	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
ANDERSON COUNTY						
NECHES BASIN						
BRUSHY CREEK WSC	149	146	141	138	138	138
FRANKSTON	239	240	238	236	236	236
PALESTINE	2,588	2,626	2,620	2,600	2,596	2,596
WALSTON SPRINGS WSC	291	288	283	277	276	276
COUNTY-OTHER	877	878	867	856	854	854
MANUFACTURING	14	18	19	20	21	22
MINING	64	81	85	68	48	35
STEAM ELECTRIC POWER	11,306	13,218	15,549	18,390	21,853	25,968
LIVESTOCK	648	648	648	648	648	648
IRRIGATION	207	207	207	207	207	207
NECHES BASIN TOTAL DEMAND	**16,383**	**18,350**	**20,657**	**23,440**	**26,877**	**30,980**
TRINITY BASIN						
BRUSHY CREEK WSC	89	87	84	82	81	81
ELKHART	249	251	250	247	246	246
FOUR PINES WSC	336	336	331	327	326	325
PALESTINE	2,457	2,492	2,484	2,465	2,462	2,462
THE CONSOLIDATED WSC	189	189	185	182	181	181
WALSTON SPRINGS WSC	117	116	113	111	111	111
COUNTY-OTHER	2,895	2,899	2,863	2,825	2,817	2,817
MANUFACTURING	16	22	23	24	25	26
MINING	76	96	100	79	57	40
LIVESTOCK	754	754	754	754	754	754
IRRIGATION	255	255	255	255	255	255
TRINITY BASIN TOTAL DEMAND	**7,433**	**7,497**	**7,442**	**7,351**	**7,315**	**7,298**
ANDERSON COUNTY TOTAL DEMAND	**23,816**	**25,847**	**28,099**	**30,791**	**34,192**	**38,278**
ANGELINA COUNTY						
NECHES BASIN						
ANGELINA WSC	251	251	255	265	275	284
BURKE	156	165	172	180	186	193
CENTRAL WCID OF ANGELINA COUNTY	480	495	522	547	569	589
DIBOLL	672	690	707	738	766	792
FOUR WAY SUD	490	509	527	546	566	585
HUDSON	388	397	406	418	433	448
HUDSON WSC	407	435	459	481	500	518
HUNTINGTON	231	236	241	247	257	265
LUFKIN	6,271	6,523	6,736	6,979	7,246	7,494
REDLAND WSC	201	199	208	217	225	232
ZAVALLA	79	81	82	84	87	90
COUNTY-OTHER	1,961	1,999	2,045	2,134	2,214	2,289
MANUFACTURING	15,249	16,858	18,487	19,934	21,478	23,142
MINING	486	585	410	312	237	180
STEAM ELECTRIC POWER	1,000	1,000	1,000	1,000	1,000	1,000
LIVESTOCK	648	648	648	648	648	648
IRRIGATION	481	481	481	481	481	481
NECHES BASIN TOTAL DEMAND	**29,451**	**31,552**	**33,386**	**35,211**	**37,168**	**39,230**
ANGELINA COUNTY TOTAL DEMAND	**29,451**	**31,552**	**33,386**	**35,211**	**37,168**	**39,230**

Water User Group (WUG) Demand

REGION I	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
CHEROKEE COUNTY						
NECHES BASIN						
ALTO	249	266	284	308	335	366
ALTO RURAL WSC	638	678	734	802	873	951
BULLARD	11	12	13	14	15	16
CRAFT-TURNEY WSC	483	502	523	560	609	663
JACKSONVILLE	2,680	2,858	3,042	3,297	3,588	3,908
NEW SUMMERFIELD	156	166	177	192	209	228
NORTH CHEROKEE WSC	602	640	681	737	801	873
RUSK	1,019	1,089	1,162	1,260	1,371	1,494
RUSK RURAL WSC	365	383	402	433	470	512
SOUTHERN UTILITIES COMPANY	480	513	546	592	644	701
TROUP	14	15	16	17	18	20
WELLS	139	148	157	170	185	201
WRIGHT CITY WSC	69	73	78	84	91	99
COUNTY-OTHER	1,139	1,205	1,277	1,379	1,500	1,633
MANUFACTURING	413	442	469	492	530	571
MINING	295	304	267	204	141	97
STEAM ELECTRIC POWER	1,790	2,093	2,462	2,912	3,460	3,835
LIVESTOCK	1,681	1,681	1,681	1,681	1,681	1,681
IRRIGATION	355	355	355	355	355	355
NECHES BASIN TOTAL DEMAND	**12,578**	**13,423**	**14,326**	**15,489**	**16,876**	**18,204**
CHEROKEE COUNTY TOTAL DEMAND	**12,578**	**13,423**	**14,326**	**15,489**	**16,876**	**18,204**
HARDIN COUNTY						
NECHES BASIN						
KOUNTZE	255	246	238	234	234	234
LUMBERTON	1,656	1,852	1,990	2,097	2,191	2,263
LUMBERTON MUD	781	794	802	811	826	838
NORTH HARDIN WSC	544	561	586	605	619	630
SILSBEE	893	881	869	864	869	875
SOUR LAKE	280	285	289	292	297	301
WEST HARDIN WSC	269	270	271	272	273	273
COUNTY-OTHER	1,618	1,657	1,677	1,727	1,765	1,797
MANUFACTURING	288	318	349	377	407	439
MINING	12	12	12	12	12	12
LIVESTOCK	161	161	161	161	161	161
IRRIGATION	3,414	3,645	3,804	3,861	3,802	3,712
NECHES BASIN TOTAL DEMAND	**10,171**	**10,682**	**11,048**	**11,313**	**11,456**	**11,535**
TRINITY BASIN						
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	10	11	12	12	13	13
WEST HARDIN WSC	4	4	4	4	4	4
COUNTY-OTHER	18	18	18	18	18	18
LIVESTOCK	2	2	2	2	2	2
TRINITY BASIN TOTAL DEMAND	**34**	**35**	**36**	**36**	**37**	**37**
HARDIN COUNTY TOTAL DEMAND	**10,205**	**10,717**	**11,084**	**11,349**	**11,493**	**11,572**
HENDERSON COUNTY						
NECHES BASIN						
ATHENS	57	59	62	66	69	73

Water User Group (WUG) Demand

REGION I	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
HENDERSON COUNTY						
NECHES BASIN						
BERRYVILLE	118	124	128	137	147	156
BETHEL-ASH WSC	325	354	380	419	455	491
BROWNSBORO	218	260	295	343	386	428
BRUSHY CREEK WSC	65	66	67	70	74	78
CHANDLER	608	723	820	954	1,073	1,189
FRANKSTON	9	13	16	20	24	28
MURCHISON	93	91	89	88	88	88
R-P-M WSC	77	89	98	113	126	138
VIRGINIA HILL WSC	176	193	207	230	252	273
COUNTY-OTHER	1,043	957	890	862	837	817
MANUFACTURING	54	62	70	78	86	95
MINING	77	86	77	59	40	28
LIVESTOCK	1,253	1,253	1,253	1,253	1,253	1,253
IRRIGATION	384	384	384	384	384	384
NECHES BASIN TOTAL DEMAND	**4,557**	**4,714**	**4,836**	**5,076**	**5,294**	**5,519**
HENDERSON COUNTY TOTAL DEMAND	**4,557**	**4,714**	**4,836**	**5,076**	**5,294**	**5,519**
HOUSTON COUNTY						
NECHES BASIN						
GRAPELAND	83	81	79	78	78	78
THE CONSOLIDATED WSC	421	409	397	390	389	389
COUNTY-OTHER	33	30	29	29	29	29
MANUFACTURING	12	14	15	16	17	18
MINING	113	89	65	42	18	8
LIVESTOCK	460	502	547	596	649	717
IRRIGATION	331	359	388	421	458	507
NECHES BASIN TOTAL DEMAND	**1,453**	**1,484**	**1,520**	**1,572**	**1,638**	**1,746**
TRINITY BASIN						
CROCKETT	1,281	1,253	1,226	1,211	1,209	1,209
GRAPELAND	128	125	121	119	118	118
LOVELADY	131	130	128	127	126	126
THE CONSOLIDATED WSC	1,146	1,111	1,078	1,060	1,056	1,056
COUNTY-OTHER	151	142	141	140	140	140
MANUFACTURING	295	324	352	377	408	442
MINING	209	165	122	77	33	14
LIVESTOCK	1,170	1,277	1,392	1,517	1,652	1,825
IRRIGATION	2,658	2,876	3,115	3,380	3,672	4,071
TRINITY BASIN TOTAL DEMAND	**7,169**	**7,403**	**7,675**	**8,008**	**8,414**	**9,001**
HOUSTON COUNTY TOTAL DEMAND	**8,622**	**8,887**	**9,195**	**9,580**	**10,052**	**10,747**
JASPER COUNTY						
NECHES BASIN						
JASPER	1,699	1,699	1,676	1,660	1,657	1,657
COUNTY-OTHER	1,500	1,472	1,431	1,405	1,399	1,399
MANUFACTURING	91,534	94,935	97,907	100,136	100,221	100,306
MINING	70	55	41	27	13	7
LIVESTOCK	230	230	230	230	230	230
IRRIGATION	23	23	23	23	23	23

Water User Group (WUG) Demand

REGION I	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
JASPER COUNTY						
NECHES BASIN TOTAL DEMAND	**95,056**	**98,414**	**101,308**	**103,481**	**103,543**	**103,622**
SABINE BASIN						
JASPER COUNTY WCID #1	224	212	207	207	207	207
KIRBYVILLE	402	401	395	390	390	390
MAURICEVILLE SUD	30	30	30	30	30	30
COUNTY-OTHER	967	950	923	906	903	903
MANUFACTURING	46	47	49	50	50	50
MINING	78	63	47	31	15	7
LIVESTOCK	132	132	132	132	132	132
IRRIGATION	13	13	13	13	13	13
SABINE BASIN TOTAL DEMAND	**1,892**	**1,848**	**1,796**	**1,759**	**1,740**	**1,732**
JASPER COUNTY TOTAL DEMAND	**96,948**	**100,262**	**103,104**	**105,240**	**105,283**	**105,354**
JEFFERSON COUNTY						
NECHES BASIN						
BEAUMONT	10,035	10,466	10,959	11,627	12,440	13,367
BEVIL OAKS	135	137	139	147	157	169
CHINA	3	3	3	3	4	4
GROVES	70	67	65	64	64	64
JEFFERSON COUNTY WCID #10	75	76	78	81	87	93
MEEKER MUD	108	112	116	123	131	141
NEDERLAND	87	89	92	97	104	111
NOME	48	49	51	53	57	61
PORT ARTHUR	60	60	59	59	59	59
PORT NECHES	742	752	770	807	862	926
COUNTY-OTHER	125	135	147	163	181	202
MANUFACTURING	220,094	313,727	327,169	340,618	354,075	368,065
MINING	128	143	161	194	217	243
STEAM ELECTRIC POWER	13,426	15,696	18,464	21,838	25,951	30,839
LIVESTOCK	75	75	75	75	75	75
IRRIGATION	11,337	11,982	12,424	12,581	12,418	12,168
NECHES BASIN TOTAL DEMAND	**256,548**	**353,569**	**370,772**	**388,530**	**406,882**	**426,587**
NECHES-TRINITY BASIN						
BEAUMONT	19,654	20,497	21,464	22,771	24,365	26,181
CHINA	140	143	147	155	164	177
GROVES	2,168	2,093	2,029	2,005	1,999	1,999
JEFFERSON COUNTY WCID #10	373	377	385	404	430	462
MEEKER MUD	323	333	346	365	391	419
NEDERLAND	2,317	2,375	2,454	2,585	2,761	2,966
NOME	27	28	29	31	33	35
PORT ARTHUR	19,745	19,715	19,489	19,442	19,423	19,422
PORT NECHES	686	695	711	746	796	854
WEST JEFFERSON COUNTY MWD	741	752	772	809	863	927
COUNTY-OTHER	2,435	3,111	3,946	4,944	6,070	7,335
MANUFACTURING	203,164	289,594	302,002	314,416	326,839	339,752
MINING	66	73	83	100	112	125
LIVESTOCK	868	868	868	868	868	868
IRRIGATION	150,615	159,183	165,066	167,154	164,976	161,665

Water User Group (WUG) Demand

REGION I	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
JEFFERSON COUNTY						
NECHES-TRINITY BASIN TOTAL DEMAND	**403,322**	**499,837**	**519,791**	**536,795**	**550,090**	**563,187**
JEFFERSON COUNTY TOTAL DEMAND	**659,870**	**853,406**	**890,563**	**925,325**	**956,972**	**989,774**
NACOGDOCHES COUNTY						
NECHES BASIN						
APPLEBY WSC	655	718	783	858	941	1,030
CUSHING	124	135	147	160	176	192
D&M WSC	905	994	1,086	1,190	1,306	1,428
GARRISON	225	247	269	295	324	354
LILLY GROVE SUD	429	469	511	559	613	671
MELROSE WSC	504	549	595	650	713	780
NACOGDOCHES	6,742	7,376	8,027	8,781	9,638	10,545
SWIFT WSC	428	465	503	550	603	660
WODEN WSC	330	356	384	418	458	501
COUNTY-OTHER	1,185	1,294	1,427	1,570	1,720	1,881
MANUFACTURING	2,564	2,798	3,029	3,228	3,483	3,758
MINING	7,000	4,500	1,643	1,299	958	707
STEAM ELECTRIC POWER	6,911	8,079	9,504	11,241	13,358	15,874
LIVESTOCK	4,364	4,557	4,781	5,040	5,337	5,779
IRRIGATION	400	400	400	400	400	400
NECHES BASIN TOTAL DEMAND	**32,766**	**32,937**	**33,089**	**36,239**	**40,028**	**44,560**
NACOGDOCHES COUNTY TOTAL DEMAND	**32,766**	**32,937**	**33,089**	**36,239**	**40,028**	**44,560**
NEWTON COUNTY						
SABINE BASIN						
MAURICEVILLE SUD	28	27	27	27	27	27
NEWTON	443	434	426	421	420	420
SOUTH NEWTON WSC	177	177	177	177	177	177
COUNTY-OTHER	969	925	887	878	875	875
MANUFACTURING	568	644	721	791	858	931
MINING	429	373	279	209	146	107
STEAM ELECTRIC POWER	14,132	16,522	19,436	22,987	27,317	32,463
LIVESTOCK	121	121	121	121	121	121
IRRIGATION	375	375	375	375	375	375
SABINE BASIN TOTAL DEMAND	**17,242**	**19,598**	**22,449**	**25,986**	**30,316**	**35,496**
NEWTON COUNTY TOTAL DEMAND	**17,242**	**19,598**	**22,449**	**25,986**	**30,316**	**35,496**
ORANGE COUNTY						
NECHES BASIN						
BRIDGE CITY	107	106	104	105	106	107
MAURICEVILLE SUD	50	50	51	52	53	54
ORANGEFIELD WSC	188	192	195	197	199	201
PORT ARTHUR	2	2	2	2	2	2
ROSE CITY	86	87	87	89	90	91
VIDOR	1,819	1,854	1,873	1,900	1,925	1,945
COUNTY-OTHER	1,608	1,593	1,636	1,664	1,684	1,701
MANUFACTURING	1,289	1,409	1,528	1,634	1,753	1,881
MINING	139	141	141	141	144	147
STEAM ELECTRIC POWER	4,966	5,805	6,829	8,077	9,598	10,637
LIVESTOCK	68	68	68	68	68	68

Water User Group (WUG) Demand

REGION I	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
ORANGE COUNTY						
NECHES BASIN						
IRRIGATION	932	996	1,039	1,054	1,038	1,014
NECHES BASIN TOTAL DEMAND	**11,254**	**12,303**	**13,553**	**14,983**	**16,660**	**17,848**
NECHES-TRINITY BASIN						
BRIDGE CITY	86	85	83	84	85	86
COUNTY-OTHER	4	4	4	4	4	4
NECHES-TRINITY BASIN TOTAL DEMAND	**90**	**89**	**87**	**88**	**89**	**90**
SABINE BASIN						
BRIDGE CITY	540	531	522	527	533	538
MAURICEVILLE SUD	587	590	609	621	630	636
ORANGE	2,619	2,638	2,639	2,657	2,689	2,717
ORANGEFIELD WSC	293	299	304	308	311	315
PINEHURST	282	283	284	289	292	295
SOUTH NEWTON WSC	100	104	107	109	111	112
VIDOR	433	441	446	452	458	463
WEST ORANGE	552	557	562	572	580	586
COUNTY-OTHER	1,287	1,275	1,310	1,331	1,347	1,361
MANUFACTURING	63,172	69,030	74,871	80,056	85,888	92,145
MINING	170	173	172	173	175	180
LIVESTOCK	140	140	140	140	140	140
IRRIGATION	2,798	2,987	3,117	3,164	3,115	3,042
SABINE BASIN TOTAL DEMAND	**72,973**	**79,048**	**85,083**	**90,399**	**96,269**	**102,530**
ORANGE COUNTY TOTAL DEMAND	**84,317**	**91,440**	**98,723**	**105,470**	**113,018**	**120,468**
PANOLA COUNTY						
CYPRESS BASIN						
COUNTY-OTHER	5	6	6	6	6	6
MINING	6	6	5	4	4	4
LIVESTOCK	15	15	15	15	15	15
CYPRESS BASIN TOTAL DEMAND	**26**	**27**	**26**	**25**	**25**	**25**
SABINE BASIN						
BECKVILLE	133	144	150	156	162	167
CARTHAGE	1,650	1,651	1,644	1,648	1,659	1,670
GILL WSC	85	84	82	83	84	85
TATUM	65	75	81	87	92	96
COUNTY-OTHER	1,615	1,629	1,623	1,639	1,669	1,696
MANUFACTURING	1,393	1,454	1,513	1,564	1,667	1,777
MINING	5,910	5,853	5,044	4,264	3,616	3,934
LIVESTOCK	1,465	1,465	1,465	1,465	1,465	1,465
IRRIGATION	64	64	64	64	64	64
SABINE BASIN TOTAL DEMAND	**12,380**	**12,419**	**11,666**	**10,970**	**10,478**	**10,954**
PANOLA COUNTY TOTAL DEMAND	**12,406**	**12,446**	**11,692**	**10,995**	**10,503**	**10,979**
POLK COUNTY						
NECHES BASIN						
CORRIGAN	225	241	253	269	281	292
COUNTY-OTHER	743	797	840	882	923	957
MANUFACTURING	604	687	774	854	924	1,000
MINING	123	97	72	46	20	9
LIVESTOCK	357	357	357	357	357	357

Water User Group (WUG) Demand

REGION I	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
POLK COUNTY						
NECHES BASIN						
IRRIGATION	428	428	428	428	428	428
NECHES BASIN TOTAL DEMAND	**2,480**	**2,607**	**2,724**	**2,836**	**2,933**	**3,043**
POLK COUNTY TOTAL DEMAND	**2,480**	**2,607**	**2,724**	**2,836**	**2,933**	**3,043**
RUSK COUNTY						
NECHES BASIN						
HENDERSON	3,254	3,564	3,874	4,226	4,611	5,014
NEW LONDON	215	235	257	281	306	333
OVERTON	61	66	72	78	85	93
WRIGHT CITY WSC	57	62	66	72	78	85
COUNTY-OTHER	1,697	1,803	1,916	2,071	2,255	2,450
MANUFACTURING	304	328	348	366	393	421
MINING	1,555	2,084	2,012	1,936	1,873	1,868
LIVESTOCK	675	684	697	709	722	722
IRRIGATION	56	56	56	56	56	56
NECHES BASIN TOTAL DEMAND	**7,874**	**8,882**	**9,298**	**9,795**	**10,379**	**11,042**
SABINE BASIN						
CHALK HILL SUD	323	343	364	393	428	464
CROSS ROADS SUD	238	251	265	285	310	336
EASTON	4	5	5	6	6	7
ELDERVILLE WSC	119	132	145	159	174	189
HENDERSON	566	620	673	735	801	871
KILGORE	723	789	855	931	1,016	1,104
NEW LONDON	173	191	207	226	247	268
OVERTON	499	545	590	643	701	762
TATUM	240	261	283	308	336	365
WEST GREGG SUD	17	18	19	20	22	24
COUNTY-OTHER	1,192	1,267	1,346	1,455	1,584	1,722
MANUFACTURING	13	14	15	15	16	18
MINING	1,435	1,923	1,858	1,788	1,728	1,724
STEAM ELECTRIC POWER	27,458	32,102	37,762	44,663	53,074	63,069
LIVESTOCK	532	540	549	560	570	570
IRRIGATION	44	44	44	44	44	44
SABINE BASIN TOTAL DEMAND	**33,576**	**39,045**	**44,980**	**52,231**	**61,057**	**71,537**
RUSK COUNTY TOTAL DEMAND	**41,450**	**47,927**	**54,278**	**62,026**	**71,436**	**82,579**
SABINE COUNTY						
NECHES BASIN						
G M WSC	96	97	97	97	97	97
PINELAND	83	78	75	74	74	74
COUNTY-OTHER	9	8	8	8	8	8
MANUFACTURING	467	536	606	668	724	785
MINING	240	218	192	167	142	124
LIVESTOCK	25	34	45	57	71	71
NECHES BASIN TOTAL DEMAND	**920**	**971**	**1,023**	**1,071**	**1,116**	**1,159**
SABINE BASIN						
G M WSC	396	397	397	397	397	397

Water User Group (WUG) Demand

REGION I	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
SABINE COUNTY						
SABINE BASIN						
HEMPHILL	306	302	298	295	295	295
COUNTY-OTHER	140	131	125	124	124	124
MINING	1,260	1,147	1,011	879	746	652
LIVESTOCK	134	183	240	306	377	377
SABINE BASIN TOTAL DEMAND	**2,236**	**2,160**	**2,071**	**2,001**	**1,939**	**1,845**
SABINE COUNTY TOTAL DEMAND	**3,156**	**3,131**	**3,094**	**3,072**	**3,055**	**3,004**
SAN AUGUSTINE COUNTY						
NECHES BASIN						
SAN AUGUSTINE	519	508	500	499	498	498
COUNTY-OTHER	582	559	539	529	526	526
MANUFACTURING	8	9	10	11	12	13
MINING	3,800	2,850	1,405	1,121	840	629
LIVESTOCK	816	904	1,004	1,121	1,249	1,249
IRRIGATION	56	56	56	56	56	56
NECHES BASIN TOTAL DEMAND	**5,781**	**4,886**	**3,514**	**3,337**	**3,181**	**2,971**
SABINE BASIN						
G M WSC	48	48	48	48	48	48
COUNTY-OTHER	7	6	6	6	6	6
MINING	200	150	74	59	44	33
LIVESTOCK	87	96	107	119	133	133
IRRIGATION	6	6	6	6	6	6
SABINE BASIN TOTAL DEMAND	**348**	**306**	**241**	**238**	**237**	**226**
SAN AUGUSTINE COUNTY TOTAL DEMAND	**6,129**	**5,192**	**3,755**	**3,575**	**3,418**	**3,197**
SHELBY COUNTY						
NECHES BASIN						
TIMPSON	7	7	7	8	8	8
COUNTY-OTHER	314	324	334	347	362	378
MINING	919	823	699	554	411	304
LIVESTOCK	1,006	1,198	1,433	1,718	2,067	2,067
IRRIGATION	7	7	7	7	7	7
NECHES BASIN TOTAL DEMAND	**2,253**	**2,359**	**2,480**	**2,634**	**2,855**	**2,764**
SABINE BASIN						
CENTER	1,847	1,958	2,056	2,158	2,262	2,358
JOAQUIN	137	142	147	155	162	169
TENAHA	227	238	248	259	271	283
TIMPSON	172	179	186	193	202	211
COUNTY-OTHER	1,707	1,762	1,815	1,885	1,971	2,055
MANUFACTURING	1,510	1,639	1,768	1,882	2,021	2,170
MINING	2,364	2,115	1,797	1,426	1,056	783
LIVESTOCK	4,259	5,075	6,067	7,279	8,755	8,755
IRRIGATION	19	19	19	19	19	19
SABINE BASIN TOTAL DEMAND	**12,242**	**13,127**	**14,103**	**15,256**	**16,719**	**16,803**
SHELBY COUNTY TOTAL DEMAND	**14,495**	**15,486**	**16,583**	**17,890**	**19,574**	**19,567**
SMITH COUNTY						
NECHES BASIN						
ARP	164	168	171	178	185	194

Water User Group (WUG) Demand

REGION I	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
SMITH COUNTY						
NECHES BASIN						
BULLARD	654	827	1,002	1,193	1,390	1,592
CRYSTAL SYSTEMS INC	260	330	403	481	560	642
DEAN WSC	765	774	786	808	836	867
JACKSON WSC	197	207	218	234	253	274
LINDALE	476	604	734	875	1,020	1,170
LINDALE RURAL WSC	221	229	239	253	271	290
NEW CHAPEL HILL	237	246	255	266	277	289
NOONDAY	189	221	254	291	330	369
OVERTON	33	40	48	56	65	74
R-P-M WSC	32	35	39	42	47	51
SOUTHERN UTILITIES COMPANY	6,234	6,420	6,638	6,937	7,294	7,671
TROUP	398	428	459	497	539	582
TYLER	20,049	21,331	22,696	24,331	26,141	28,031
WALNUT GROVE WSC	1,018	1,162	1,313	1,486	1,671	1,864
WHITEHOUSE	1,165	1,330	1,503	1,699	1,909	2,127
WRIGHT CITY WSC	273	295	319	348	381	415
COUNTY-OTHER	823	1,000	1,180	1,382	1,595	1,816
MANUFACTURING	5,120	5,597	6,055	6,443	6,976	7,553
MINING	134	139	140	109	80	58
LIVESTOCK	1,115	1,115	1,115	1,115	1,115	1,115
IRRIGATION	1,486	1,518	1,550	1,583	1,618	1,659
NECHES BASIN TOTAL DEMAND	**41,043**	**44,016**	**47,117**	**50,607**	**54,553**	**58,703**
SMITH COUNTY TOTAL DEMAND	**41,043**	**44,016**	**47,117**	**50,607**	**54,553**	**58,703**
TRINITY COUNTY						
NECHES BASIN						
GROVETON	58	59	58	56	58	61
COUNTY-OTHER	230	234	235	229	239	250
MINING	5	5	5	5	5	5
LIVESTOCK	478	478	478	478	478	478
IRRIGATION	500	500	500	500	500	500
NECHES BASIN TOTAL DEMAND	**1,271**	**1,276**	**1,276**	**1,268**	**1,280**	**1,294**
TRINITY COUNTY TOTAL DEMAND	**1,271**	**1,276**	**1,276**	**1,268**	**1,280**	**1,294**
TYLER COUNTY						
NECHES BASIN						
COLMESNEIL	148	146	143	142	142	142
IVANHOE	92	90	88	87	87	87
IVANHOE NORTH	62	60	59	58	58	58
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	5	5	5	5	5	5
TYLER COUNTY WSC	661	639	618	606	604	604
WOODVILLE	908	900	890	884	883	883
COUNTY-OTHER	1,494	1,448	1,404	1,380	1,376	1,376
MANUFACTURING	476	483	490	496	501	506
MINING	160	198	150	103	55	29
STEAM ELECTRIC POWER	1,029	1,029	1,029	1,029	1,029	1,029
LIVESTOCK	288	288	288	288	288	288

Water User Group (WUG) Demand

REGION I	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
TYLER COUNTY						
NECHES BASIN						
IRRIGATION	675	675	675	675	675	675
NECHES BASIN TOTAL DEMAND	**5,998**	**5,961**	**5,839**	**5,753**	**5,703**	**5,682**
TYLER COUNTY TOTAL DEMAND	**5,998**	**5,961**	**5,839**	**5,753**	**5,703**	**5,682**
REGION I TOTAL DEMAND	**1,108,800**	**1,330,825**	**1,395,212**	**1,463,778**	**1,533,147**	**1,607,250**

Appendix 2-D

Wholesale Water Provider Demands DB17 Report

This appendix will include a copy of the Wholesale Water Provider Demands data from the TWDB Data Web Interface known as the DB17. The summary will be divided by Wholesale Water Provider, county, and river basin. The TWDB will make this DB17 report available to RWPGs after submittal of the 2016 Initially Prepared Plan.

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WWP DEMAND

ANGELINA NECHES RIVER AUTHORITY

CUSTOMER	WUG	County	Basin	USE TYPE	WWP DEMAND (ACRE-FEET PER YEAR)					
					2020	2030	2040	2050	2060	2070
CHEROKEE COUNTY-OTHER	COUNTY-OTHER	CHEROKEE	NECHES	COUNTY OTHER	3,848	3,848	3,848	3,848	3,848	3,848
CITY OF JACKSONVILLE	JACKSONVILLE	CHEROKEE	NECHES	MUNICIPAL	4,275	4,275	4,275	4,275	4,275	4,275
CITY OF NEW SUMMERFILED	NEW SUMMERFIELD	CHEROKEE	NECHES	MUNICIPAL	2,565	2,565	2,565	2,565	2,565	2,565
NORTH CHEROKEE WSC	NORTH CHEROKEE WSC	CHEROKEE	NECHES	MUNICIPAL	4,275	4,275	4,275	4,275	4,275	4,275
CITY OF RUSK	RUSK	CHEROKEE	NECHES	MUNICIPAL	4,275	4,275	4,275	4,275	4,275	4,275
RUSK RURAL WSC	RUSK RURAL WSC	CHEROKEE	NECHES	MUNICIPAL	855	855	855	855	855	855
CITY OF ALTO	ALTO	CHEROKEE	NECHES	MUNICIPAL	428	428	428	428	428	428
NACOGDOCHES COUNTY-OTHER	CARO WSC	NACOGDOCHES	NECHES	MUNICIPAL	428	428	428	428	428	428
CITY OF NACOGDOCHES	NACOGDOCHES	NACOGDOCHES	NECHES	MUNICIPAL	8,551	8,551	8,551	8,551	8,551	8,551
CITY OF NEW LONDON	NEW LONDON	RUSK	SABINE	MUNICIPAL	855	855	855	855	855	855
CITY OF TROUP	TROUP	SMITH	NECHES	MUNICIPAL	4,275	4,275	4,275	4,275	4,275	4,275
CITY OF ARP	ARP	SMITH	NECHES	MUNICIPAL	428	428	428	428	428	428
SMITH COUNTY-OTHER	BLACKJACK WSC	SMITH	NECHES	COUNTY OTHER	855	855	855	855	855	855
JACKSON WSC	JACKSON WSC	SMITH	NECHES	MUNICIPAL	855	855	855	855	855	855
CITY OF WHITEHOUSE	WHITEHOUSE	SMITH	NECHES	MUNICIPAL	8,551	8,551	8,551	8,551	8,551	8,551
DALLAS	DALLAS			MUNICIPAL	0	0	0	0	0	56,050
COUNTY OTHER	HOLMWOOD UTILITY	JASPER	NECHES	COUNTY OTHER	65	70	70	70	70	70
UNIDENTIFIED CUSTOMER	STEAM ELECTRIC POWER	CHEROKEE	NECHES	STEAM ELECTRIC POWER	8,000	15,000	20,000	20,000	20,000	20,000
RUSK COUNTY REFINERY	MANUFACTURING	RUSK	NECHES	MANUFACTURING	5,600	5,600	5,600	5,600	5,600	5,600
ANGELINA MINING	MINING	ANGELINA	NECHES	MINING	474	573	398	300	225	168
CHEROKEE MINING	MINING	CHEROKEE	NECHES	MINING	238	247	210	147	84	40
NACOGDOCHES MINING	MINING	NACOGDOCHES	NECHES	MINING	5,475	2,975	118	0	0	0
SHELBY MINING	MINING	SHELBY	NECHES	MINING	0	0	0	0	0	0
SAN AUGUSTINE MINING	MINING	SAN AUGUSTINE	NECHES	MINING	2,102	1,102	0	0	0	0
RUSK MINING	MINING	RUSK	NECHES	MINING	1,285	1,814	1,742	1,666	1,603	1,598
ANRA TOTAL DEMAND					**68,557**	**72,699**	**73,456**	**73,102**	**72,901**	**128,845**

ANGELINA NACOGDOCHES WCID#1

CUSTOMER	WUG	County	Basin	USE TYPE	WWP DEMAND (ACRE-FEET PER YEAR)					
					2020	2030	2040	2050	2060	2070
LUMINANT	STEAM ELECTRIC POWER	CHEROKEE	NECHES	STEAM ELECTRIC POWER	5,000	5,000	5,000	5,000	5,000	5,000
NACOGDOCHES	STEAM ELECTRIC POWER	NACOGDOCHES	NECHES	STEAM ELECTRIC POWER	7,280	7,280	7,280	7,280	7,280	7,280
HENDERSON	HENDERSON	RUSK	NECHES	MUNICIPAL	0	0	8,289	8,289	8,289	8,289
AN WCID #1 TOTAL DEMAND					**12,280**	**12,280**	**20,569**	**20,569**	**20,569**	**20,569**

ATHENS MUNICIPAL WATER AUTHORITY

CUSTOMER	WUG	County	Basin	USE TYPE	WWP DEMAND (ACRE-FEET PER YEAR)					
					2020	2030	2040	2050	2060	2070
ATHENS	ATHENS	HENDERSON	TRINITY AND NECHES	MUNICIPAL	2,973	3,244	3,473	3,809	6,484	9,782
HENDERSON COUNTY	IRRIGATION	HENDERSON	NECHES	IRRIGATION	170	170	170	170	170	170
HENDERSON COUNTY	LIVESTOCK	HENDERSON	NECHES	LIVESTOCK	3,023	3,023	3,023	3,023	3,023	3,023
HENDERSON COUNTY	MANUFACTURING	HENDERSON	TRINITY	MANUFACTURING	345	356	368	380	391	403
ATHENS MWA TOTAL DEMAND					**6,511**	**6,793**	**7,034**	**7,382**	**10,068**	**13,378**

CITY OF BEAUMONT

CUSTOMER	WUG	County	Basin	USE TYPE	WWP DEMAND (ACRE-FEET PER YEAR)					
					2020	2030	2040	2050	2060	2070
CITY OF BEAUMONT	BEAUMONT	JEFFERSON	NECHES	MUNICIPAL	29,689	30,963	32,423	34,398	36,805	39,548
JEFFERSON	COUNTY-OTHER	JEFFERSON	NECHES	COUNTY-OTHER	2,509	3,181	4,000	4,000	4,000	4,000
JEFFERSON	MANUFACTURING	JEFFERSON	NECHES	MANUFACTURING	1,642	1,658	1,675	1,692	1,709	1,726
MEEKER MUD	JEFFERSON	JEFFERSON	NECHES	MUNICIPAL	4	4	5	5	5	6
CITY OF BEAUMONT TOTAL DEMAND					**33,844**	**35,807**	**38,103**	**40,095**	**42,519**	**45,279**

CITY OF CARTHAGE

CUSTOMER	WUG	County	Basin	USE TYPE	WWP DEMAND (ACRE-FEET PER YEAR)					
					2020	2030	2040	2050	2060	2070
CITY OF CARTHAGE	CARTHAGE	PANOLA	SABINE	MUNICIPAL	1,650	1,651	1,644	1,648	1,659	1,670
PANOLA	COUNTY-OTHER	PANOLA	SABINE	COUNTY-OTHER	300	300	300	300	300	300
PANOLA	MANUFACTURING	PANOLA	SABINE	MANUFACTURING	905	945	983	1,017	1,084	1,155
CITY OF CARTHAGE TOTAL DEMAND					**2,855**	**2,896**	**2,927**	**2,965**	**3,043**	**3,125**

CITY OF CENTER

CUSTOMER	WUG	County	Basin	USE TYPE	WWP DEMAND (ACRE-FEET PER YEAR)					
					2020	2030	2040	2050	2060	2070
SAND HILLS WSC	COUNTY-OTHER	SHELBY	SABINE	COUNTY-OTHER	162	167	172	179	187	195

SHELBYVILLE WSC	COUNTY-OTHER	SHELBY	SABINE	COUNTY-OTHER	10	10	11	11	12	12
PANOLA	SHELBY	SHELBY	SABINE	MANUFACTURING	1,510	1,639	1,768	1,882	2,021	2,170
CITY OF CENTER	CENTER	SHELBY	SABINE	MUNICIPAL	1,847	1,958	2,056	2,158	2,262	2,358
CITY OF CENTER TOTAL DEMAND					**3,529**	**3,774**	**4,007**	**4,230**	**4,481**	**4,735**

HOUSTON COUNTY WCID #1

					WWP DEMAND (ACRE-FEET PER YEAR)					
CUSTOMER	**WUG**	**County**	**Basin**	**USE TYPE**	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
GRAPELAND	GRAPELAND	HOUSTON	TRINITY	MUNICIPAL	170	170	170	170	170	170
COUNTY-OTHER	COUNTY-OTHER	HOUSTON	TRINITY	COUNTY-OTHER	92	92	92	92	92	92
HOUSTON MANUFACTURING	MANUFACTURING	HOUSTON	TRINITY	MANUFACTURING	301	331	360	385	417	451
CROCKETT	CROCKETT	HOUSTON	TRINITY	MUNICIPAL	2,148	2,148	2,148	2,148	2,148	2,148
LOVELADY	LOVELADY	HOUSTON	TRINITY	MUNICIPAL	37	37	37	37	37	37
CONSOLIDATED WSC	CONSOLIDATED WSC	HOUSTON	TRINITY	MUNICIPAL	1,043	1,043	1,043	1,043	1,043	1,043
CONSOLIDATED WSC (POTENTIAL)	CONSOLIDATED WSC	HOUSTON	TRINITY	MUNICIPAL	522	522	522	522	522	522
NACOGDOCHES POWER	STEAM ELECTRIC POWER	HOUSTON	TRINITY	STEAM ELECTRIC POWER	1,000	1,000	1,000	1,000	1,000	1,000
HOUSTON MINING	MINNG	HOUSTON	TRINITY	MINING			250	250	500	500
HOUSTON COUNTY WCID #1 TOTAL DEMAND					**5,313**	**5,343**	**5,622**	**5,647**	**5,929**	**5,963**

CITY OF JACKSONVILLE

					WWP DEMAND (ACRE-FEET PER YEAR)					
CUSTOMER	**WUG**	**County**	**Basin**	**USE TYPE**	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
CITY OF JACKSONVILLE	JACKSONVILLE	CHEROKEE	NECHES	MUNICIPAL	2,680	2,858	3,042	3,297	3,588	3,908
CHEROKEE MANUFACTURING	MANUFACTURING	CHEROKEE	NECHES	MANUFACTURING	413	442	469	492	530	571
COUNTY-OTHER	COUNTY-OTHER	CHEROKEE	NECHES	COUNTY-OTHER	285	301	319	345	375	408
NORTH CHEROKEE WSC	NORTH CHEROKEE WSC	CHEROKEE	NECHES	MUNICIPAL	615	653	694	750	814	886
CRAFT TURNEY WSC	CRAFT TURNEY WSC	CHEROKEE	NECHES	MUNICIPAL	483	502	523	560	609	663
CITY OF JACKSONVILLE TOTAL DEMAND					**4,476**	**4,756**	**5,047**	**5,444**	**5,916**	**6,436**

LOWER NECHES VALLEY AUTHORITY

					WWP DEMAND (ACRE-FEET PER YEAR)					
CUSTOMER	**WUG**	**County**	**Basin**	**USE TYPE**	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
CITY OF BEAUMONT	BEAUMONT	JEFFERSON	NECHES	MUNICIPAL	8,411	9,575	10,933	11,718	12,712	13,718
JASPER MANUFACTURING	MANUFACTURING	JASPER	NECHES	MANUFACTURING	60,000	60,000	60,000	60,000	60,000	60,000
NACOGDOCHES MANUFACTURING	MANUFACTURING	NACOGDOCHES	NECHES	MANUFACTURING	10,000	10,000	10,000	10,000	10,000	10,000
GROVES	GROVES	JEFFERSON	NECHES	MUNICIPAL	2,238	2,160	2,094	2,069	2,063	2,063
NEDERLAND	NEDERLAND	JEFFERSON	NECHES	MUNICIPAL	2,404	2,464	2,546	2,682	2,865	3,077
PORT ARTHUR	PORT ARTHUR	JEFFERSON	NECHES	MUNICIPAL	26,253	26,223	25,996	25,949	25,930	25,929
PORT NECHES	PORT NECHES	JEFFERSON	NECHES	MUNICIPAL	1,428	1,447	1,481	1,553	1,658	1,780
JEFFERSON COUNTY-OTHER	COUNTY-OTHER	JEFFERSON	NECHES	COUNTY-OTHER	256	325	409	511	625	754
JEFFERSON MANUFACTURING	MANUFACTURING	JEFFERSON	NECHES	MANUFACTURING	232,792	331,827	346,044	360,269	374,503	389,299
JEFFERSON IRRIGATION	IRRIGATION	JEFFERSON	NECHES	IRRIGATION	140,000	140,000	140,000	140,000	140,000	140,000
WEST JEFFERSON COUNTY MWD	JEFFERSON	JEFFERSON	NECHES	MUNICIPAL	741	752	772	809	863	927
JEFFERSON COUNTY WCID #1	JEFFERSON	JEFFERSON	NECHES	MUNICIPAL	448	453	463	485	517	555
NOME	NOME	JEFFERSON	NECHES	MUNICIPAL	75	77	80	84	90	96
WINNIE & STOWELL	TRINITY BAY CONSERVATION	CHAMBERS	TRINITY	MUNICIPAL	2,262	2,637	3,037	3,488	3,988	4,518
BOLIVAR PENINSULA SUD	CHAMBERS	CHAMBERS	TRINITY	MUNICIPAL	6,000	6,000	6,000	6,000	6,000	6,000
CHAMBERS IRRIGATION	IRRIGATION	CHAMBERS	TRINITY	IRRIGATION	37,000	37,000	37,000	37,000	37,000	37,000
LIBERTY IRRIGATION	IRRIGATION	LIBERTY	TRINITY	IRRIGATION	23,000	23,000	23,000	23,000	23,000	23,000
CITY OF WOODVILLE	WOODVILLE	TRINITY	TRINITY	MUNICIPAL	5,600	5,600	5,600	5,600	5,600	5,600
LOWER NECHES VALLEY AUTHORITY TOTAL DEMAND					**558,908**	**659,539**	**675,455**	**691,216**	**707,414**	**724,316**

LUFKIN

					WWP DEMAND (ACRE-FEET PER YEAR)					
CUSTOMER	**WUG**	**County**	**Basin**	**USE TYPE**	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
CITY OF LUFKIN	LUFKIN	ANGELINA	NECHES	MUNICIPAL	6,271	6,523	6,736	6,979	7,246	7,494
COUNTY-OTHER	COUNTY-OTHER	ANGELINA	NECHES	COUNTY-OTHER	156	165	172	180	186	193
ANGELINA MANUFACTURING	MANUFACTURING	ANGELINA	NECHES	MANUFACTURING	3,050	3,372	3,697	3,987	4,296	4,628
REDLAND WSC	REDLAND WSC	ANGELINA	NECHES	MUNICIPAL	307	307	307	307	307	307
ANGELINA FRESH WATER	COUNTY-OTHER	ANGELINA	NECHES	COUNTY-OTHER	74	74	74	74	74	74
HUNTINGTON	HUNTINGTON	ANGELINA	NECHES	MUNICIPAL	448	448	448	448	448	448
DIBOLL	DIBOLL	ANGELINA	NECHES	MUNICIPAL	1,940	1,940	1,940	1,940	1,940	1,940
WOODLAWN WSC	COUNTY-OTHER	ANGELINA	NECHES	COUNTY-OTHER	221	221	221	221	221	221
STEAM ELECTRIC POWER	STEAM ELECTRIC POWER	ANGELINA	NECHES	STEAM ELECTRIC POWER	16,802	16,802	16,802	16,802	16,802	16,802
ANGELINA IRRIGATION	IRRIGATION	ANGELINA	NECHES	IRRIGATION	481	481	481	481	481	481
LOWER NECHES VALLEY AUTHORITY					28,000	0	0	0	0	0
CITY OF LUFKIN TOTAL DEMAND					**29,749**	**30,332**	**30,878**	**31,418**	**32,000**	**32,588**

CITY OF NACOGDOCHES

					WWP DEMAND (ACRE-FEET PER YEAR)					
CUSTOMER	**WUG**	**County**	**Basin**	**USE TYPE**	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
CITY OF NACOGDOCHES	NACOGDOCHES	NACOGDOCHES	NECHES	MUNICIPAL	6,742	7,376	8,027	8,781	9,638	10,545
NACOGDOCHES MANUFACTURING	NACOGDOCHES	NACOGDOCHES	NECHES	MANUFACTURING	2,564	2,798	3,029	3,228	3,483	3,758

D&M WSC	D&M WSC	NACOGDOCHES	NECHES	MUNICIPAL	258	258	258	258	258	258
APPLEBY WSC	APPLEBY WSC	NACOGDOCHES	NECHES	MUNICIPAL	93	93	93	93	93	93
NACOGDOCHES MUD#1, LILY GROV	COUNTY-OTHER	NACOGDOCHES	NECHES	COUNTY-OTHER	67	67	67	67	67	67
MELROSE WSC	MELROSE WSC	NACOGDOCHES	NECHES	MUNICIPAL	37	37	37	37	37	37
CITY OF NACOGDOCHES TOTAL DEMAND					**9,761**	**10,629**	**11,511**	**12,464**	**13,576**	**14,758**

PANOLA COUNTY FRESH WATER SUPPLY DISTRICT

					WWP DEMAND (ACRE-FEET PER YEAR)					
CUSTOMER	**WUG**	**County**	**Basin**	**USE TYPE**	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
CITY OF CARTHAGE	CARTHAGE	PANOLA	SABINE	MUNICIPAL	13,452	13,452	13,452	13,452	13,452	13,452
PANOLA MINING	PANOLA	PANOLA	SABINE	MINING	3,550	3,515	3,029	2,561	2,172	2,363
PANOLA COUNTY FWSD TOTAL DEMAND					**17,002**	**16,967**	**16,481**	**16,013**	**15,624**	**15,815**

CITY OF PORT ARTHUR

					WWP DEMAND (ACRE-FEET PER YEAR)					
CUSTOMER	**WUG**	**County**	**Basin**	**USE TYPE**	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
CITY OF PORT ARTHUR	PORT ARTHUR	JEFFERSON	NECHES/NECHES-TRINITY	MUNICIPAL	19,805	19,775	19,548	19,501	19,482	19,481
TEXAS PARKS AND WILDLIFE	COUNTY-OTHER	JEFFERSON	NECHES/NECHES-TRINITY	COUNTY-OTHER	5	5	5	5	5	5
MOTIVA	MANUFACTURING	JEFFERSON	NECHES/NECHES-TRINITY	MANUFACTURING	280	280	280	280	280	280
FLINT HILLS RESOURCES	MANUFACTURING	JEFFERSON	NECHES/NECHES-TRINITY	MANUFACTURING	55	55	55	55	55	55
TOTAL PETROCHEMICALS	MANUFACTURING	JEFFERSON	NECHES/NECHES-TRINITY	MANUFACTURING	95	95	95	95	95	95
GOLDEN PASS LNG	MANUFACTURING	JEFFERSON	NECHES/NECHES-TRINITY	MANUFACTURING	28	28	28	28	28	28
BASF TOTAL PETROCHEMICALS	MANUFACTURING	JEFFERSON	NECHES/NECHES-TRINITY	MANUFACTURING	57	57	57	57	57	57
CHENIERE LNG	MANUFACTURING	JEFFERSON	NECHES/NECHES-TRINITY	MANUFACTURING	5,646	5,646	5,646	5,646	5,646	5,646
OTHER	MANUFACTURING	JEFFERSON	NECHES/NECHES-TRINITY	MANUFACTURING	282	282	282	282	282	282
CITY OF PORT ARTHUR TOTAL DEMAND					**26,253**	**26,223**	**25,996**	**25,949**	**25,930**	**25,929**

SABINE RIVER AUTHORITY

					WWP DEMAND (ACRE-FEET PER YEAR)					
CUSTOMER	**WUG**	**County**	**Basin**	**USE TYPE**	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
LOWER BASIN CUSTOMERS										
HEMPHILL		SABINE	SABINE	MUNICIPAL	743	743	743	743	743	743
HUXLEY	COUNTY-OTHER	SHELBY	SABINE	COUNTY-OTHER	280	280	280	280	280	280
TENASKA	STEAM ELECTRIC POWER	RUSK	SABINE	STEAM ELECTRIC POWER	17,922	17,922	17,922	17,922	17,922	17,922
BEECHWOOD WSC	COUNTY-OTHER	SABINE	SABINE	COUNTY-OTHER	190	190	190	190	190	190
EL CAMINO WSC	COUNTY-OTHER	SABINE	SABINE	COUNTY-OTHER	36	36	36	36	36	36
G-M WSC		SABINE	SABINE	MUNICIPAL	560	560	560	560	560	560
XTO	MINING	PANOLA, SHELBY,	SABINE	MINING	7,500	7,500	7,500	7,500	7,500	7,500
INVISTA	MANUFACTURING	ORANGE	SABINE	MANUFACTURING	31	31	31	31	31	31
CANAL (GULF COAST DIVISION) CUSTOMERS										
HONEYWELL	MANUFACTURING	ORANGE	SABINE	MANUFACTURING	1,120	1,120	1,120	1,120	1,120	1,120
CHEVRON PHILLIPS	MANUFACTURING	ORANGE	SABINE	MANUFACTURING	1,841	1,841	1,841	1,841	1,841	1,841
E.I. DUPONT	MANUFACTURING	ORANGE	SABINE	MANUFACTURING	24,643	24,643	24,643	24,643	24,643	24,643
ENTERGY	STEAM ELECTRIC POWER	ORANGE	SABINE	STEAM ELECTRIC POWER	4,481	4,481	4,481	4,481	4,481	4,481
FIRESTONE	MANUFACTURING	ORANGE	SABINE	MANUFACTURING	1,473	1,473	1,473	1,473	1,473	1,473
INTERNATIONAL PAPER	MANUFACTURING	ORANGE	SABINE	MANUFACTURING	22,403	22,403	22,403	22,403	22,403	22,403
GERDAU AMERISTEEL US INC	MANUFACTURING	JEFFERSON	NECHES	MANUFACTURING	1,120	1,120	1,120	1,120	1,120	1,120
LANXESS	MANUFACTURING	ORANGE	SABINE	MANUFACTURING	4,480	4,480	4,480	4,480	4,480	4,480
COTTONWOOD ENERGY	STEAM ELECTRIC POWER	NEWTON	SABINE	STEAM ELECTRIC POWER	13,442	13,442	13,442	13,442	13,442	13,442
ROSE CITY	ROSE CITY	ORANGE	SABINE	MUNICIPAL	478	478	478	478	478	478
ORANGE IRRIGATION	IRRIGATION	ORANGE	SABINE	IRRIGATION	1,255	1,255	1,255	1,255	1,255	1,255
SRA POTENTIAL CUSTOMERS										
LOWER NECHES VALLEY AUTHORIT	MUNICIPAL	JEFFERSON	NECHES	MUNICIPAL				200,000	200,000	200,000
CITY OF CENTER	CENTER	SHELBY	SABINE	MUNICIPAL			2,242	2,242	2,242	2,242
ORANGE IRRIGATION	IRRIGATION	ORANGE	SABINE	IRRIGATION	2,432	2,685	2,858	2,920	2,855	2,758
ORANGE MANUFACTURING	MANUFACTURING	ORANGE	SABINE	MANUFACTURING	3,943	9,890	15,850	21,141	27,092	33,477
ORANGE STEAM ELECTRIC POWER	STEAM ELECTRIC POWER	ORANGE	SABINE	STEAM ELECTRIC POWER	0	14	1,038	2,286	3,807	4,846
NEWTON MINING AND STEAM ELEC	STEAM ELECTRIC POWER	ORANGE	SABINE	STEAM ELECTRIC POWER	805	3,139	5,994	9,545	13,875	19,021
SHELBY LIVESTOCK	LIVESTOCK	SHELBY	SABINE	LIVESTOCK	1,367	2,375	3,602	5,099	6,924	6,924
RUSK STEAM ELECTRIC POWER	STEAM ELECTRIC POWER	RUSK	NECHES	STEAM ELECTRIC POWER	0	0	0	462	8,873	18,868
OTHER POTENTIAL CUSTOMERS IN OTHER REGIONS										
EAST TEXAS TRANSFER		REGION H		MUNICIPAL			250,000	250,000	250,000	250,000
NORTH TEXAS MUNICIPAL WATER DISTRICT		REGION C		MUNICIPAL						100,000
HARRISON MANUFACTURING		REGION D		MANUFACTURING	50,000	55,000	65,000	70,000	80,000	0
HARRISON STEAM ELECTRIC POWER		REGION D		STEAM ELECTRIC POWER	2,000	6,000	10,000	15,000	21,000	47,000
GREENVILLE		REGION D		MUNICIPAL	0	0	0	0	0	9,090
SABINE RIVER AUTHORITY TOTAL DEMAND					**164,545**	**183,101**	**460,582**	**682,693**	**720,666**	**798,224**

CITY OF TYLER

					WWP DEMAND (ACRE-FEET PER YEAR)					
CUSTOMER	**WUG**	**County**	**Basin**	**USE TYPE**	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
CURRENT CUSTOMERS										
CITY OF TYLER	TYLER	SMITH	NECHES	MUNICIPAL	20,049	21,331	22,696	24,331	26,141	28,031

CITY OF TYLER	TYLER	SMITH	NECHES	MANUFACTURING	192	214	239	272	311	359
SMITH MANUFACTURING	MANUFACTURING	SMITH	NECHES	STEAM ELECTRIC POWER	3,072	3,358	3,633	3,866	4,186	4,532
WHITEHOUSE	WHITEHOUSE	SMITH	NECHES	MUNICIPAL	747	747	747	747	747	747
SOUTHERN UTILITIES COMPANY	SOUTHERN UTILITIES COMPA	SMITH	NECHES	COUNTY-OTHER	312	321	332	347	365	384
WALNUT GROVE WATER SYSTEM		SMITH	NECHES	MUNICIPAL	1,495	1,495	1,495	1,495	1,495	1,495
COMMUNITY WATER	COUNTY-OTHER	SMITH	NECHES	COUNTY-OTHER	92	92	92	92	92	92
SMITH IRRIGATION	IRRIGATION	SMITH	NECHES	IRRIGATION	400	400	400	400	400	400
POTENTIAL CUSTOMERS										
BULLARD	BULLARD	SMITH	NECHES	MUNICIPAL	67	239	413	603	799	1,001
CRYSTAL SYSTEMS INC	CRYSTAL SYSTEMS INC	SMITH	NECHES	MUNICIPAL	12	105	219	356	510	642
LINDALE	LINDALE	SMITH	NECHES	MUNICIPAL	52	180	323	490	662	826
SMITH MANUFACTURING	MANUFACTURING	SMITH	NECHES	MANUFACTURING	1,764	1,982	2,192	2,370	2,614	2,879
SMITH MINING	MINING	SMITH	NECHES	MINING	108	113	114	83	54	32
CHANDLER	HENDERSON	HENDERSON	TRINITY	MUNICIPAL	0	0	0	66	176	350
CITY OF TYLER TOTAL DEMAND					**28,362**	**30,578**	**32,895**	**35,518**	**38,552**	**41,770**

UPPER NECHES RIVER MUNICIPAL WATER AUTHORITY

					WWP DEMAND (ACRE-FEET PER YEAR)					
CUSTOMER	**WUG**	**County**	**Basin**	**USE TYPE**	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
CITY OF DALLAS	DALLAS	DALLAS	TRINITY	MUNICIPAL	114,337	114,337	114,337	114,337	114,337	114,337
CITY OF TYLER	TYLER	SMITH	NECHES	MUNICIPAL	67,200	67,200	67,200	67,200	67,200	67,200
CITY OF PALESTINE	PALESTINE	ANDERSON	NECHES	MUNICIPAL	28,000	28,000	28,000	28,000	28,000	28,000
SMITH IRRIGATION	IRRIGATION	SMITH	NECHES	IRRIGATION	82	73	64	57	51	51
CHEROKEE IRRIGATION	IRRIGATION	SMITH	NECHES	IRRIGATION	41	36	32	28	25	25
HENDERSON IRRIGATION	IRRIGATION	SMITH	NECHES	IRRIGATION	82	73	64	57	51	51
EMERALD BAY GOLF COURSE	IRRIGATION	SMITH	NECHES	IRRIGATION	105	105	105	105	105	105
MONARCH UTILITIES	MANUFACTURING	SMITH	NECHES	MANUFACTURING	100	100	100	100	100	100
ARBORGEN SUPER TREE FARM	IRRIGATION	SMITH	NECHES	IRRIGATION	300	300	300	300	300	300
DALLAS (FUTURE CONTRACT)	DALLAS	DALLAS	TRINITY	MUNICIPAL	0	0	0	0	47,250	47,250
UPPER NECHES RIVER MUNICIPAL WATER AUTHORITY TOTAL DEMAND					**210,247**	**210,224**	**210,202**	**210,184**	**257,419**	**257,419**

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Attachment D

Model to Calculate Rice Water Use and Total Irrigation for Southeastern Rice-Producing Counties

Line	Parameter	Units	2010/2011	2020	2030	2040	2050	2060	2070
1	U.S. Rice Production[1]	lbs	25,000,000,000	27,524,411,927	30,055,052,023	32,352,245,997	34,260,849,768	35,655,796,001	36,786,440,837
2	% Global Rice Produced by U.S.[2]	%	2%	2%	2%	2%	2%	2%	2%
3	Global Rice Demand[3]	lbs	1,250,000,000,000	1,376,220,596,352	1,502,752,601,133	1,617,612,299,871	1,713,042,488,396	1,782,789,800,049	1,839,322,041,874
4	Global Population Projections[4]	People	7,084,321,722	7,799,671,572	8,516,786,316	9,167,748,763	9,708,595,289	10,103,885,205	10,424,279,276
5	Per-Capita Rice Demands[5]	lbs/person	176	176	176	176	176	176	176
6	Per Acre Yields[6]	lbs/acre	6,969	7,606	8,315	9,024	9,733	10,441	11,150
7	Texas Rice Production[7]	lbs	1,266,707,900	1,394,615,601	1,522,838,873	1,639,233,824	1,735,939,562	1,806,619,139	1,863,907,009
8	% Global Rice Produced by Texas[8]	%	0.1013%	0.1013%	0.1013%	0.1013%	0.1013%	0.1013%	0.1013%
9	**Western and Other Rice-Producing Counties[9]**								
10	Rice Irrigation Demands[10]	af/yr	595,021	575,004	554,987	534,970	514,953	494,936	474,919
11	Estimated Gross Irrigation Rate[11]	in/yr	56.0	56.0	56.0	56.0	56.0	56.0	56.0
12	Rice-Planted Acreage[12]	acres	127,505	123,215	118,926	114,636	110,347	106,058	101,768
13	Rice Production[13]	lbs	888,579,109	937,174,377	988,867,908	1,034,479,131	1,074,008,046	1,107,348,595	1,134,717,182
14	**Southeastern Rice-Producing Counties[14]**								
15	Rice Production[15]	lbs	378,128,791	457,441,225	533,970,965	604,754,692	661,931,516	699,270,544	729,189,827
16	Rice-Planted Acreage[16]	acres	54,259	60,142	64,218	67,016	68,009	66,974	65,398
17	Estimated Gross Irrigation Rate[17]	in/yr	60.0	60.0	60.0	60.0	60.0	60.0	60.0
18	Rice Irrigation Demands[18]	af/yr	271,293	300,711	321,089	335,081	340,045	334,868	326,991
19	**Rice Irrigation Demand for Region I Rice-Producing Counties[19]**								
20	Hardin County	af/yr	2,159	2,393	2,555	2,666	2,706	2,665	2,602
21	Jefferson County	af/yr	121,928	135,149	144,307	150,596	152,827	150,500	146,960
22	Orange County	af/yr	3,365	3,730	3,983	4,156	4,218	4,153	4,056
23	**Proposed Irrigation Revisions for Region I Rice-Producing Counties[20]**								
24	Hardin County	af/yr	3,080	3,414	3,645	3,804	3,861	3,802	3,712
25	Jefferson County	af/yr	122,652	135,952	145,165	151,490	153,735	151,394	147,833
26	Orange County	af/yr	3,365	3,730	3,983	4,156	4,218	4,153	4,056

Footnotes:

[1] **U.S. Rice Production**. The 2010 total production was sourced from the *USDA Agricultural Projections to 2021.* Decadal Projections for 2020-2070 were calculated by multiplying global rice demand (Line 3) by the percent of global rice produced by the U.S. (Line 2).

[2] **Percent Global Rice Produced by U.S**. The current percentage of global rice demand met by U.S. production is 2%, as sourced from the USDA Rice Projections 2008-17 Market Outlook. This percentage has been held constant throughout the planning period, based on information provided by Dr. Lloyd T. (Ted) Wilson of the AgriLife Research & Extension Center in Beaumont, Texas.

[3] **Global Rice Demand**. The 2010 global rice demand value was determined by dividing the 2010 U.S. rice production (Line 1) by the 2010 percent U.S. rice production (Line 2). Decadal values for 2020-2070 were then determined by multiplying the per-capita rice production value for each decade (Line 5) by the global population projection (Line 4) for the same decade.

[4] **Global Population Projections**. Population projections for each decade were sourced from the United Nations Department of Economic and Social Affairs.

[5] **Per-Capita Rice Demand**. The 2010 estimated per-capita demand for rice was determined by dividing the global rice demand in 2010 (Line 3) by the 2010 global population. The per-capita value for all decades was assumed to be constant and was established at the 2010 value.

[6] **Per Acre Yields**. The 2011 per-acre yield (Yield) was sourced from the AgriLife Research Document. Based on personal correspondence with Dr. Wilson, yields are expected to increase by 60% over the planning period, enabling an estimate of the yield for 2070 at 1.6 X Yield for 2011. Decadal values for 2020-2060 were determined by linear interpolation between the 2011 and 2070 values.

[7] **Texas Rice Production**. The 2011 Texas rice production was sourced from the AgriLife Research Document. Decadal projections for 2020-2070 were calculated by multiplying the global rice demand (Line 3) by the Texas contribution to the global rice market (Line 8).

[8] **Percent Global Rice Produced by Texas**. The current percentage of rice produced by Texas for the global market was calculated by dividing the 2010 Texas Rice Production (Line 7) by the 2010 Global Rice Demand (Line 3). This value was held constant throughout the planning period.

[9] **Western and Other Rice-Producing Counties.** These counties include all rice-producing counties in Regions D, G, K, L, and P, Harris County, and all rice-producing Region H counties west of Harris County. Table 3 in the Technical Memorandum identifies these 18 counties. Lines 10-13 provide relevant model inputs for Western and Other Rice-Producing Counties.

[10] **Rice Irrigation Demands for Western and Other Rice-Producing Counties.** The 2010 rice irrigation demand value was determined by summing the average historical rice water use estimates (2005-2010) for Western and Other Rice-Producing Counties. Decadal water use projections from 2020 to 2070 were provided by the TWDB for these counties. The Western and Other Rice-Producing Counties projections for each decade were summed to determine Western and Other Rice-Producing Counties irrigation demands for each decade.

[11] **Estimated Gross Irrigation Rate for Western and Other Rice-Producing Counties**. The irrigation rates for the Western and Other Rice-Producing Counties were estimated based on historical rice irrigation rates for each county provided by the TWDB (51 in/yr), coupled with an approximate 10% increase to allow for drought-year planning.

[12] **Rice-Planted Acreage for Western and Other Rice-Producing Counties**. Decadal values were determined by multiplying the rice irrigation demands (Line 10) by 12 and dividing by the average gross irrigation rate (Line 11).

[13] **Rice Production for Western and Other Rice-Producing Counties**. Decadal values were determined by multiplying the rice planted acres (Line 11) by the yield for each decade (Line 6).

[14] **Southeastern Rice-Producing Counties.** The Southeastern Rice-Producing Counties are located east of Harris County in Regions H and I. Included are Hardin, Jefferson, and Orange Counties (Region I), and Chambers and Liberty Counties (Region H). Lines 15-18 provide relevant model inputs for Southeastern Rice-Producing Counties.

[15] **Rice Production for Southeastern Rice-Producing Counties**. Decadal values were calculated by subtracting Rice Production for Western and Other Rice-Producing Counties (Line 13) from Texas Rice Production (Line 7).

[16] **Rice-Planted Acreage for Southeastern Rice-Producing Counties**. Decadal values were calculated by dividing the rice production for Southeastern Rice-Producing Counties (Line 15) by the yield for each decade (Line 6).

[17] **Estimated Gross Irrigation Rate for Southeastern Rice-Producing Counties**. The irrigation rates for the Southeastern Rice-Producing Counties were estimated based on historical rice irrigation rates for each county provided by the TWDB (55 in/yr), coupled with an approximate 10% increase to allow for drought-year planning.

[18] **Rice Irrigation Demands for Southeastern Rice-Producing Counties**. Calculated by multiplying the rice-planted acreage (Line 16) by the average gross irrigation rate for Southeastern Rice-Producing Counties (Line 17)

[19] **Rice Irrigation Demand for Region I Rice-Producing Counties.** Historical (2005-2010) irrigation use estimates were provided by the TWDB and averaged for each rice-producing county. The proportion of rice irrigation water use that each Region I county represents was determined by dividing the average irrigation water use for each county by the total for the Southeastern Rice-Producing Counties. This proportion was multiplied by the decadal Southeastern rice-producing counties rice water demands (Line 18) to calculate the county-specific rice water use for Hardin, Jefferson, and Orange Counties. These values represent the county-specific water demands for only the production of rice.

[20] **Proposed Irrigation Revisions for Region I Rice-Producing Counties**. Calculated by dividing the county-specific rice irrigation demands (Lines 20, 21, and 22) by the percentage of rice-related water demands (in Table 1 of the Technical Memorandum) for each county. This value represents the proposed total irrigation demands for irrigating golf courses and growing crops such as vegetables, hay, grapes, orchards, and rice.

Appendix 3-A

Water Availability DB17 Report

The following appendix includes a copy of the Water Availability data from the TWDB Data Web Interface known as the DB17. The summary is divided by source, county, basin, and salinity.

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Source Availability

REGION I

GROUNDWATER	COUNTY	BASIN	SALINITY	SOURCE AVAILABILITY (ACRE-FEET PER YEAR)					
				2020	2030	2040	2050	2060	2070
CARRIZO-WILCOX AQUIFER	ANDERSON	NECHES	FRESH	4,393	4,393	4,393	4,393	4,393	4,393
CARRIZO-WILCOX AQUIFER	ANDERSON	TRINITY	FRESH	5,684	5,684	5,684	5,684	5,684	5,684
CARRIZO-WILCOX AQUIFER	ANGELINA	NECHES	FRESH	26,414	26,414	26,414	26,414	26,414	26,414
CARRIZO-WILCOX AQUIFER	CHEROKEE	NECHES	FRESH	11,222	11,222	11,222	11,222	11,222	11,222
CARRIZO-WILCOX AQUIFER	HENDERSON	NECHES	FRESH	3,999	3,999	3,999	3,999	3,999	3,999
CARRIZO-WILCOX AQUIFER	HOUSTON	NECHES	FRESH	1,924	1,924	1,924	1,924	1,924	1,924
CARRIZO-WILCOX AQUIFER	HOUSTON	TRINITY	FRESH	3,432	3,432	3,432	3,432	3,432	3,432
CARRIZO-WILCOX AQUIFER	NACOGDOCHES	NECHES	FRESH	21,385	21,385	21,385	21,385	21,385	21,385
CARRIZO-WILCOX AQUIFER	PANOLA	CYPRESS	FRESH	6	6	6	6	6	6
CARRIZO-WILCOX AQUIFER	PANOLA	SABINE	FRESH	8,221	8,221	8,063	8,063	8,063	8,063
CARRIZO-WILCOX AQUIFER	RUSK	NECHES	FRESH	11,776	11,766	11,766	11,766	11,747	11,747
CARRIZO-WILCOX AQUIFER	RUSK	SABINE	FRESH	9,067	9,067	9,067	9,067	9,067	9,067
CARRIZO-WILCOX AQUIFER	SABINE	NECHES	FRESH	1,254	1,254	1,254	1,254	1,254	1,254
CARRIZO-WILCOX AQUIFER	SABINE	SABINE	FRESH	5,604	5,604	5,604	5,604	5,604	5,604
CARRIZO-WILCOX AQUIFER	SAN AUGUSTINE	NECHES	FRESH	1,490	1,490	1,490	1,490	1,490	1,490
CARRIZO-WILCOX AQUIFER	SAN AUGUSTINE	SABINE	FRESH	291	291	291	291	291	291
CARRIZO-WILCOX AQUIFER	SHELBY	NECHES	FRESH	2,736	2,578	2,288	2,152	2,019	2,019
CARRIZO-WILCOX AQUIFER	SHELBY	SABINE	FRESH	8,481	8,323	8,159	8,159	7,710	7,710
CARRIZO-WILCOX AQUIFER	SMITH	NECHES	FRESH	21,004	21,004	21,004	21,004	21,004	21,004
CARRIZO-WILCOX AQUIFER	TRINITY	NECHES	FRESH	1,114	1,114	1,114	1,114	1,114	1,114
GULF COAST AQUIFER	HARDIN	NECHES	FRESH	34,821	34,821	34,821	34,821	34,821	34,821
GULF COAST AQUIFER	HARDIN	TRINITY	FRESH	138	138	138	138	138	138
GULF COAST AQUIFER	JASPER	NECHES	FRESH	37,620	37,541	37,541	37,541	37,541	37,541
GULF COAST AQUIFER	JASPER	SABINE	FRESH	29,953	29,953	29,953	29,953	29,953	29,953
GULF COAST AQUIFER	JEFFERSON	NECHES	FRESH	804	804	804	804	804	804
GULF COAST AQUIFER	JEFFERSON	NECHES-TRINITY	FRESH	1,641	1,641	1,641	1,641	1,641	1,641
GULF COAST AQUIFER	NEWTON	NECHES	FRESH	176	176	176	176	176	176
GULF COAST AQUIFER	NEWTON	SABINE	FRESH	34,001	33,963	33,963	33,963	33,963	33,963
GULF COAST AQUIFER	ORANGE	NECHES	FRESH	3,925	3,925	3,925	3,925	3,925	3,925
GULF COAST AQUIFER	ORANGE	NECHES-TRINITY	FRESH	256	256	256	256	256	256
GULF COAST AQUIFER	ORANGE	SABINE	FRESH	15,832	15,832	15,832	15,832	15,832	15,832
GULF COAST AQUIFER	POLK	NECHES	FRESH	11,886	11,886	11,886	11,276	11,224	11,224

Source Availability

REGION I

GROUNDWATER	COUNTY	BASIN	SALINITY	SOURCE AVAILABILITY (ACRE-FEET PER YEAR)					
				2020	2030	2040	2050	2060	2070
GULF COAST AQUIFER	TYLER	NECHES	FRESH	38,199	38,156	38,156	38,156	38,156	38,156
OTHER AQUIFER | UNDIFFERENTIATED	ANDERSON	TRINITY	FRESH	298	298	298	298	298	298
OTHER AQUIFER | UNDIFFERENTIATED	ANGELINA	NECHES	FRESH	812	812	812	812	812	812
OTHER AQUIFER | UNDIFFERENTIATED	CHEROKEE	NECHES	FRESH	268	268	268	268	268	268
OTHER AQUIFER | UNDIFFERENTIATED	HENDERSON	NECHES	FRESH	5	5	5	5	5	5
OTHER AQUIFER | UNDIFFERENTIATED	HENDERSON	TRINITY	FRESH	680	680	680	680	680	680
OTHER AQUIFER | UNDIFFERENTIATED	HOUSTON	NECHES	FRESH	378	378	378	378	378	378
OTHER AQUIFER | UNDIFFERENTIATED	HOUSTON	TRINITY	FRESH	888	888	888	888	888	888
OTHER AQUIFER | UNDIFFERENTIATED	NACOGDOCHES	NECHES	FRESH	1,131	1,131	1,131	1,131	1,131	1,131
OTHER AQUIFER | UNDIFFERENTIATED	POLK	NECHES	FRESH	1,270	1,270	1,270	1,270	1,270	1,270
OTHER AQUIFER | UNDIFFERENTIATED	RUSK	NECHES	FRESH	270	270	270	270	270	270
OTHER AQUIFER | UNDIFFERENTIATED	RUSK	SABINE	FRESH	469	469	469	469	469	469
OTHER AQUIFER | UNDIFFERENTIATED	SABINE	SABINE	FRESH	336	336	336	336	336	336
OTHER AQUIFER | UNDIFFERENTIATED	SAN AUGUSTINE	NECHES	FRESH	1,395	1,395	1,395	1,395	1,395	1,395
OTHER AQUIFER | UNDIFFERENTIATED	SMITH	NECHES	FRESH	922	922	922	922	922	922
OTHER AQUIFER | UNDIFFERENTIATED	TRINITY	NECHES	FRESH	700	700	700	700	700	700
QUEEN CITY AQUIFER	ANDERSON	NECHES	FRESH	9,762	9,762	9,762	9,762	9,762	9,762
QUEEN CITY AQUIFER	ANDERSON	TRINITY	FRESH	9,039	9,039	9,039	9,039	9,039	9,039
QUEEN CITY AQUIFER	ANGELINA	NECHES	FRESH	1,093	1,093	1,093	1,093	1,093	1,093
QUEEN CITY AQUIFER	CHEROKEE	NECHES	FRESH	22,396	22,396	22,396	22,396	22,396	22,396
QUEEN CITY AQUIFER	HENDERSON	NECHES	FRESH	12,316	12,316	12,316	12,316	12,316	12,316
QUEEN CITY AQUIFER	HOUSTON	NECHES	FRESH	131	131	131	131	131	131
QUEEN CITY AQUIFER	HOUSTON	TRINITY	FRESH	279	279	279	279	279	279
QUEEN CITY AQUIFER	NACOGDOCHES	NECHES	FRESH	5,002	5,002	5,002	5,002	5,002	5,002
QUEEN CITY AQUIFER	RUSK	NECHES	FRESH	40	40	40	40	40	40
QUEEN CITY AQUIFER	RUSK	SABINE	FRESH	18	18	18	18	18	18
QUEEN CITY AQUIFER	SAN AUGUSTINE	NECHES	FRESH	7	7	7	7	7	7
QUEEN CITY AQUIFER	SAN AUGUSTINE	SABINE	FRESH	0	0	0	0	0	0
QUEEN CITY AQUIFER	SMITH	NECHES	FRESH	28,259	28,259	28,259	28,259	28,259	28,259
QUEEN CITY AQUIFER	TRINITY	NECHES	FRESH	0	0	0	0	0	0
SPARTA AQUIFER	ANDERSON	NECHES	FRESH	344	344	344	344	344	344
SPARTA AQUIFER	ANDERSON	TRINITY	FRESH	272	272	272	272	272	272
SPARTA AQUIFER	ANGELINA	NECHES	FRESH	689	689	689	689	689	689
SPARTA AQUIFER	CHEROKEE	NECHES	FRESH	359	359	359	359	359	359
SPARTA AQUIFER	HOUSTON	NECHES	FRESH	302	302	302	302	302	302

Source Availability

REGION I

GROUNDWATER	COUNTY	BASIN	SALINITY	SOURCE AVAILABILITY (ACRE-FEET PER YEAR)					
				2020	2030	2040	2050	2060	2070
SPARTA AQUIFER	HOUSTON	TRINITY	FRESH	594	594	594	594	594	594
SPARTA AQUIFER	NACOGDOCHES	NECHES	FRESH	409	409	409	409	409	409
SPARTA AQUIFER	SABINE	NECHES	FRESH	61	61	61	61	61	61
SPARTA AQUIFER	SABINE	SABINE	FRESH	235	235	235	235	235	235
SPARTA AQUIFER	SAN AUGUSTINE	NECHES	FRESH	202	202	202	202	202	202
SPARTA AQUIFER	SAN AUGUSTINE	SABINE	FRESH	3	3	3	3	3	3
SPARTA AQUIFER	TRINITY	NECHES	FRESH	313	313	313	313	313	313
YEGUA-JACKSON AQUIFER	ANGELINA	NECHES	FRESH	16,890	16,890	16,890	16,890	16,507	16,507
YEGUA-JACKSON AQUIFER	HOUSTON	NECHES	FRESH	1,324	1,324	1,324	1,324	1,324	1,324
YEGUA-JACKSON AQUIFER	HOUSTON	TRINITY	FRESH	4,061	4,061	4,061	4,061	4,061	4,061
YEGUA-JACKSON AQUIFER	NACOGDOCHES	NECHES	FRESH	235	235	235	235	235	235
YEGUA-JACKSON AQUIFER	POLK	NECHES	FRESH	360	360	360	360	360	360
YEGUA-JACKSON AQUIFER	SABINE	NECHES	FRESH	3,724	3,724	3,724	3,724	3,724	3,724
YEGUA-JACKSON AQUIFER	SABINE	SABINE	FRESH	575	575	575	575	575	575
YEGUA-JACKSON AQUIFER	SAN AUGUSTINE	NECHES	FRESH	2,102	2,102	2,102	2,102	2,102	2,102
YEGUA-JACKSON AQUIFER	SAN AUGUSTINE	SABINE	FRESH	9	9	9	9	9	9
YEGUA-JACKSON AQUIFER	TRINITY	NECHES	FRESH	700	700	700	700	700	700
GROUNDWATER TOTAL SOURCE AVAILABILITY				**490,676**	**490,190**	**489,578**	**488,832**	**487,796**	**487,796**

REGION I

REUSE	COUNTY	BASIN	SALINITY	SOURCE AVAILABILITY (ACRE-FEET PER YEAR)					
				2020	2030	2040	2050	2060	2070
DIRECT REUSE	ORANGE	SABINE	FRESH	15	15	15	15	15	15
DIRECT REUSE | IRRIGATION/MANUFACTURING	SHELBY	SABINE	FRESH	233	246	259	270	284	299
DIRECT REUSE | MANUFACTURING	SABINE	SABINE	FRESH	20	20	20	20	20	20
INDIRECT REUSE | IRRIGATION	JEFFERSON	NECHES-TRINITY	FRESH	13,687	13,687	13,687	13,687	13,687	13,687
REUSE TOTAL SOURCE AVAILABILITY				**13,955**	**13,968**	**13,981**	**13,992**	**14,006**	**14,021**

REGION I

SURFACE WATER	COUNTY	BASIN	SALINITY	SOURCE AVAILABILITY (ACRE-FEET PER YEAR)					
				2020	2030	2040	2050	2060	2070
ATHENS LAKE/RESERVOIR	RESERVOIR	NECHES	FRESH	5,983	5,903	5,822	5,741	5,660	5,580
BELLWOOD LAKE/RESERVOIR	RESERVOIR	NECHES	FRESH	950	950	950	950	950	950
CENTER LAKE/RESERVOIR	RESERVOIR	SABINE	FRESH	1,874	1,874	1,874	1,874	1,874	1,874
CHEROKEE LAKE/RESERVOIR	RESERVOIR	SABINE	FRESH	28,650	28,415	28,180	27,945	27,710	27,477

Source Availability

REGION I

SURFACE WATER	COUNTY	BASIN	SALINITY	SOURCE AVAILABILITY (ACRE-FEET PER YEAR)					
				2020	2030	2040	2050	2060	2070
CYPRESS LIVESTOCK LOCAL SUPPLY	PANOLA	CYPRESS	FRESH	30	30	30	30	30	30
HOUSTON COUNTY LAKE/RESERVOIR	RESERVOIR	TRINITY	FRESH	7,000	7,000	7,000	7,000	7,000	7,000
JACKSONVILLE LAKE/RESERVOIR	RESERVOIR	NECHES	FRESH	6,200	6,200	6,200	6,200	6,200	6,200
KURTH LAKE/RESERVOIR	RESERVOIR	NECHES	FRESH	18,417	18,413	18,408	18,404	18,400	18,396
LAKE NACONICHE/RESERVOIR	RESERVOIR	NECHES	FRESH	4,500	4,500	4,500	4,500	4,500	4,500
MARTIN LAKE/RESERVOIR	RESERVOIR	SABINE	FRESH	25,000	25,000	25,000	25,000	25,000	25,000
MURVAUL LAKE/RESERVOIR	RESERVOIR	SABINE	FRESH	21,203	20,615	20,027	19,438	18,850	18,279
NACOGDOCHES LAKE/RESERVOIR	RESERVOIR	NECHES	FRESH	16,683	16,300	15,917	15,533	15,150	14,776
NECHES LIVESTOCK LOCAL SUPPLY	ANDERSON	NECHES	FRESH	333	333	333	333	333	333
NECHES LIVESTOCK LOCAL SUPPLY	ANGELINA	NECHES	FRESH	661	661	661	661	661	661
NECHES LIVESTOCK LOCAL SUPPLY	CHEROKEE	NECHES	FRESH	1,555	1,555	1,555	1,555	1,555	1,555
NECHES LIVESTOCK LOCAL SUPPLY	HARDIN	NECHES	FRESH	155	155	155	155	155	155
NECHES LIVESTOCK LOCAL SUPPLY	HENDERSON	NECHES	FRESH	770	770	770	770	770	770
NECHES LIVESTOCK LOCAL SUPPLY	HOUSTON	NECHES	FRESH	1,007	1,007	1,007	1,007	1,007	1,007
NECHES LIVESTOCK LOCAL SUPPLY	JASPER	NECHES	FRESH	332	332	332	332	332	332
NECHES LIVESTOCK LOCAL SUPPLY	NACOGDOCHES	NECHES	FRESH	2,386	2,386	2,386	2,386	2,386	2,386
NECHES LIVESTOCK LOCAL SUPPLY	ORANGE	NECHES	FRESH	56	56	56	56	56	56
NECHES LIVESTOCK LOCAL SUPPLY	POLK	NECHES	FRESH	396	396	396	396	396	396
NECHES LIVESTOCK LOCAL SUPPLY	RUSK	NECHES	FRESH	808	808	808	808	808	808
NECHES LIVESTOCK LOCAL SUPPLY	SABINE	NECHES	FRESH	71	71	71	71	71	71
NECHES LIVESTOCK LOCAL SUPPLY	SAN AUGUSTINE	NECHES	FRESH	465	465	465	465	465	465
NECHES LIVESTOCK LOCAL SUPPLY	SHELBY	NECHES	FRESH	334	334	334	334	334	334
NECHES LIVESTOCK LOCAL SUPPLY	SMITH	NECHES	FRESH	605	605	605	605	605	605
NECHES LIVESTOCK LOCAL SUPPLY	TRINITY	NECHES	FRESH	449	449	449	449	449	449
NECHES LIVESTOCK LOCAL SUPPLY	TYLER	NECHES	FRESH	239	239	239	239	239	239
NECHES OTHER LOCAL SUPPLY	CHEROKEE	NECHES	FRESH	19	19	19	19	19	19
NECHES OTHER LOCAL SUPPLY	JEFFERSON	NECHES	FRESH	110	110	110	110	110	110
NECHES OTHER LOCAL SUPPLY	NACOGDOCHES	NECHES	FRESH	494	494	494	494	494	494
NECHES OTHER LOCAL SUPPLY	POLK	NECHES	FRESH	20	20	20	20	20	20

Source Availability

REGION I

SURFACE WATER	COUNTY	BASIN	SALINITY	SOURCE AVAILABILITY (ACRE-FEET PER YEAR)					
				2020	2030	2040	2050	2060	2070
NECHES OTHER LOCAL SUPPLY	TYLER	NECHES	FRESH	8	8	8	8	8	8
NECHES RUN-OF-RIVER	ANDERSON	NECHES	FRESH	197	197	197	197	197	197
NECHES RUN-OF-RIVER	ANGELINA	NECHES	FRESH	74	74	74	74	74	74
NECHES RUN-OF-RIVER	CHEROKEE	NECHES	FRESH	182	182	182	182	182	182
NECHES RUN-OF-RIVER	HARDIN	NECHES	FRESH	57	57	57	57	57	57
NECHES RUN-OF-RIVER	HOUSTON	NECHES	FRESH	287	287	287	287	287	287
NECHES RUN-OF-RIVER	JASPER	NECHES	FRESH	743	743	743	743	743	743
NECHES RUN-OF-RIVER	JEFFERSON	NECHES	BRACKISH	752,152	752,152	752,152	752,152	752,152	752,152
NECHES RUN-OF-RIVER	NACOGDOCHES	NECHES	FRESH	136	136	136	136	136	136
NECHES RUN-OF-RIVER	ORANGE	NECHES	BRACKISH	17,310	17,310	17,310	17,310	17,310	17,310
NECHES RUN-OF-RIVER	RUSK	NECHES	FRESH	88	88	88	88	88	88
NECHES RUN-OF-RIVER	SABINE	NECHES	FRESH	182	182	182	182	182	182
NECHES RUN-OF-RIVER	SMITH	NECHES	FRESH	50	50	50	50	50	50
NECHES RUN-OF-RIVER	TRINITY	NECHES	FRESH	62	62	62	62	62	62
NECHES RUN-OF-RIVER	TYLER	NECHES	FRESH	123	123	123	123	123	123
NECHES RUN-OF-RIVER | ANGELINA & NECHES RIVER AUTHORITY	SHELBY	NECHES	FRESH	1,000	1,000	1,000	1,000	1,000	1,000
NECHES RUN-OF-RIVER | BEAUMONT	JEFFERSON	NECHES	FRESH	15,933	16,732	17,670	18,877	20,307	21,588
NECHES RUN-OF-RIVER | PINE ISLAND BAYOU	JASPER	NECHES	FRESH	381,876	381,876	381,876	381,876	381,876	381,876
NECHES-TRINITY LIVESTOCK LOCAL SUPPLY	JEFFERSON	NECHES-TRINITY	FRESH	800	800	800	800	800	800
NECHES-TRINITY OTHER LOCAL SUPPLY	JEFFERSON	NECHES-TRINITY	FRESH	1,000	1,000	1,000	1,000	1,000	1,000
NECHES-TRINITY RUN-OF-RIVER	JEFFERSON	NECHES-TRINITY	FRESH	55,940	55,940	55,940	55,940	55,940	55,940
PALESTINE LAKE/RESERVOIR	RESERVOIR	NECHES	FRESH	205,417	203,375	201,333	199,292	197,250	195,229
PINKSTON LAKE/RESERVOIR	RESERVOIR	NECHES	FRESH	3,800	3,800	3,800	3,800	3,800	3,800
RUSK CITY LAKE/RESERVOIR	RESERVOIR	NECHES	FRESH	63	63	62	61	60	59
SABINE LIVESTOCK LOCAL SUPPLY	JASPER	SABINE	FRESH	215	215	215	215	215	215
SABINE LIVESTOCK LOCAL SUPPLY	NEWTON	SABINE	FRESH	155	155	155	155	155	155
SABINE LIVESTOCK LOCAL SUPPLY	ORANGE	SABINE	FRESH	42	42	42	42	42	42
SABINE LIVESTOCK LOCAL SUPPLY	PANOLA	SABINE	FRESH	1,224	1,224	1,224	1,224	1,224	1,224
SABINE LIVESTOCK LOCAL SUPPLY	RUSK	SABINE	FRESH	308	308	308	308	308	308
SABINE LIVESTOCK LOCAL SUPPLY	SABINE	SABINE	FRESH	634	634	634	634	634	634
SABINE LIVESTOCK LOCAL SUPPLY	SAN AUGUSTINE	SABINE	FRESH	71	71	71	71	71	71
SABINE LIVESTOCK LOCAL SUPPLY	SHELBY	SABINE	FRESH	2,998	2,998	2,998	2,998	2,998	2,998

Source Availability

REGION I

SURFACE WATER	COUNTY	BASIN	SALINITY	SOURCE AVAILABILITY (ACRE-FEET PER YEAR)					
				2020	2030	2040	2050	2060	2070
SABINE OTHER LOCAL SUPPLY	NEWTON	SABINE	FRESH	158	158	158	158	158	158
SABINE OTHER LOCAL SUPPLY	ORANGE	SABINE	FRESH	178	178	178	178	178	178
SABINE OTHER LOCAL SUPPLY	RUSK	SABINE	FRESH	1,230	1,230	1,230	1,230	1,230	1,230
SABINE RUN-OF-RIVER	NEWTON	SABINE	FRESH	185	185	185	185	185	185
SABINE RUN-OF-RIVER	ORANGE	SABINE	FRESH	28	28	28	28	28	28
SABINE RUN-OF-RIVER	ORANGE	SABINE	BRACKISH	267,000	267,000	267,000	267,000	267,000	267,000
SABINE RUN-OF-RIVER	PANOLA	SABINE	FRESH	601	601	601	601	601	601
SABINE RUN-OF-RIVER	RUSK	SABINE	FRESH	137	137	137	137	137	137
SABINE RUN-OF-RIVER | SRA CANAL	NEWTON	SABINE	FRESH	147,100	147,100	147,100	147,100	147,100	147,100
SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	FRESH	848,000	848,000	848,000	848,000	848,000	848,000
SAN AUGUSTINE LAKE/RESERVOIR	RESERVOIR	NECHES	FRESH	1,285	1,285	1,285	1,285	1,285	1,285
STRIKER LAKE/RESERVOIR	RESERVOIR	NECHES	FRESH	19,357	18,530	17,703	16,877	16,050	15,264
TIMPSON LAKE/RESERVOIR	RESERVOIR	NECHES	FRESH	350	350	350	350	350	350
TOLEDO BEND LAKE/RESERVOIR	RESERVOIR	SABINE	FRESH	750,000	750,000	750,000	750,000	750,000	750,000
TOLEDO BEND LAKE/RESERVOIR | LOUISIANA PORTION	RESERVOIR	SABINE-LOUISIANA	FRESH	336	336	336	336	336	336
TRINITY LIVESTOCK LOCAL SUPPLY	ANDERSON	TRINITY	FRESH	684	684	684	684	684	684
TRINITY LIVESTOCK LOCAL SUPPLY	HOUSTON	TRINITY	FRESH	783	783	783	783	783	783
TRINITY RUN-OF-RIVER	ANDERSON	TRINITY	FRESH	1,060	1,060	1,060	1,060	1,060	1,060
TRINITY RUN-OF-RIVER	HOUSTON	TRINITY	FRESH	1,783	1,783	1,783	1,783	1,783	1,783
TYLER LAKE/RESERVOIR	RESERVOIR	NECHES	FRESH	30,900	30,875	30,850	30,825	30,800	30,775
SURFACE WATER TOTAL SOURCE AVAILABILITY				**3,662,037**	**3,658,652**	**3,655,403**	**3,652,424**	**3,649,668**	**3,646,854**
REGION I TOTAL SOURCE AVAILABILITY				**4,166,668**	**4,162,810**	**4,158,962**	**4,155,248**	**4,151,470**	**4,148,671**

Appendix 3-B

Water User Group Existing Water Supplies

DB17 Report

The following appendix includes a copy of the Water User Group Existing Water Supplies data from the TWDB Data Web Interface known as the DB17. The summary is divided by Water User Group, source, county, and basin.

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Water User Group (WUG) Existing Water Supply

REGION I	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
		2020	2030	2040	2050	2060	2070
ANDERSON COUNTY							
NECHES BASIN							
BRUSHY CREEK WSC	I | CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	296	296	296	296	296	296
FRANKSTON	I | CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	388	382	378	372	366	360
PALESTINE	I | CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	366	404	397	377	373	373
PALESTINE	I | PALESTINE LAKE/RESERVOIR	2,222	2,222	2,223	2,223	2,223	2,223
WALSTON SPRINGS WSC	I | CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	299	299	299	299	299	299
COUNTY-OTHER	I | CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	249	250	239	228	226	226
COUNTY-OTHER	I | PALESTINE LAKE/RESERVOIR	47	47	47	47	47	47
COUNTY-OTHER	I | QUEEN CITY AQUIFER | ANDERSON COUNTY	466	466	466	466	466	466
COUNTY-OTHER	I | SPARTA AQUIFER | ANDERSON COUNTY	163	163	163	163	163	163
MANUFACTURING	I | CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	14	18	19	20	21	22
MINING	I | CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	64	81	85	68	48	35
STEAM ELECTRIC POWER		0	0	0	0	0	0
LIVESTOCK	I | CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	14	14	14	14	14	14
LIVESTOCK	I | NECHES LIVESTOCK LOCAL SUPPLY	333	333	333	333	333	333
LIVESTOCK	I | QUEEN CITY AQUIFER | ANDERSON COUNTY	301	301	301	301	301	301
IRRIGATION	I | CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	124	124	124	124	124	124
IRRIGATION	I | NECHES RUN-OF-RIVER	197	197	197	197	197	197
IRRIGATION	I | QUEEN CITY AQUIFER | ANDERSON COUNTY	149	149	149	149	149	149
NECHES BASIN TOTAL EXISTING SUPPLY		**5,692**	**5,746**	**5,730**	**5,677**	**5,646**	**5,628**
TRINITY BASIN							
BRUSHY CREEK WSC	I | CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	382	382	382	382	382	382
ELKHART	I | CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	428	428	428	428	428	428
PALESTINE	I | CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	348	383	376	357	354	354
PALESTINE	I | PALESTINE LAKE/RESERVOIR	2,109	2,109	2,108	2,108	2,108	2,108
WALSTON SPRINGS WSC	I | CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	117	116	113	111	111	111
FOUR PINES WSC	I | CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	549	549	549	549	549	549
THE CONSOLIDATED WSC	I | CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	254	254	254	254	254	254
THE CONSOLIDATED WSC	I | HOUSTON COUNTY LAKE/RESERVOIR	102	104	103	102	100	98
COUNTY-OTHER	I | CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	2,335	2,339	2,303	2,265	2,257	2,257
COUNTY-OTHER	I | OTHER AQUIFER | ANDERSON COUNTY	260	260	260	260	260	260
COUNTY-OTHER	I | QUEEN CITY AQUIFER | ANDERSON COUNTY	432	432	432	432	432	432
COUNTY-OTHER	I | SPARTA AQUIFER | ANDERSON COUNTY	128	128	128	128	128	128

Water User Group (WUG) Existing Water Supply

REGION I	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
		2020	2030	2040	2050	2060	2070
ANDERSON COUNTY							
TRINITY BASIN							
MANUFACTURING	I | CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	16	22	23	24	25	26
MINING	I | CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	100	100	100	100	100	100
MINING	I | OTHER AQUIFER | ANDERSON COUNTY	29	29	29	29	29	29
LIVESTOCK	I | CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	18	18	18	18	18	18
LIVESTOCK	I | OTHER AQUIFER | ANDERSON COUNTY	9	9	9	9	9	9
LIVESTOCK	I | QUEEN CITY AQUIFER | ANDERSON COUNTY	64	64	64	64	64	64
LIVESTOCK	I | TRINITY LIVESTOCK LOCAL SUPPLY	684	684	684	684	684	684
IRRIGATION	I | CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	161	161	161	161	161	161
IRRIGATION	I | QUEEN CITY AQUIFER | ANDERSON COUNTY	138	138	138	138	138	138
IRRIGATION	I | TRINITY RUN-OF-RIVER	1,060	1,060	1,060	1,060	1,060	1,060
TRINITY BASIN TOTAL EXISTING SUPPLY		**9,723**	**9,769**	**9,722**	**9,663**	**9,651**	**9,650**
ANDERSON COUNTY TOTAL EXISTING SUPPLY		**15,415**	**15,515**	**15,452**	**15,340**	**15,297**	**15,278**
ANGELINA COUNTY							
NECHES BASIN							
LUFKIN	I | CARRIZO-WILCOX AQUIFER | ANGELINA COUNTY	3,763	3,914	4,042	4,187	4,348	4,186
LUFKIN	I | KURTH LAKE/RESERVOIR	2,508	2,609	2,694	2,792	2,898	3,308
CENTRAL WCID OF ANGELINA COUNTY	I | CARRIZO-WILCOX AQUIFER | ANGELINA COUNTY	877	877	877	877	877	877
DIBOLL	I | CARRIZO-WILCOX AQUIFER | ANGELINA COUNTY	1,806	1,806	1,806	1,806	1,806	1,806
DIBOLL	I | YEGUA-JACKSON AQUIFER | ANGELINA COUNTY	908	908	908	908	908	908
HUDSON	I | CARRIZO-WILCOX AQUIFER | ANGELINA COUNTY	642	642	642	642	642	664
HUDSON WSC	I | CARRIZO-WILCOX AQUIFER | ANGELINA COUNTY	1,157	1,157	1,157	1,157	1,157	1,157
HUNTINGTON	I | CARRIZO-WILCOX AQUIFER | ANGELINA COUNTY	448	448	448	448	448	448
HUNTINGTON	I | YEGUA-JACKSON AQUIFER | ANGELINA COUNTY	609	609	609	609	609	609
ZAVALLA	I | YEGUA-JACKSON AQUIFER | ANGELINA COUNTY	79	81	82	84	87	90
ANGELINA WSC	I | OTHER AQUIFER | ANGELINA COUNTY	523	523	523	523	523	523
REDLAND WSC	I | CARRIZO-WILCOX AQUIFER | ANGELINA COUNTY	778	778	778	778	778	778
FOUR WAY SUD	I | YEGUA-JACKSON AQUIFER | ANGELINA COUNTY	1,216	1,216	1,216	1,216	1,216	1,216
BURKE	I | YEGUA-JACKSON AQUIFER | ANGELINA COUNTY	156	165	172	180	186	193
COUNTY-OTHER	I | CARRIZO-WILCOX AQUIFER | ANGELINA COUNTY	1,733	1,733	1,733	1,733	1,733	1,733
COUNTY-OTHER	I | OTHER AQUIFER | ANGELINA COUNTY	175	175	175	175	175	175
COUNTY-OTHER	I | SPARTA AQUIFER | ANGELINA COUNTY	175	175	175	175	175	175
COUNTY-OTHER	I | YEGUA-JACKSON AQUIFER | ANGELINA COUNTY	275	275	275	275	275	275
MANUFACTURING	I | CARRIZO-WILCOX AQUIFER | ANGELINA COUNTY	1,964	2,157	2,352	2,526	2,711	2,911
MANUFACTURING	I | KURTH LAKE/RESERVOIR	1,220	1,349	1,479	1,595	1,719	1,851

Water User Group (WUG) Existing Water Supply

REGION I	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
		2020	2030	2040	2050	2060	2070
ANGELINA COUNTY							
NECHES BASIN							
MANUFACTURING	I | OTHER AQUIFER | ANGELINA COUNTY	101	101	101	101	101	101
MANUFACTURING	I | YEGUA-JACKSON AQUIFER | ANGELINA COUNTY	1,242	1,242	1,242	1,242	1,242	1,242
MINING	I | OTHER AQUIFER | ANGELINA COUNTY	13	13	13	13	13	13
STEAM ELECTRIC POWER	I | CARRIZO-WILCOX AQUIFER | ANGELINA COUNTY	10,081	10,081	10,081	10,081	10,081	10,081
STEAM ELECTRIC POWER	I | KURTH LAKE/RESERVOIR	6,721	6,721	6,721	6,721	6,721	6,721
LIVESTOCK	I | CARRIZO-WILCOX AQUIFER | ANGELINA COUNTY	13	13	13	13	13	13
LIVESTOCK	I | NECHES LIVESTOCK LOCAL SUPPLY	661	661	661	661	661	661
LIVESTOCK	I | SPARTA AQUIFER | ANGELINA COUNTY	13	13	13	13	13	13
LIVESTOCK	I | YEGUA-JACKSON AQUIFER | ANGELINA COUNTY	50	50	50	50	50	50
IRRIGATION	I | KURTH LAKE/RESERVOIR	481	481	481	481	481	481
IRRIGATION	I | YEGUA-JACKSON AQUIFER | ANGELINA COUNTY	331	331	331	331	331	331
NECHES BASIN TOTAL EXISTING SUPPLY		**40,719**	**41,304**	**41,850**	**42,393**	**42,978**	**43,590**
ANGELINA COUNTY TOTAL EXISTING SUPPLY		**40,719**	**41,304**	**41,850**	**42,393**	**42,978**	**43,590**
CHEROKEE COUNTY							
NECHES BASIN							
JACKSONVILLE	I | CARRIZO-WILCOX AQUIFER | CHEROKEE COUNTY	804	858	913	989	1,077	1,173
JACKSONVILLE	I | JACKSONVILLE LAKE/RESERVOIR	1,876	2,000	2,129	2,308	2,511	2,735
ALTO	I | CARRIZO-WILCOX AQUIFER | CHEROKEE COUNTY	508	508	508	508	508	508
ALTO RURAL WSC	I | CARRIZO-WILCOX AQUIFER | CHEROKEE COUNTY	736	736	736	736	736	736
BULLARD	I | CARRIZO-WILCOX AQUIFER | CHEROKEE COUNTY	16	16	16	16	16	16
BULLARD	I | CARRIZO-WILCOX AQUIFER | SMITH COUNTY	10	9	8	7	6	6
CRAFT-TURNEY WSC	I | CARRIZO-WILCOX AQUIFER | CHEROKEE COUNTY	145	151	157	168	183	199
CRAFT-TURNEY WSC	I | JACKSONVILLE LAKE/RESERVOIR	338	351	366	392	426	464
NEW SUMMERFIELD	I | CARRIZO-WILCOX AQUIFER | CHEROKEE COUNTY	253	253	253	253	253	253
NORTH CHEROKEE WSC	I | CARRIZO-WILCOX AQUIFER | CHEROKEE COUNTY	185	196	208	225	244	266
NORTH CHEROKEE WSC	I | JACKSONVILLE LAKE/RESERVOIR	417	444	473	512	557	607
RUSK	I | CARRIZO-WILCOX AQUIFER | CHEROKEE COUNTY	1,339	1,340	1,341	1,342	1,342	1,443
RUSK	I | RUSK CITY LAKE/RESERVOIR	63	63	62	61	60	59
RUSK RURAL WSC	I | CARRIZO-WILCOX AQUIFER | CHEROKEE COUNTY	557	557	557	557	557	557
SOUTHERN UTILITIES COMPANY	I | CARRIZO-WILCOX AQUIFER | CHEROKEE COUNTY	480	513	546	592	644	701
TROUP	I | CARRIZO-WILCOX AQUIFER | CHEROKEE COUNTY	14	15	16	17	18	20
WELLS	I | CARRIZO-WILCOX AQUIFER | CHEROKEE COUNTY	382	382	382	382	382	382
WRIGHT CITY WSC	I | CARRIZO-WILCOX AQUIFER | CHEROKEE COUNTY	102	102	102	102	102	99

Water User Group (WUG) Existing Water Supply

REGION I	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
		2020	2030	2040	2050	2060	2070
CHEROKEE COUNTY							
NECHES BASIN							
COUNTY-OTHER	I | CARRIZO-WILCOX AQUIFER | CHEROKEE COUNTY	587	591	597	605	614	623
COUNTY-OTHER	I | JACKSONVILLE LAKE/RESERVOIR	199	211	223	241	262	286
COUNTY-OTHER	I | OTHER AQUIFER | CHEROKEE COUNTY	196	196	196	196	196	196
COUNTY-OTHER	I | QUEEN CITY AQUIFER | CHEROKEE COUNTY	676	676	676	676	676	676
COUNTY-OTHER	I | SPARTA AQUIFER | CHEROKEE COUNTY	156	156	156	156	156	156
MANUFACTURING	I | CARRIZO-WILCOX AQUIFER | CHEROKEE COUNTY	134	143	151	158	169	181
MANUFACTURING	I | JACKSONVILLE LAKE/RESERVOIR	289	309	328	344	371	400
MANUFACTURING	I | QUEEN CITY AQUIFER | CHEROKEE COUNTY	1	1	1	1	1	1
MINING	I | NECHES OTHER LOCAL SUPPLY	19	19	19	19	19	19
MINING	I | OTHER AQUIFER | CHEROKEE COUNTY	38	38	38	38	38	38
STEAM ELECTRIC POWER	I | STRIKER LAKE/RESERVOIR	5,000	5,000	5,000	5,000	5,000	5,000
LIVESTOCK	I | CARRIZO-WILCOX AQUIFER | CHEROKEE COUNTY	49	49	49	49	49	49
LIVESTOCK	I | NECHES LIVESTOCK LOCAL SUPPLY	1,555	1,555	1,555	1,555	1,555	1,555
LIVESTOCK	I | OTHER AQUIFER | CHEROKEE COUNTY	33	33	33	33	33	33
LIVESTOCK	I | QUEEN CITY AQUIFER | CHEROKEE COUNTY	176	176	176	176	176	176
IRRIGATION	I | CARRIZO-WILCOX AQUIFER | CHEROKEE COUNTY	5	5	5	5	5	5
IRRIGATION	I | NECHES RUN-OF-RIVER	182	182	182	182	182	182
IRRIGATION	I | OTHER AQUIFER | CHEROKEE COUNTY	1	1	1	1	1	1
IRRIGATION	I | PALESTINE LAKE/RESERVOIR	41	36	32	28	25	25
IRRIGATION	I | QUEEN CITY AQUIFER | CHEROKEE COUNTY	206	206	206	206	206	206
IRRIGATION	I | SPARTA AQUIFER | CHEROKEE COUNTY	1	1	1	1	1	1
NECHES BASIN TOTAL EXISTING SUPPLY		**17,769**	**18,078**	**18,398**	**18,837**	**19,357**	**20,033**
CHEROKEE COUNTY TOTAL EXISTING SUPPLY		**17,769**	**18,078**	**18,398**	**18,837**	**19,357**	**20,033**
HARDIN COUNTY							
NECHES BASIN							
KOUNTZE	I | GULF COAST AQUIFER | HARDIN COUNTY	1,041	1,041	1,041	1,041	1,041	1,041
LUMBERTON	I | GULF COAST AQUIFER | HARDIN COUNTY	1,656	1,852	1,990	2,097	2,191	2,263
LUMBERTON MUD	I | GULF COAST AQUIFER | HARDIN COUNTY	4,382	4,186	4,048	3,941	3,847	3,775
NORTH HARDIN WSC	I | GULF COAST AQUIFER | HARDIN COUNTY	1,906	1,906	1,906	1,906	1,906	1,906
SILSBEE	I | GULF COAST AQUIFER | HARDIN COUNTY	1,617	1,617	1,617	1,617	1,617	1,617
SOUR LAKE	I | GULF COAST AQUIFER | HARDIN COUNTY	934	934	934	934	934	934
WEST HARDIN WSC	I | GULF COAST AQUIFER | HARDIN COUNTY	771	768	766	763	761	758
COUNTY-OTHER	I | GULF COAST AQUIFER | HARDIN COUNTY	1,629	1,668	1,688	1,738	1,776	1,808
MANUFACTURING	I | GULF COAST AQUIFER | HARDIN COUNTY	294	324	355	383	413	445
MINING	I | GULF COAST AQUIFER | HARDIN COUNTY	12	12	12	12	12	12
LIVESTOCK	I | GULF COAST AQUIFER | HARDIN COUNTY	69	69	69	69	69	69
LIVESTOCK	I | NECHES LIVESTOCK LOCAL SUPPLY	155	155	155	155	155	155
IRRIGATION	I | GULF COAST AQUIFER | HARDIN COUNTY	3,357	3,588	3,747	3,804	3,745	3,655
IRRIGATION	I | NECHES RUN-OF-RIVER	57	57	57	57	57	57

Water User Group (WUG) Existing Water Supply

REGION I	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
		2020	2030	2040	2050	2060	2070
HARDIN COUNTY							
NECHES BASIN TOTAL EXISTING SUPPLY		**17,880**	**18,177**	**18,385**	**18,517**	**18,524**	**18,495**
TRINITY BASIN							
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	I | GULF COAST AQUIFER | HARDIN COUNTY	10	11	12	12	13	13
WEST HARDIN WSC	I | GULF COAST AQUIFER | HARDIN COUNTY	4	4	4	4	4	4
COUNTY-OTHER	I | GULF COAST AQUIFER | HARDIN COUNTY	18	18	18	18	18	18
LIVESTOCK	I | GULF COAST AQUIFER | HARDIN COUNTY	2	2	2	2	2	2
TRINITY BASIN TOTAL EXISTING SUPPLY		**34**	**35**	**36**	**36**	**37**	**37**
HARDIN COUNTY TOTAL EXISTING SUPPLY		**17,914**	**18,212**	**18,421**	**18,553**	**18,561**	**18,532**
HENDERSON COUNTY							
NECHES BASIN							
ATHENS	C | CARRIZO-WILCOX AQUIFER | HENDERSON COUNTY	16	15	18	22	16	11
ATHENS	I | ATHENS LAKE/RESERVOIR	39	41	42	43	36	29
BERRYVILLE	I | CARRIZO-WILCOX AQUIFER | HENDERSON COUNTY	118	124	128	137	147	156
BETHEL-ASH WSC	I | CARRIZO-WILCOX AQUIFER | HENDERSON COUNTY	659	637	625	620	616	616
BROWNSBORO	I | CARRIZO-WILCOX AQUIFER | HENDERSON COUNTY	218	260	295	343	386	428
BRUSHY CREEK WSC	I | CARRIZO-WILCOX AQUIFER | HENDERSON COUNTY	65	66	67	70	74	78
CHANDLER	I | CARRIZO-WILCOX AQUIFER | HENDERSON COUNTY	877	877	877	877	877	877
FRANKSTON	I | CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	15	21	25	31	37	43
MURCHISON	I | CARRIZO-WILCOX AQUIFER | HENDERSON COUNTY	93	91	89	88	88	88
VIRGINIA HILL WSC	C | CARRIZO-WILCOX AQUIFER | HENDERSON COUNTY	280	280	279	280	279	273
R-P-M WSC	D | CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	38	37	37	38	38	39
R-P-M WSC	D | QUEEN CITY AQUIFER | VAN ZANDT COUNTY	36	35	35	36	36	36
COUNTY-OTHER	I | CARRIZO-WILCOX AQUIFER | HENDERSON COUNTY	1,044	958	891	863	838	818
COUNTY-OTHER	I | OTHER AQUIFER | HENDERSON COUNTY	539	539	539	539	539	539
MANUFACTURING	I | CARRIZO-WILCOX AQUIFER | HENDERSON COUNTY	78	78	78	79	87	96
MINING	I | CARRIZO-WILCOX AQUIFER | HENDERSON COUNTY	54	54	54	54	54	54
MINING	I | OTHER AQUIFER | HENDERSON COUNTY	65	65	65	65	65	65
LIVESTOCK	I | ATHENS LAKE/RESERVOIR	1,547	1,474	1,416	1,341	951	700
LIVESTOCK	I | CARRIZO-WILCOX AQUIFER | HENDERSON COUNTY	360	360	360	360	360	360
LIVESTOCK	I | NECHES LIVESTOCK LOCAL SUPPLY	770	770	770	770	770	770
LIVESTOCK	I | QUEEN CITY AQUIFER | HENDERSON COUNTY	188	188	188	188	188	188
IRRIGATION	C | CARRIZO-WILCOX AQUIFER | HENDERSON COUNTY	50	51	60	71	68	63
IRRIGATION	C | DIRECT REUSE	32	32	32	32	32	32
IRRIGATION	C | TRINITY RUN-OF-RIVER	415	415	415	415	415	415

Water User Group (WUG) Existing Water Supply

REGION I	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
		2020	2030	2040	2050	2060	2070
HENDERSON COUNTY							
NECHES BASIN							
IRRIGATION	I | ATHENS LAKE/RESERVOIR	168	160	154	146	103	76
IRRIGATION	I | PALESTINE LAKE/RESERVOIR	82	73	64	57	51	51
IRRIGATION	I | QUEEN CITY AQUIFER | HENDERSON COUNTY	25	25	25	25	25	25
NECHES BASIN TOTAL EXISTING SUPPLY		**7,871**	**7,726**	**7,628**	**7,590**	**7,176**	**6,926**
HENDERSON COUNTY TOTAL EXISTING SUPPLY		**7,871**	**7,726**	**7,628**	**7,590**	**7,176**	**6,926**
HOUSTON COUNTY							
NECHES BASIN							
GRAPELAND	I | CARRIZO-WILCOX AQUIFER | HOUSTON COUNTY	240	239	241	241	242	242
GRAPELAND	I | HOUSTON COUNTY LAKE/RESERVOIR	45	45	45	45	45	44
THE CONSOLIDATED WSC	I | CARRIZO-WILCOX AQUIFER | HOUSTON COUNTY	755	755	755	755	755	755
THE CONSOLIDATED WSC	I | HOUSTON COUNTY LAKE/RESERVOIR	227	224	221	218	214	211
COUNTY-OTHER	I | CARRIZO-WILCOX AQUIFER | HOUSTON COUNTY	10	10	10	10	10	10
COUNTY-OTHER	I | OTHER AQUIFER | HOUSTON COUNTY	5	5	5	5	5	5
COUNTY-OTHER	I | SPARTA AQUIFER | HOUSTON COUNTY	30	30	30	30	30	30
MANUFACTURING	I | CARRIZO-WILCOX AQUIFER | HOUSTON COUNTY	24	24	24	24	24	24
MINING	I | OTHER AQUIFER | HOUSTON COUNTY	113	89	65	42	18	8
LIVESTOCK	I | CARRIZO-WILCOX AQUIFER | HOUSTON COUNTY	4	4	4	4	4	4
LIVESTOCK	I | NECHES LIVESTOCK LOCAL SUPPLY	1,007	1,007	1,007	1,007	1,007	1,007
LIVESTOCK	I | OTHER AQUIFER | HOUSTON COUNTY	14	14	14	14	14	14
LIVESTOCK	I | QUEEN CITY AQUIFER | HOUSTON COUNTY	14	14	14	14	14	14
LIVESTOCK	I | SPARTA AQUIFER | HOUSTON COUNTY	29	29	29	29	29	29
IRRIGATION	I | NECHES RUN-OF-RIVER	287	287	287	287	287	287
IRRIGATION	I | OTHER AQUIFER | HOUSTON COUNTY	50	50	50	50	50	50
NECHES BASIN TOTAL EXISTING SUPPLY		**2,854**	**2,826**	**2,801**	**2,775**	**2,748**	**2,734**
TRINITY BASIN							
CROCKETT	I | HOUSTON COUNTY LAKE/RESERVOIR	2,008	1,995	1,981	1,968	1,952	1,934
GRAPELAND	I | CARRIZO-WILCOX AQUIFER | HOUSTON COUNTY	369	370	368	368	367	367
GRAPELAND	I | HOUSTON COUNTY LAKE/RESERVOIR	70	69	68	68	67	67
LOVELADY	I | HOUSTON COUNTY LAKE/RESERVOIR	35	34	34	34	34	33
LOVELADY	I | YEGUA-JACKSON AQUIFER | HOUSTON COUNTY	201	201	201	201	201	201
THE CONSOLIDATED WSC	I | CARRIZO-WILCOX AQUIFER | HOUSTON COUNTY	1,329	1,329	1,329	1,329	1,329	1,329
THE CONSOLIDATED WSC	I | HOUSTON COUNTY LAKE/RESERVOIR	617	608	599	592	582	574
COUNTY-OTHER	I | CARRIZO-WILCOX AQUIFER | HOUSTON COUNTY	94	94	94	94	94	94
COUNTY-OTHER	I | HOUSTON COUNTY LAKE/RESERVOIR	86	80	78	77	77	76
COUNTY-OTHER	I | OTHER AQUIFER | HOUSTON COUNTY	100	100	100	100	100	100

Water User Group (WUG) Existing Water Supply

REGION I	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
		2020	2030	2040	2050	2060	2070
HOUSTON COUNTY							
TRINITY BASIN							
COUNTY-OTHER	I | YEGUA-JACKSON AQUIFER | HOUSTON COUNTY	50	50	50	50	50	50
MANUFACTURING	I | CARRIZO-WILCOX AQUIFER | HOUSTON COUNTY	18	18	18	18	18	18
MANUFACTURING	I | HOUSTON COUNTY LAKE/RESERVOIR	301	331	360	385	417	451
MINING	I | OTHER AQUIFER | HOUSTON COUNTY	209	165	122	77	33	14
LIVESTOCK	I | CARRIZO-WILCOX AQUIFER | HOUSTON COUNTY	244	351	466	591	726	899
LIVESTOCK	I | OTHER AQUIFER | HOUSTON COUNTY	55	55	55	55	55	55
LIVESTOCK	I | QUEEN CITY AQUIFER | HOUSTON COUNTY	13	13	13	13	13	13
LIVESTOCK	I | SPARTA AQUIFER | HOUSTON COUNTY	75	75	75	75	75	75
LIVESTOCK	I | TRINITY LIVESTOCK LOCAL SUPPLY	783	783	783	783	783	783
IRRIGATION	I | CARRIZO-WILCOX AQUIFER | HOUSTON COUNTY	38	38	38	38	38	38
IRRIGATION	I | OTHER AQUIFER | HOUSTON COUNTY	6	6	6	6	6	6
IRRIGATION	I | QUEEN CITY AQUIFER | HOUSTON COUNTY	50	50	50	50	50	50
IRRIGATION	I | SPARTA AQUIFER | HOUSTON COUNTY	25	25	25	25	25	25
IRRIGATION	I | TRINITY RUN-OF-RIVER	1,783	1,783	1,783	1,783	1,783	1,783
TRINITY BASIN TOTAL EXISTING SUPPLY		**8,559**	**8,623**	**8,696**	**8,780**	**8,875**	**9,035**
HOUSTON COUNTY TOTAL EXISTING SUPPLY		**11,413**	**11,449**	**11,497**	**11,555**	**11,623**	**11,769**
JASPER COUNTY							
NECHES BASIN							
JASPER	I | GULF COAST AQUIFER | JASPER COUNTY	4,790	4,790	4,790	4,790	4,790	4,790
COUNTY-OTHER	I | GULF COAST AQUIFER | JASPER COUNTY	1,500	1,472	1,431	1,405	1,399	1,399
MANUFACTURING	I | GULF COAST AQUIFER | JASPER COUNTY	31,270	31,270	31,270	31,270	31,270	31,270
MANUFACTURING	I | NECHES RUN-OF-RIVER	616	616	616	616	616	616
MANUFACTURING	I | SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	60,000	60,000	60,000	60,000	60,000	60,000
MINING	I | GULF COAST AQUIFER | JASPER COUNTY	70	55	41	27	13	7
LIVESTOCK	I | GULF COAST AQUIFER | JASPER COUNTY	115	115	115	115	115	115
LIVESTOCK	I | NECHES LIVESTOCK LOCAL SUPPLY	332	332	332	332	332	332
IRRIGATION	I | NECHES RUN-OF-RIVER	81	81	81	81	81	81
NECHES BASIN TOTAL EXISTING SUPPLY		**98,774**	**98,731**	**98,676**	**98,636**	**98,616**	**98,610**
SABINE BASIN							
JASPER COUNTY WCID #1	I | GULF COAST AQUIFER | JASPER COUNTY	1,073	1,073	1,073	1,073	1,073	1,073
KIRBYVILLE	I | GULF COAST AQUIFER | JASPER COUNTY	584	584	584	584	584	584
MAURICEVILLE SUD	I | GULF COAST AQUIFER | ORANGE COUNTY	73	73	71	69	68	68
COUNTY-OTHER	I | GULF COAST AQUIFER | JASPER COUNTY	1,159	1,183	1,233	1,259	1,265	1,265
MANUFACTURING	I | GULF COAST AQUIFER | JASPER COUNTY	50	50	50	50	50	50
MINING	I | GULF COAST AQUIFER | JASPER COUNTY	78	63	47	31	15	7
LIVESTOCK	I | GULF COAST AQUIFER | JASPER COUNTY	134	134	134	134	134	134
LIVESTOCK	I | SABINE LIVESTOCK LOCAL SUPPLY	215	215	215	215	215	215
IRRIGATION	I | NECHES RUN-OF-RIVER	46	46	46	46	46	46
SABINE BASIN TOTAL EXISTING SUPPLY		**3,412**	**3,421**	**3,453**	**3,461**	**3,450**	**3,442**

Water User Group (WUG) Existing Water Supply

REGION I	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
		2020	2030	2040	2050	2060	2070
JASPER COUNTY TOTAL EXISTING SUPPLY		**102,186**	**102,152**	**102,129**	**102,097**	**102,066**	**102,052**
JEFFERSON COUNTY							
NECHES BASIN							
BEAUMONT	I | GULF COAST AQUIFER | HARDIN COUNTY	3,211	3,211	3,211	3,211	3,211	3,211
BEAUMONT	I | NECHES RUN-OF-RIVER	4,358	4,392	4,442	4,903	5,442	5,933
BEAUMONT	I | SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	2,466	2,863	3,137	2,754	2,299	1,892
PORT ARTHUR	I | SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	60	60	59	59	59	59
BEVIL OAKS	I | GULF COAST AQUIFER | JEFFERSON COUNTY	135	137	139	147	157	169
CHINA	I | GULF COAST AQUIFER | JEFFERSON COUNTY	3	3	3	3	4	4
GROVES	I | SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	70	67	65	64	64	64
JEFFERSON COUNTY WCID #10	I | SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	75	76	78	81	87	93
MEEKER MUD	I | GULF COAST AQUIFER | JEFFERSON COUNTY	127	128	128	128	133	139
MEEKER MUD	I | NECHES RUN-OF-RIVER	1	1	1	1	1	2
NEDERLAND	I | SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	87	89	92	97	104	111
NOME	I | SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	48	49	51	53	57	61
PORT NECHES	I | SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	742	752	770	807	862	926
COUNTY-OTHER	I | GULF COAST AQUIFER | JEFFERSON COUNTY	2	2	2	2	1	1
COUNTY-OTHER	I | NECHES RUN-OF-RIVER	123	132	141	119	102	89
COUNTY-OTHER	I | SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	18	19	19	20	21	23
MANUFACTURING	I | GULF COAST AQUIFER | HARDIN COUNTY	10	10	10	10	10	10
MANUFACTURING	I | GULF COAST AQUIFER | JEFFERSON COUNTY	80	80	80	80	80	80
MANUFACTURING	I | NECHES RUN-OF-RIVER	121,326	126,064	126,079	126,100	126,123	126,146
MANUFACTURING	I | SABINE RUN-OF-RIVER	582	582	582	582	582	582
MANUFACTURING	I | SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	4,324	51,094	58,470	65,828	73,187	80,841
MINING	I | GULF COAST AQUIFER | JEFFERSON COUNTY	18	33	51	84	107	133
MINING	I | NECHES OTHER LOCAL SUPPLY	110	110	110	110	110	110
STEAM ELECTRIC POWER		0	0	0	0	0	0
LIVESTOCK	I | GULF COAST AQUIFER | JEFFERSON COUNTY	75	75	75	75	75	75
IRRIGATION	I | NECHES RUN-OF-RIVER	9,800	9,800	9,800	9,800	9,800	9,800
IRRIGATION	I | NECHES-TRINITY INDIRECT REUSE	958	958	958	958	958	958
IRRIGATION	I | NECHES-TRINITY RUN-OF-RIVER	3,832	3,832	3,832	3,832	3,832	3,832
NECHES BASIN TOTAL EXISTING SUPPLY		**152,641**	**204,619**	**212,385**	**219,908**	**227,468**	**235,344**
NECHES-TRINITY BASIN							
BEAUMONT	I | GULF COAST AQUIFER | HARDIN COUNTY	6,289	6,289	6,289	6,289	6,289	6,289
BEAUMONT	I | NECHES RUN-OF-RIVER	8,536	8,602	8,701	9,602	10,660	11,622
BEAUMONT	I | SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	4,829	5,606	6,143	5,394	4,502	3,705
PORT ARTHUR	I | SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	19,745	19,715	19,489	19,442	19,423	19,422
CHINA	I | GULF COAST AQUIFER | JEFFERSON COUNTY	140	143	147	155	164	177

Water User Group (WUG) Existing Water Supply

REGION I	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
		2020	2030	2040	2050	2060	2070
JEFFERSON COUNTY							
NECHES-TRINITY BASIN							
GROVES	I | SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	2,168	2,093	2,029	2,005	1,999	1,999
JEFFERSON COUNTY WCID #10	I | SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	373	377	385	404	430	462
MEEKER MUD	I | GULF COAST AQUIFER | JEFFERSON COUNTY	381	380	380	380	395	415
MEEKER MUD	I | NECHES RUN-OF-RIVER	3	3	4	4	4	4
NEDERLAND	I | SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	2,317	2,375	2,454	2,585	2,761	2,966
NOME	I | SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	27	28	29	31	33	35
PORT NECHES	I | SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	686	695	711	746	796	854
WEST JEFFERSON COUNTY MWD	I | SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	741	752	772	809	863	927
COUNTY-OTHER	I | GULF COAST AQUIFER | JEFFERSON COUNTY	48	48	48	48	49	49
COUNTY-OTHER	I | NECHES RUN-OF-RIVER	2,386	3,049	3,798	3,625	3,428	3,226
COUNTY-OTHER	I | SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	360	428	512	613	726	853
MANUFACTURING	I | GULF COAST AQUIFER | HARDIN COUNTY	10	10	10	10	10	10
MANUFACTURING	I | GULF COAST AQUIFER | JEFFERSON COUNTY	1	1	1	1	1	1
MANUFACTURING	I | NECHES RUN-OF-RIVER	111,992	116,365	116,380	116,399	116,423	116,442
MANUFACTURING	I | SABINE RUN-OF-RIVER	538	538	538	538	538	538
MANUFACTURING	I | SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	3,934	47,104	53,915	60,707	67,499	74,564
MINING	I | GULF COAST AQUIFER | JEFFERSON COUNTY	32	39	49	66	78	91
MINING	I | NECHES-TRINITY RUN-OF-RIVER	34	34	34	34	34	34
LIVESTOCK	I | GULF COAST AQUIFER | JEFFERSON COUNTY	131	131	131	131	131	131
LIVESTOCK	I | NECHES-TRINITY LIVESTOCK LOCAL SUPPLY	800	800	800	800	800	800
IRRIGATION	I | NECHES RUN-OF-RIVER	130,200	130,200	130,200	130,200	130,200	130,200
IRRIGATION	I | NECHES-TRINITY INDIRECT REUSE	12,729	12,729	12,729	12,729	12,729	12,729
IRRIGATION	I | NECHES-TRINITY RUN-OF-RIVER	50,914	50,914	50,914	50,914	50,914	50,914
NECHES-TRINITY BASIN TOTAL EXISTING SUPPLY		**360,344**	**409,448**	**417,592**	**424,661**	**431,879**	**439,459**
JEFFERSON COUNTY TOTAL EXISTING SUPPLY		**512,985**	**614,067**	**629,977**	**644,569**	**659,347**	**674,803**
NACOGDOCHES COUNTY							
NECHES BASIN							
NACOGDOCHES	I | CARRIZO-WILCOX AQUIFER | NACOGDOCHES COUNTY	1,889	2,101	2,326	2,588	2,891	3,219
NACOGDOCHES	I | NACOGDOCHES LAKE/RESERVOIR	4,853	5,275	5,701	6,193	6,747	7,326
APPLEBY WSC	I | CARRIZO-WILCOX AQUIFER | NACOGDOCHES COUNTY	873	873	874	874	876	965
APPLEBY WSC	I | NACOGDOCHES LAKE/RESERVOIR	67	67	66	66	65	65
CUSHING	I | CARRIZO-WILCOX AQUIFER | NACOGDOCHES COUNTY	229	229	229	229	229	229
GARRISON	I | CARRIZO-WILCOX AQUIFER | NACOGDOCHES COUNTY	565	565	565	565	565	565
LILLY GROVE SUD	I | CARRIZO-WILCOX AQUIFER | NACOGDOCHES COUNTY	761	761	761	761	761	761
SWIFT WSC	I | CARRIZO-WILCOX AQUIFER | NACOGDOCHES COUNTY	666	666	666	666	666	666
D&M WSC	I | CARRIZO-WILCOX AQUIFER | NACOGDOCHES COUNTY	1,008	1,009	1,011	1,012	1,013	1,015

Water User Group (WUG) Existing Water Supply

REGION I	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
		2020	2030	2040	2050	2060	2070
NACOGDOCHES COUNTY							
NECHES BASIN							
D&M WSC	I | NACOGDOCHES LAKE/RESERVOIR	186	185	183	182	181	179
MELROSE WSC	I | CARRIZO-WILCOX AQUIFER | NACOGDOCHES COUNTY	781	782	782	782	782	782
MELROSE WSC	I | NACOGDOCHES LAKE/RESERVOIR	27	26	26	26	26	26
WODEN WSC	I | CARRIZO-WILCOX AQUIFER | NACOGDOCHES COUNTY	770	770	770	770	770	770
COUNTY-OTHER	I | CARRIZO-WILCOX AQUIFER | NACOGDOCHES COUNTY	655	764	897	1,040	1,190	1,351
COUNTY-OTHER	I | NACOGDOCHES LAKE/RESERVOIR	48	48	48	48	48	48
COUNTY-OTHER	I | OTHER AQUIFER | NACOGDOCHES COUNTY	79	79	79	79	79	79
COUNTY-OTHER	I | QUEEN CITY AQUIFER | NACOGDOCHES COUNTY	221	221	221	221	221	221
COUNTY-OTHER	I | SPARTA AQUIFER | NACOGDOCHES COUNTY	156	156	156	156	156	156
COUNTY-OTHER	I | YEGUA-JACKSON AQUIFER | NACOGDOCHES COUNTY	26	26	26	26	26	26
MANUFACTURING	I | CARRIZO-WILCOX AQUIFER | NACOGDOCHES COUNTY	718	797	878	951	1,045	1,147
MANUFACTURING	I | NACOGDOCHES LAKE/RESERVOIR	1,846	2,001	2,151	2,277	2,438	2,611
MANUFACTURING	I | SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	10,000	10,000	10,000	10,000	10,000	10,000
MINING	I | HOUSTON COUNTY LAKE/RESERVOIR	0	0	0	0	0	0
MINING	I | NECHES OTHER LOCAL SUPPLY	494	494	494	494	494	494
MINING	I | OTHER AQUIFER | NACOGDOCHES COUNTY	1,031	1,031	1,031	1,031	1,031	1,031
STEAM ELECTRIC POWER	I | HOUSTON COUNTY LAKE/RESERVOIR	0	0	0	0	0	0
STEAM ELECTRIC POWER	I | STRIKER LAKE/RESERVOIR	7,280	7,280	7,280	7,280	7,280	7,280
LIVESTOCK	I | CARRIZO-WILCOX AQUIFER | NACOGDOCHES COUNTY	229	229	229	229	229	229
LIVESTOCK	I | NECHES LIVESTOCK LOCAL SUPPLY	2,386	2,386	2,386	2,386	2,386	2,386
LIVESTOCK	I | OTHER AQUIFER | NACOGDOCHES COUNTY	21	21	21	21	21	21
LIVESTOCK	I | QUEEN CITY AQUIFER | NACOGDOCHES COUNTY	84	84	84	84	84	84
IRRIGATION	I | CARRIZO-WILCOX AQUIFER | NACOGDOCHES COUNTY	373	373	373	373	373	373
IRRIGATION	I | NECHES RUN-OF-RIVER	136	136	136	136	136	136
NECHES BASIN TOTAL EXISTING SUPPLY		**38,458**	**39,435**	**40,450**	**41,546**	**42,809**	**44,241**
NACOGDOCHES COUNTY TOTAL EXISTING SUPPLY		**38,458**	**39,435**	**40,450**	**41,546**	**42,809**	**44,241**
NEWTON COUNTY							
SABINE BASIN							
MAURICEVILLE SUD	I | GULF COAST AQUIFER | ORANGE COUNTY	68	65	64	62	62	61
NEWTON	I | GULF COAST AQUIFER | NEWTON COUNTY	483	483	483	483	483	483
SOUTH NEWTON WSC	I | GULF COAST AQUIFER | NEWTON COUNTY	321	321	321	321	321	321
COUNTY-OTHER	I | GULF COAST AQUIFER | NEWTON COUNTY	1,425	1,425	1,425	1,425	1,425	1,425
MANUFACTURING	I | GULF COAST AQUIFER | NEWTON COUNTY	433	509	586	656	723	796
MANUFACTURING	I | SABINE RUN-OF-RIVER	135	135	135	135	135	135
MINING	I | GULF COAST AQUIFER | NEWTON COUNTY	156	156	156	156	156	156
MINING	I | SABINE OTHER LOCAL SUPPLY	158	158	158	158	158	158

Water User Group (WUG) Existing Water Supply

REGION I	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
		2020	2030	2040	2050	2060	2070
NEWTON COUNTY							
SABINE BASIN							
STEAM ELECTRIC POWER	I | SABINE RUN-OF-RIVER	13,442	13,442	13,442	13,442	13,442	13,442
LIVESTOCK	I | GULF COAST AQUIFER | NEWTON COUNTY	104	104	104	104	104	104
LIVESTOCK	I | SABINE LIVESTOCK LOCAL SUPPLY	155	155	155	155	155	155
IRRIGATION	I | GULF COAST AQUIFER | NEWTON COUNTY	330	330	330	330	330	330
IRRIGATION	I | SABINE RUN-OF-RIVER	50	50	50	50	50	50
SABINE BASIN TOTAL EXISTING SUPPLY		**17,260**	**17,333**	**17,409**	**17,477**	**17,544**	**17,616**
NEWTON COUNTY TOTAL EXISTING SUPPLY		**17,260**	**17,333**	**17,409**	**17,477**	**17,544**	**17,616**
ORANGE COUNTY							
NECHES BASIN							
PORT ARTHUR	I | SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	2	2	2	2	2	2
BRIDGE CITY	I | GULF COAST AQUIFER | ORANGE COUNTY	117	117	117	117	117	117
MAURICEVILLE SUD	I | GULF COAST AQUIFER | ORANGE COUNTY	121	121	120	120	121	122
ROSE CITY	I | GULF COAST AQUIFER | ORANGE COUNTY	106	106	106	106	106	106
ROSE CITY	I | SABINE RUN-OF-RIVER	478	478	478	478	478	478
VIDOR	I | GULF COAST AQUIFER | ORANGE COUNTY	1,819	1,854	1,873	1,900	1,925	1,945
ORANGEFIELD WSC	I | GULF COAST AQUIFER | ORANGE COUNTY	188	192	195	197	199	201
COUNTY-OTHER	I | GULF COAST AQUIFER | ORANGE COUNTY	1,608	1,593	1,636	1,664	1,684	1,701
MANUFACTURING	I | GULF COAST AQUIFER | ORANGE COUNTY	1,289	1,320	1,320	1,320	1,320	1,320
MINING	I | GULF COAST AQUIFER | ORANGE COUNTY	149	149	149	149	149	147
STEAM ELECTRIC POWER	I | GULF COAST AQUIFER | ORANGE COUNTY	1,310	1,310	1,310	1,310	1,310	1,310
STEAM ELECTRIC POWER	I | SABINE RUN-OF-RIVER	4,481	4,481	4,481	4,481	4,481	4,481
LIVESTOCK	I | GULF COAST AQUIFER | ORANGE COUNTY	114	114	114	114	114	114
LIVESTOCK	I | NECHES LIVESTOCK LOCAL SUPPLY	56	56	56	56	56	56
IRRIGATION		0	0	0	0	0	0
NECHES BASIN TOTAL EXISTING SUPPLY		**11,838**	**11,893**	**11,957**	**12,014**	**12,062**	**12,100**
NECHES-TRINITY BASIN							
BRIDGE CITY	I | GULF COAST AQUIFER | ORANGE COUNTY	90	90	90	90	90	90
COUNTY-OTHER	I | GULF COAST AQUIFER | ORANGE COUNTY	4	4	4	4	4	4
NECHES-TRINITY BASIN TOTAL EXISTING SUPPLY		**94**	**94**	**94**	**94**	**94**	**94**
SABINE BASIN							
BRIDGE CITY	I | GULF COAST AQUIFER | ORANGE COUNTY	540	540	540	540	540	540
MAURICEVILLE SUD	I | GULF COAST AQUIFER | ORANGE COUNTY	1,425	1,428	1,432	1,436	1,436	1,436
ORANGE	I | GULF COAST AQUIFER | ORANGE COUNTY	2,619	2,638	2,639	2,657	2,689	2,717
PINEHURST	I | GULF COAST AQUIFER | ORANGE COUNTY	282	283	284	289	292	295
SOUTH NEWTON WSC	I | GULF COAST AQUIFER | ORANGE COUNTY	100	104	107	109	111	112
VIDOR	I | GULF COAST AQUIFER | ORANGE COUNTY	433	441	446	452	458	463
WEST ORANGE	I | GULF COAST AQUIFER | ORANGE COUNTY	552	557	562	572	580	586
ORANGEFIELD WSC	I | GULF COAST AQUIFER | ORANGE COUNTY	293	299	304	308	311	315

Water User Group (WUG) Existing Water Supply

REGION I	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
		2020	2030	2040	2050	2060	2070
ORANGE COUNTY							
SABINE BASIN							
COUNTY-OTHER	I | GULF COAST AQUIFER | ORANGE COUNTY	1,287	1,275	1,310	1,331	1,347	1,361
MANUFACTURING	I | GULF COAST AQUIFER | ORANGE COUNTY	4,649	4,649	4,649	4,649	4,650	4,604
MANUFACTURING	I | SABINE RUN-OF-RIVER	55,960	55,960	55,960	55,960	55,960	55,960
MANUFACTURING	I | TOLEDO BEND LAKE/RESERVOIR	31	31	31	31	31	31
MINING	I | GULF COAST AQUIFER | ORANGE COUNTY	0	0	0	0	0	2
MINING	I | SABINE OTHER LOCAL SUPPLY	178	178	178	178	178	178
LIVESTOCK	I | GULF COAST AQUIFER | ORANGE COUNTY	114	114	114	114	114	114
LIVESTOCK	I | SABINE LIVESTOCK LOCAL SUPPLY	42	42	42	42	42	42
IRRIGATION	I | DIRECT REUSE	15	15	15	15	15	15
IRRIGATION	I | SABINE RUN-OF-RIVER	1,283	1,283	1,283	1,283	1,283	1,283
SABINE BASIN TOTAL EXISTING SUPPLY		**69,803**	**69,837**	**69,896**	**69,966**	**70,037**	**70,054**
ORANGE COUNTY TOTAL EXISTING SUPPLY		**81,735**	**81,824**	**81,947**	**82,074**	**82,193**	**82,248**
PANOLA COUNTY							
CYPRESS BASIN							
COUNTY-OTHER	I | CARRIZO-WILCOX AQUIFER | PANOLA COUNTY	6	6	6	6	6	6
MINING	I | MURVAUL LAKE/RESERVOIR	4	4	3	2	2	2
MINING	I | TOLEDO BEND LAKE/RESERVOIR	4	4	4	4	6	6
LIVESTOCK	I | CYPRESS LIVESTOCK LOCAL SUPPLY	30	30	30	30	30	30
CYPRESS BASIN TOTAL EXISTING SUPPLY		**44**	**44**	**43**	**42**	**44**	**44**
SABINE BASIN							
CARTHAGE	I | CARRIZO-WILCOX AQUIFER | PANOLA COUNTY	49	49	49	49	49	49
CARTHAGE	I | MURVAUL LAKE/RESERVOIR	1,601	1,602	1,595	1,599	1,610	1,621
BECKVILLE	I | CARRIZO-WILCOX AQUIFER | PANOLA COUNTY	581	581	581	581	581	581
GILL WSC	D | CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	126	126	126	126	126	126
GILL WSC	D | O' THE PINES LAKE/RESERVOIR	33	33	33	33	33	33
TATUM	I | CARRIZO-WILCOX AQUIFER | RUSK COUNTY	65	75	81	87	92	96
COUNTY-OTHER	I | CARRIZO-WILCOX AQUIFER | PANOLA COUNTY	1,503	1,503	1,503	1,503	1,503	1,503
COUNTY-OTHER	I | MURVAUL LAKE/RESERVOIR	291	291	291	291	291	291
MANUFACTURING	I | CARRIZO-WILCOX AQUIFER | PANOLA COUNTY	266	267	268	269	271	273
MANUFACTURING	I | MURVAUL LAKE/RESERVOIR	879	917	955	987	1,052	1,081
MANUFACTURING	I | SABINE RUN-OF-RIVER	114	114	114	114	114	114
MINING	I | CARRIZO-WILCOX AQUIFER | PANOLA COUNTY	1,489	1,489	1,489	1,489	1,489	1,489
MINING	I | MURVAUL LAKE/RESERVOIR	3,546	3,511	3,026	2,559	2,170	2,361
MINING	I | SABINE RUN-OF-RIVER	296	296	296	296	296	296
MINING	I | TOLEDO BEND LAKE/RESERVOIR	3,896	4,196	4,496	4,496	5,494	5,494
LIVESTOCK	I | CARRIZO-WILCOX AQUIFER | PANOLA COUNTY	416	416	416	416	416	416
LIVESTOCK	I | SABINE LIVESTOCK LOCAL SUPPLY	1,224	1,224	1,224	1,224	1,224	1,224
IRRIGATION	I | CARRIZO-WILCOX AQUIFER | PANOLA COUNTY	383	383	383	383	383	383

Water User Group (WUG) Existing Water Supply

REGION I	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
		2020	2030	2040	2050	2060	2070
PANOLA COUNTY							
SABINE BASIN							
IRRIGATION	I | SABINE RUN-OF-RIVER	191	191	191	191	191	191
SABINE BASIN TOTAL EXISTING SUPPLY		**16,949**	**17,264**	**17,117**	**16,693**	**17,385**	**17,622**
PANOLA COUNTY TOTAL EXISTING SUPPLY		**16,993**	**17,308**	**17,160**	**16,735**	**17,429**	**17,666**
POLK COUNTY							
NECHES BASIN							
CORRIGAN	I | OTHER AQUIFER | POLK COUNTY	292	292	292	292	292	292
COUNTY-OTHER	I | GULF COAST AQUIFER | POLK COUNTY	583	637	680	722	763	797
COUNTY-OTHER	I | OTHER AQUIFER | POLK COUNTY	160	160	160	160	160	160
MANUFACTURING	I | GULF COAST AQUIFER | POLK COUNTY	166	249	336	416	486	562
MANUFACTURING	I | OTHER AQUIFER | POLK COUNTY	447	447	447	447	447	447
MINING	I | GULF COAST AQUIFER | POLK COUNTY	83	83	83	83	83	83
MINING	I | NECHES OTHER LOCAL SUPPLY	20	20	20	20	20	20
MINING	I | OTHER AQUIFER | POLK COUNTY	83	83	83	83	83	83
LIVESTOCK	I | GULF COAST AQUIFER | POLK COUNTY	231	231	231	231	231	231
LIVESTOCK	I | NECHES LIVESTOCK LOCAL SUPPLY	396	396	396	396	396	396
LIVESTOCK	I | OTHER AQUIFER | POLK COUNTY	1	1	1	1	1	1
LIVESTOCK	I | YEGUA-JACKSON AQUIFER | POLK COUNTY	6	6	6	6	6	6
IRRIGATION	I | GULF COAST AQUIFER | POLK COUNTY	769	769	769	769	769	769
NECHES BASIN TOTAL EXISTING SUPPLY		**3,237**	**3,374**	**3,504**	**3,626**	**3,737**	**3,847**
POLK COUNTY TOTAL EXISTING SUPPLY		**3,237**	**3,374**	**3,504**	**3,626**	**3,737**	**3,847**
RUSK COUNTY							
NECHES BASIN							
HENDERSON	D | FORK LAKE/RESERVOIR	3,470	3,469	3,470	3,470	3,470	3,470
HENDERSON	I | CARRIZO-WILCOX AQUIFER | RUSK COUNTY	2,466	2,466	2,466	2,466	2,466	2,466
HENDERSON	I | STRIKER LAKE/RESERVOIR	0	0	0	0	0	0
NEW LONDON	I | CARRIZO-WILCOX AQUIFER | RUSK COUNTY	333	333	333	333	333	333
OVERTON	I | CARRIZO-WILCOX AQUIFER | RUSK COUNTY	100	100	100	100	100	100
WRIGHT CITY WSC	I | CARRIZO-WILCOX AQUIFER | RUSK COUNTY	84	84	84	84	84	85
COUNTY-OTHER	I | CARRIZO-WILCOX AQUIFER | RUSK COUNTY	2,446	2,446	2,446	2,446	2,446	2,446
COUNTY-OTHER	I | OTHER AQUIFER | RUSK COUNTY	4	4	4	4	4	4
MANUFACTURING	I | CARRIZO-WILCOX AQUIFER | RUSK COUNTY	333	357	377	395	422	450
MANUFACTURING	I | NECHES RUN-OF-RIVER	2	2	2	2	2	2
MINING	I | OTHER AQUIFER | RUSK COUNTY	270	270	270	270	270	270
MINING	I | SABINE OTHER LOCAL SUPPLY	210	0	0	0	0	0
LIVESTOCK	I | CARRIZO-WILCOX AQUIFER | RUSK COUNTY	156	156	156	156	156	156
LIVESTOCK	I | NECHES LIVESTOCK LOCAL SUPPLY	808	808	808	808	808	808
IRRIGATION	I | CARRIZO-WILCOX AQUIFER | RUSK COUNTY	215	215	215	215	215	215
IRRIGATION	I | NECHES RUN-OF-RIVER	86	86	86	86	86	86
NECHES BASIN TOTAL EXISTING SUPPLY		**10,983**	**10,796**	**10,817**	**10,835**	**10,862**	**10,891**
SABINE BASIN							
EASTON	I | CHEROKEE LAKE/RESERVOIR	4	5	5	6	6	7

Water User Group (WUG) Existing Water Supply

REGION I	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
		2020	2030	2040	2050	2060	2070
RUSK COUNTY							
SABINE BASIN							
ELDERVILLE WSC	D | FORK LAKE/RESERVOIR	97	97	97	97	97	96
ELDERVILLE WSC	I | CHEROKEE LAKE/RESERVOIR	95	96	96	96	95	94
HENDERSON	D | FORK LAKE/RESERVOIR	603	604	603	603	603	603
HENDERSON	I | CARRIZO-WILCOX AQUIFER | RUSK COUNTY	400	400	400	400	400	400
HENDERSON	I | SABINE RUN-OF-RIVER	10	10	10	10	10	10
HENDERSON	I | STRIKER LAKE/RESERVOIR	0	0	0	0	0	0
KILGORE	D | CARRIZO-WILCOX AQUIFER | GREGG COUNTY	365	370	370	369	366	361
KILGORE	D | FORK LAKE/RESERVOIR	506	841	841	839	832	821
NEW LONDON	I | CARRIZO-WILCOX AQUIFER | RUSK COUNTY	268	268	268	268	268	268
OVERTON	I | CARRIZO-WILCOX AQUIFER | RUSK COUNTY	578	578	578	578	578	578
TATUM	I | CARRIZO-WILCOX AQUIFER | RUSK COUNTY	358	348	342	336	336	367
WEST GREGG SUD	D | CARRIZO-WILCOX AQUIFER | GREGG COUNTY	27	28	28	27	27	27
CHALK HILL SUD	I | CARRIZO-WILCOX AQUIFER | RUSK COUNTY	1,043	1,043	1,043	1,043	1,043	1,043
CROSS ROADS SUD	D | FORK LAKE/RESERVOIR	248	248	249	249	248	248
CROSS ROADS SUD	I | CARRIZO-WILCOX AQUIFER | RUSK COUNTY	397	398	399	399	398	397
COUNTY-OTHER	I | CARRIZO-WILCOX AQUIFER | RUSK COUNTY	1,800	1,800	1,800	1,800	1,800	1,800
COUNTY-OTHER	I | OTHER AQUIFER | RUSK COUNTY	81	81	81	81	81	81
MANUFACTURING	D | FORK LAKE/RESERVOIR	1	1	1	1	1	1
MANUFACTURING	I | CARRIZO-WILCOX AQUIFER | RUSK COUNTY	13	14	15	15	16	18
MINING	I | CARRIZO-WILCOX AQUIFER | RUSK COUNTY	201	201	201	201	201	201
MINING	I | OTHER AQUIFER | RUSK COUNTY	214	214	214	214	214	214
MINING	I | SABINE OTHER LOCAL SUPPLY	1,020	1,230	1,230	1,230	1,230	1,230
STEAM ELECTRIC POWER	I | CARRIZO-WILCOX AQUIFER | RUSK COUNTY	1,279	1,279	1,279	1,279	1,279	1,279
STEAM ELECTRIC POWER	I | MARTIN LAKE/RESERVOIR	25,000	25,000	25,000	25,000	25,000	25,000
STEAM ELECTRIC POWER	I | TOLEDO BEND LAKE/RESERVOIR	17,922	17,922	17,922	17,922	17,922	17,922
LIVESTOCK	I | CARRIZO-WILCOX AQUIFER | RUSK COUNTY	224	232	241	252	262	262
LIVESTOCK	I | SABINE LIVESTOCK LOCAL SUPPLY	308	308	308	308	308	308
IRRIGATION	I | OTHER AQUIFER | RUSK COUNTY	170	170	170	170	170	170
IRRIGATION	I | SABINE RUN-OF-RIVER	127	127	127	127	127	127
SABINE BASIN TOTAL EXISTING SUPPLY		**53,359**	**53,913**	**53,918**	**53,920**	**53,918**	**53,933**
RUSK COUNTY TOTAL EXISTING SUPPLY		**64,342**	**64,709**	**64,735**	**64,755**	**64,780**	**64,824**
SABINE COUNTY							
NECHES BASIN							
PINELAND	I | CARRIZO-WILCOX AQUIFER | SABINE COUNTY	88	88	88	88	88	88
G M WSC	I | TOLEDO BEND LAKE/RESERVOIR	100	100	100	100	100	100
COUNTY-OTHER	I | CARRIZO-WILCOX AQUIFER | RUSK COUNTY	85	85	85	85	85	85
COUNTY-OTHER	I | CARRIZO-WILCOX AQUIFER | SABINE COUNTY	10	10	10	10	10	10
COUNTY-OTHER	I | SPARTA AQUIFER | SABINE COUNTY	40	40	40	40	40	40
COUNTY-OTHER	I | TOLEDO BEND LAKE/RESERVOIR	29	28	29	29	29	29

Water User Group (WUG) Existing Water Supply

REGION I	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
		2020	2030	2040	2050	2060	2070
SABINE COUNTY							
NECHES BASIN							
COUNTY-OTHER	I | YEGUA-JACKSON AQUIFER | SABINE COUNTY	59	59	59	59	59	59
MANUFACTURING	I | CARRIZO-WILCOX AQUIFER | SABINE COUNTY	45	45	45	45	45	45
MANUFACTURING	I | DIRECT REUSE	20	20	20	20	20	20
MANUFACTURING	I | NECHES RUN-OF-RIVER	182	182	182	182	182	182
MANUFACTURING	I | YEGUA-JACKSON AQUIFER | SABINE COUNTY	600	600	600	600	600	600
MINING	I | TOLEDO BEND LAKE/RESERVOIR	320	319	319	319	320	320
MINING	I | YEGUA-JACKSON AQUIFER | SABINE COUNTY	44	44	44	44	44	44
LIVESTOCK	I | CARRIZO-WILCOX AQUIFER | SABINE COUNTY	8	8	8	8	8	8
LIVESTOCK	I | NECHES LIVESTOCK LOCAL SUPPLY	71	71	71	71	71	71
LIVESTOCK	I | SPARTA AQUIFER | SABINE COUNTY	3	3	3	3	3	3
NECHES BASIN TOTAL EXISTING SUPPLY		**1,704**	**1,702**	**1,703**	**1,703**	**1,704**	**1,704**
SABINE BASIN							
HEMPHILL	I | TOLEDO BEND LAKE/RESERVOIR	743	743	743	743	743	743
G M WSC	I | CARRIZO-WILCOX AQUIFER | SABINE COUNTY	270	270	270	270	270	270
G M WSC	I | TOLEDO BEND LAKE/RESERVOIR	126	127	127	127	127	127
COUNTY-OTHER	I | CARRIZO-WILCOX AQUIFER | SABINE COUNTY	85	85	85	85	85	85
COUNTY-OTHER	I | OTHER AQUIFER | SABINE COUNTY	3	3	3	3	3	3
COUNTY-OTHER	I | TOLEDO BEND LAKE/RESERVOIR	450	451	450	450	450	450
MINING	I | OTHER AQUIFER | SABINE COUNTY	234	234	234	234	234	234
MINING	I | TOLEDO BEND LAKE/RESERVOIR	1,680	1,681	1,681	1,681	1,680	1,680
LIVESTOCK	I | CARRIZO-WILCOX AQUIFER | SABINE COUNTY	3	3	3	3	3	3
LIVESTOCK	I | SABINE LIVESTOCK LOCAL SUPPLY	634	634	634	634	634	634
LIVESTOCK	I | SPARTA AQUIFER | SABINE COUNTY	3	3	3	3	3	3
LIVESTOCK	I | YEGUA-JACKSON AQUIFER | SABINE COUNTY	10	10	10	10	10	10
SABINE BASIN TOTAL EXISTING SUPPLY		**4,241**	**4,244**	**4,243**	**4,243**	**4,242**	**4,242**
SABINE COUNTY TOTAL EXISTING SUPPLY		**5,945**	**5,946**	**5,946**	**5,946**	**5,946**	**5,946**
SAN AUGUSTINE COUNTY							
NECHES BASIN							
SAN AUGUSTINE	I | SAN AUGUSTINE LAKE/RESERVOIR	519	517	517	517	517	517
COUNTY-OTHER	I | CARRIZO-WILCOX AQUIFER | NACOGDOCHES COUNTY	1	1	1	1	1	1
COUNTY-OTHER	I | CARRIZO-WILCOX AQUIFER | SAN AUGUSTINE COUNTY	428	428	428	428	428	428
COUNTY-OTHER	I | GULF COAST AQUIFER | JASPER COUNTY	2	2	2	2	2	2
COUNTY-OTHER	I | OTHER AQUIFER | SAN AUGUSTINE COUNTY	156	156	156	156	156	156
COUNTY-OTHER	I | SAN AUGUSTINE LAKE/RESERVOIR	98	100	100	100	100	100
COUNTY-OTHER	I | SPARTA AQUIFER | SAN AUGUSTINE COUNTY	79	79	79	79	79	79
COUNTY-OTHER	I | YEGUA-JACKSON AQUIFER | SABINE COUNTY	4	4	4	4	4	4
COUNTY-OTHER	I | YEGUA-JACKSON AQUIFER | SAN AUGUSTINE COUNTY	231	231	231	231	231	231
MANUFACTURING	I | CARRIZO-WILCOX AQUIFER | SAN AUGUSTINE COUNTY	17	17	17	17	17	17
MINING	I | OTHER AQUIFER | SAN AUGUSTINE COUNTY	1,230	1,230	1,230	1,230	1,230	1,230
MINING	I | SAN AUGUSTINE LAKE/RESERVOIR	468	518	594	609	624	635

Water User Group (WUG) Existing Water Supply

REGION I	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
		2020	2030	2040	2050	2060	2070
SAN AUGUSTINE COUNTY							
NECHES BASIN							
LIVESTOCK	I | CARRIZO-WILCOX AQUIFER | SAN AUGUSTINE COUNTY	339	427	527	644	772	772
LIVESTOCK	I | NECHES LIVESTOCK LOCAL SUPPLY	465	465	465	465	465	465
LIVESTOCK	I | SPARTA AQUIFER | SAN AUGUSTINE COUNTY	12	12	12	12	12	12
IRRIGATION	I | CARRIZO-WILCOX AQUIFER | SAN AUGUSTINE COUNTY	56	56	56	56	56	56
NECHES BASIN TOTAL EXISTING SUPPLY		**4,105**	**4,243**	**4,419**	**4,551**	**4,694**	**4,705**
SABINE BASIN							
G M WSC	I | CARRIZO-WILCOX AQUIFER | SAN AUGUSTINE COUNTY	26	26	26	26	26	26
G M WSC	I | TOLEDO BEND LAKE/RESERVOIR	50	50	50	50	50	50
COUNTY-OTHER	I | CARRIZO-WILCOX AQUIFER | SAN AUGUSTINE COUNTY	88	88	88	88	88	88
MINING	I | SAN AUGUSTINE LAKE/RESERVOIR	200	150	74	59	44	33
LIVESTOCK	I | CARRIZO-WILCOX AQUIFER | SAN AUGUSTINE COUNTY	16	25	36	48	62	62
LIVESTOCK	I | OTHER AQUIFER | SAN AUGUSTINE COUNTY	9	9	9	9	9	9
LIVESTOCK	I | SABINE LIVESTOCK LOCAL SUPPLY	71	71	71	71	71	71
LIVESTOCK	I | YEGUA-JACKSON AQUIFER | SAN AUGUSTINE COUNTY	9	9	9	9	9	9
IRRIGATION	I | CARRIZO-WILCOX AQUIFER | SAN AUGUSTINE COUNTY	6	6	6	6	6	6
SABINE BASIN TOTAL EXISTING SUPPLY		**475**	**434**	**369**	**366**	**365**	**354**
SAN AUGUSTINE COUNTY TOTAL EXISTING SUPPLY		**4,580**	**4,677**	**4,788**	**4,917**	**5,059**	**5,059**
SHELBY COUNTY							
NECHES BASIN							
TIMPSON	I | CARRIZO-WILCOX AQUIFER | SHELBY COUNTY	7	7	7	8	8	8
COUNTY-OTHER	I | PINKSTON LAKE/RESERVOIR	152	157	161	168	175	183
COUNTY-OTHER	I | TIMPSON LAKE/RESERVOIR	350	350	350	350	350	350
MINING	I | CARRIZO-WILCOX AQUIFER | SHELBY COUNTY	483	483	483	483	483	482
MINING	I | TOLEDO BEND LAKE/RESERVOIR	448	364	280	280	0	0
LIVESTOCK	I | CARRIZO-WILCOX AQUIFER | SHELBY COUNTY	108	108	108	108	108	108
LIVESTOCK	I | NECHES LIVESTOCK LOCAL SUPPLY	334	334	334	334	334	334
IRRIGATION	I | CARRIZO-WILCOX AQUIFER | SHELBY COUNTY	16	16	16	16	16	16
NECHES BASIN TOTAL EXISTING SUPPLY		**1,898**	**1,819**	**1,739**	**1,747**	**1,474**	**1,481**
SABINE BASIN							
CENTER	I | CARRIZO-WILCOX AQUIFER | SHELBY COUNTY	8	8	8	8	8	178
CENTER	I | CENTER LAKE/RESERVOIR	306	324	340	357	375	362
CENTER	I | PINKSTON LAKE/RESERVOIR	1,541	1,634	1,716	1,801	1,887	1,825
JOAQUIN	I | TOLEDO BEND LAKE/RESERVOIR	183	188	193	201	208	215
TENAHA	I | CARRIZO-WILCOX AQUIFER | SHELBY COUNTY	442	442	442	442	442	442
TIMPSON	I | CARRIZO-WILCOX AQUIFER | SHELBY COUNTY	558	558	558	558	558	558
COUNTY-OTHER	I | CARRIZO-WILCOX AQUIFER | SHELBY COUNTY	1,614	1,666	1,716	1,783	1,863	1,943
COUNTY-OTHER	I | CENTER LAKE/RESERVOIR	30	31	32	33	35	36
COUNTY-OTHER	I | TOLEDO BEND LAKE/RESERVOIR	180	175	170	162	155	148
MANUFACTURING	I | CARRIZO-WILCOX AQUIFER | SHELBY COUNTY	175	175	175	175	175	175

Water User Group (WUG) Existing Water Supply

REGION I	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
		2020	2030	2040	2050	2060	2070
SHELBY COUNTY							
SABINE BASIN							
MANUFACTURING	I | CENTER LAKE/RESERVOIR	248	269	290	308	331	356
MANUFACTURING	I | DIRECT REUSE	151	164	177	188	202	217
MANUFACTURING	I | PINKSTON LAKE/RESERVOIR	1,247	1,354	1,460	1,555	1,670	1,792
MINING	I | CARRIZO-WILCOX AQUIFER | SHELBY COUNTY	1,242	1,242	1,242	1,242	1,242	1,243
MINING	I | TOLEDO BEND LAKE/RESERVOIR	1,152	936	720	720	0	0
LIVESTOCK	I | CARRIZO-WILCOX AQUIFER | SHELBY COUNTY	458	458	458	458	458	458
LIVESTOCK	I | SABINE LIVESTOCK LOCAL SUPPLY	2,998	2,998	2,998	2,998	2,998	2,998
IRRIGATION	I | DIRECT REUSE	82	82	82	82	82	82
SABINE BASIN TOTAL EXISTING SUPPLY		**12,615**	**12,704**	**12,777**	**13,071**	**12,689**	**13,028**
SHELBY COUNTY TOTAL EXISTING SUPPLY		**14,513**	**14,523**	**14,516**	**14,818**	**14,163**	**14,509**
SMITH COUNTY							
NECHES BASIN							
TYLER	I | CARRIZO-WILCOX AQUIFER | SMITH COUNTY	2,228	2,370	2,522	2,703	2,905	3,115
TYLER	I | PALESTINE LAKE/RESERVOIR	8,353	8,888	9,456	10,138	10,892	11,679
TYLER	I | TYLER LAKE/RESERVOIR	9,468	10,073	10,718	11,490	12,344	13,237
ARP	I | CARRIZO-WILCOX AQUIFER | SMITH COUNTY	164	168	171	178	185	194
BULLARD	I | CARRIZO-WILCOX AQUIFER | CHEROKEE COUNTY	16	16	16	16	16	16
BULLARD	I | CARRIZO-WILCOX AQUIFER | SMITH COUNTY	587	588	589	590	591	591
CRYSTAL SYSTEMS INC	D | CARRIZO-WILCOX AQUIFER | SMITH COUNTY	165	158	138	105	50	0
CRYSTAL SYSTEMS INC	I | CARRIZO-WILCOX AQUIFER | SMITH COUNTY	83	67	46	20	0	0
DEAN WSC	I | CARRIZO-WILCOX AQUIFER | SMITH COUNTY	765	774	786	808	836	867
JACKSON WSC	D | CARRIZO-WILCOX AQUIFER | SMITH COUNTY	197	207	218	234	253	274
LINDALE	I | CARRIZO-WILCOX AQUIFER | SMITH COUNTY	424	424	424	424	424	424
LINDALE RURAL WSC	I | CARRIZO-WILCOX AQUIFER | SMITH COUNTY	221	229	239	253	271	290
NEW CHAPEL HILL	I | CARRIZO-WILCOX AQUIFER | SMITH COUNTY	237	246	255	266	277	289
NOONDAY	I | CARRIZO-WILCOX AQUIFER | SMITH COUNTY	189	221	254	291	330	369
OVERTON	I | CARRIZO-WILCOX AQUIFER | SMITH COUNTY	33	40	48	56	65	74
SOUTHERN UTILITIES COMPANY	I | CARRIZO-WILCOX AQUIFER | SMITH COUNTY	5,957	6,134	6,343	6,628	6,970	7,330
SOUTHERN UTILITIES COMPANY	I | PALESTINE LAKE/RESERVOIR	130	134	138	145	152	160
SOUTHERN UTILITIES COMPANY	I | TYLER LAKE/RESERVOIR	147	152	157	164	172	181
TROUP	I | CARRIZO-WILCOX AQUIFER | SMITH COUNTY	398	428	459	497	539	582
WHITEHOUSE	I | CARRIZO-WILCOX AQUIFER | SMITH COUNTY	501	666	839	1,035	1,245	1,463
WHITEHOUSE	I | PALESTINE LAKE/RESERVOIR	311	311	311	311	311	311
WHITEHOUSE	I | TYLER LAKE/RESERVOIR	353	353	353	353	353	353
R-P-M WSC	D | CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	16	15	15	14	14	14
R-P-M WSC	D | QUEEN CITY AQUIFER | VAN ZANDT COUNTY	15	14	14	13	14	14

Water User Group (WUG) Existing Water Supply

REGION I	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
		2020	2030	2040	2050	2060	2070
SMITH COUNTY							
NECHES BASIN							
WALNUT GROVE WSC	I | CARRIZO-WILCOX AQUIFER | SMITH COUNTY	593	593	593	593	593	593
WALNUT GROVE WSC	I | JACKSONVILLE LAKE/RESERVOIR	13	13	13	13	13	13
WALNUT GROVE WSC	I | PALESTINE LAKE/RESERVOIR	623	623	623	623	623	623
WALNUT GROVE WSC	I | TYLER LAKE/RESERVOIR	706	706	706	706	706	706
WRIGHT CITY WSC	I | CARRIZO-WILCOX AQUIFER | SMITH COUNTY	403	403	403	403	403	415
COUNTY-OTHER	I | CARRIZO-WILCOX AQUIFER | SMITH COUNTY	26	26	26	26	26	26
COUNTY-OTHER	I | PALESTINE LAKE/RESERVOIR	100	100	100	100	100	100
COUNTY-OTHER	I | QUEEN CITY AQUIFER | SMITH COUNTY	584	761	941	1,143	1,356	1,577
COUNTY-OTHER	I | TYLER LAKE/RESERVOIR	113	113	113	113	113	113
MANUFACTURING	I | CARRIZO-WILCOX AQUIFER | SMITH COUNTY	616	648	678	704	740	779
MANUFACTURING	I | OTHER AQUIFER | SMITH COUNTY	209	209	209	209	209	209
MANUFACTURING	I | PALESTINE LAKE/RESERVOIR	1,380	1,499	1,614	1,711	1,844	1,988
MANUFACTURING	I | TYLER LAKE/RESERVOIR	1,451	1,586	1,716	1,826	1,977	2,140
MINING	I | OTHER AQUIFER | SMITH COUNTY	26	26	26	26	26	26
LIVESTOCK	I | NECHES LIVESTOCK LOCAL SUPPLY	605	605	605	605	605	605
LIVESTOCK	I | QUEEN CITY AQUIFER | SMITH COUNTY	510	510	510	510	510	510
IRRIGATION	I | BELLWOOD LAKE/RESERVOIR	400	400	400	400	400	400
IRRIGATION	I | CARRIZO-WILCOX AQUIFER | SMITH COUNTY	225	225	225	225	225	0
IRRIGATION	I | NECHES RUN-OF-RIVER	50	50	50	50	50	50
IRRIGATION	I | PALESTINE LAKE/RESERVOIR	487	478	469	462	456	456
IRRIGATION	I | QUEEN CITY AQUIFER | SMITH COUNTY	324	365	406	446	487	753
NECHES BASIN TOTAL EXISTING SUPPLY		**40,402**	**42,615**	**44,935**	**47,626**	**50,671**	**53,909**
SMITH COUNTY TOTAL EXISTING SUPPLY		**40,402**	**42,615**	**44,935**	**47,626**	**50,671**	**53,909**
TRINITY COUNTY							
NECHES BASIN							
GROVETON	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	283	281	283	285	283	285
GROVETON	H | YEGUA-JACKSON AQUIFER | TRINITY COUNTY	29	30	29	28	29	31
COUNTY-OTHER	H | LIVINGSTON-WALLISVILLE LAKE/RESERVOIR SYSTEM	435	436	436	436	435	436
COUNTY-OTHER	I | YEGUA-JACKSON AQUIFER | TRINITY COUNTY	560	560	560	560	560	560
MINING	H | YEGUA-JACKSON AQUIFER | TRINITY COUNTY	5	5	5	5	5	5
LIVESTOCK	I | NECHES LIVESTOCK LOCAL SUPPLY	449	449	449	449	449	449
LIVESTOCK	I | YEGUA-JACKSON AQUIFER | TRINITY COUNTY	29	29	29	29	29	29
IRRIGATION	I | NECHES RUN-OF-RIVER	62	62	62	62	62	62
IRRIGATION	I | YEGUA-JACKSON AQUIFER | TRINITY COUNTY	108	108	108	108	108	108
NECHES BASIN TOTAL EXISTING SUPPLY		**1,960**	**1,960**	**1,961**	**1,962**	**1,960**	**1,965**
TRINITY COUNTY TOTAL EXISTING SUPPLY		**1,960**	**1,960**	**1,961**	**1,962**	**1,960**	**1,965**
TYLER COUNTY							
NECHES BASIN							
COLMESNEIL	I | GULF COAST AQUIFER | TYLER COUNTY	355	355	355	355	355	355

Water User Group (WUG) Existing Water Supply

REGION I	SOURCE REGION | SOURCE NAME	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
		2020	2030	2040	2050	2060	2070
TYLER COUNTY							
NECHES BASIN							
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	I | GULF COAST AQUIFER | TYLER COUNTY	5	5	5	5	5	5
TYLER COUNTY WSC	I | GULF COAST AQUIFER | TYLER COUNTY	1,051	1,051	1,051	1,051	1,051	1,051
WOODVILLE	I | GULF COAST AQUIFER | TYLER COUNTY	1,159	1,159	1,159	1,159	1,159	1,159
WOODVILLE	I | SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	4,762	4,762	4,762	4,762	4,762	4,762
IVANHOE	I | GULF COAST AQUIFER | TYLER COUNTY	217	217	217	217	217	217
IVANHOE NORTH	I | GULF COAST AQUIFER | TYLER COUNTY	217	217	217	217	217	217
COUNTY-OTHER	I | GULF COAST AQUIFER | TYLER COUNTY	1,494	1,448	1,404	1,380	1,376	1,376
MANUFACTURING	I | GULF COAST AQUIFER | TYLER COUNTY	476	483	490	496	501	506
MINING	I | GULF COAST AQUIFER | TYLER COUNTY	229	229	229	229	229	229
MINING	I | NECHES OTHER LOCAL SUPPLY	8	8	8	8	8	8
STEAM ELECTRIC POWER	I | GULF COAST AQUIFER | TYLER COUNTY	191	191	191	191	191	191
STEAM ELECTRIC POWER	I | SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	838	838	838	838	838	838
LIVESTOCK	I | GULF COAST AQUIFER | TYLER COUNTY	75	75	75	75	75	75
LIVESTOCK	I | NECHES LIVESTOCK LOCAL SUPPLY	239	239	239	239	239	239
IRRIGATION	I | GULF COAST AQUIFER | TYLER COUNTY	559	559	559	559	559	559
IRRIGATION	I | NECHES RUN-OF-RIVER	123	123	123	123	123	123
NECHES BASIN TOTAL EXISTING SUPPLY		**11,998**	**11,959**	**11,922**	**11,904**	**11,905**	**11,910**
TYLER COUNTY TOTAL EXISTING SUPPLY		**11,998**	**11,959**	**11,922**	**11,904**	**11,905**	**11,910**
REGION I TOTAL EXISTING SUPPLY		**1,027,695**	**1,134,166**	**1,154,625**	**1,174,320**	**1,194,601**	**1,216,723**

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Appendix 3-C

Desired Future Conditions and Modeled Available Groundwater Report

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The TWDB Groundwater Resources Division's Groundwater Availability Modeling Section has prepared GAM Run reports for each Groundwater Management Area (GMA) in Texas. The ETRWPA falls within two of these GMAs, GMA 11 and GMA 14. The reports related to these two GMAs are provided in this appendix.

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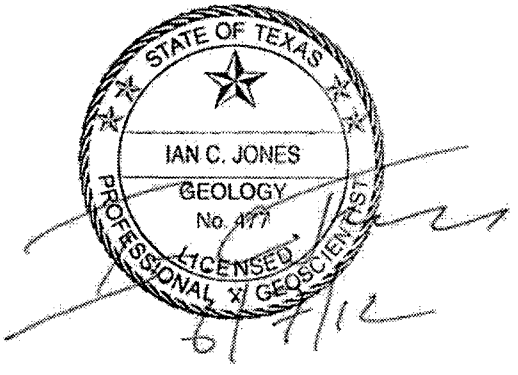
GAM Run 10-016 MAG (Version 2): Model Run for the Yegua-Jackson, Sparta, Queen City, and Carrizo-Wilcox Aquifers in Groundwater Management Area 11

by Ian C. Jones, Ph.D., P.G., Jerry Shi, Ph.D., P.G., and Oliver Wade, P.G.
Texas Water Development Board
Groundwater Resources Division
Groundwater Availability Modeling Section
(512) 463-6641
June 7, 2012



The seal appearing on this document was authorized by Ian C. Jones, P.G. 477, on June 7, 2012.

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GAM RUN 10-016 MAG (VERSION 2): MODEL RUN FOR THE YEGUA-JACKSON, SPARTA, QUEEN CITY, AND CARRIZO-WILCOX AQUIFERS IN GROUNDWATER MANAGEMENT AREA 11

by Ian C. Jones, Ph.D., P.G., Jerry Shi, Ph.D., P.G., and Wade Oliver, P.G.
Texas Water Development Board
Groundwater Resources Division
Groundwater Availability Modeling Section
(512) 463-6641
June 7, 2012

EXECUTIVE SUMMARY:

The modeled available groundwater for Groundwater Management Area 11 is summarized for the Carrizo-Wilcox (Table 1), Queen City (Table 2), Sparta (Table 3), and Yegua-Jackson (Table 4) aquifers. Modeled available groundwater values for these aquifers are also summarized by county (Table 5), regional planning area (Table 6), river basin (Table 7), and groundwater conservation district (Table 8). The pumping estimates are based on Groundwater Availability Modeling Task 10-009. This previously completed model simulation meets the desired future condition adopted by the members of Groundwater Management Area 11 of an overall average drawdown of 17 feet.

The modeled available groundwater within the groundwater conservation districts that reflects the desired future conditions adopted by Groundwater Management Area 11 declines from approximately 195,000 acre-feet per year in 2010 to 189,000 acre-feet per year in 2060 (Table 8). When areas outside of groundwater conservation districts are considered, the modeled available groundwater is approximately 559,000 acre-feet per year in 2010 and declines to 543,000 acre-feet per year in 2060.

The total modeled available groundwater for each aquifer in Groundwater Management Area 11, including areas outside a groundwater conservation district, is also summarized by groundwater conservation district for each decade between 2010 and 2060 (Tables 9 through 15).

REQUESTOR:

Ms. Monique Norman, General Counsel, and Mr. Len Luscomb, General Manager, of Rusk County Groundwater Conservation District on behalf of Groundwater Management Area 11.

DESCRIPTION OF REQUEST:

In a letter dated May 4th, 2010 and received by the Texas Water Development Board (TWDB) on May 6th, 2010, Ms. Norman and Mr. Luscomb provided the Texas Water Development Board (TWDB) with the desired future condition (DFC) of the Carrizo-Wilcox, Queen City, Sparta, and Yegua-Jackson aquifers within Groundwater Management Area 11. The desired future condition for the aquifers, as described in Resolution No. 1 and adopted April 13, 2010 by the groundwater conservation districts (GCDs) within Groundwater Management Area 11, is described below:

> *The Desired Future Condition is defined as allowing up to an average draw down of 17 feet that applies throughout [Groundwater Management Area] 11. ... The Desired Future Condition of 17 feet average drawdown is based on 178 individual drawdowns by aquifer and county.*

METHODS:

The aquifers referred to above are covered by two groundwater availability models: one for the northern portion of the Carrizo-Wilcox, Queen City, and Sparta aquifers (Fryar and others, 2003; Kelley and others, 2004) and one for the Yegua-Jackson Aquifer (Deeds and others, 2010). The aquifers covered by each of the groundwater availability models are shown in Figures 1 and 2.

In the previously completed Groundwater Availability Modeling Task 10-009, both of these models were run and achieved the above desired future condition (Oliver, 2010). The pumping results for Groundwater Management Area 11 presented here, taken directly from the simulations documented in Oliver (2010), have been divided by county, regional water planning area, river basin, and groundwater conservation district. These areas are shown in Figure 3. See Oliver (2010) for a full description of the methods, assumptions, and results for the groundwater availability model run.

The model results presented in this report were extracted from all areas of the model representing the units of the Carrizo-Wilcox, Queen City, Sparta, and Yegua-Jackson aquifers. This includes some areas outside the "official" boundaries of the aquifers shown in the 2007 State Water Plan (TWDB, 2007). For this reason, the area over which the average drawdown that meets the desired future condition was calculated may reflect water of quality ranging from fresh to brackish and saline.

PARAMETERS AND ASSUMPTIONS:

Northern Portion of the Carrizo-Wilcox, Queen City, and Sparta Aquifers

The parameters and assumptions for the groundwater availability model run for the northern portion of the Carrizo-Wilcox, Queen City, and Sparta Aquifers are described below:

- Version 2.01 of the groundwater availability model for the northern portion of the Carrizo-Wilcox, Queen City, and Sparta Aquifers was used for this analysis. See Fryar and others (2003) and Kelley and others (2004) for assumptions and limitations of the groundwater availability model for the northern part of the Carrizo-Wilcox, Queen City, and Sparta Aquifers.
- The model includes eight layers, representing:
    1. Sparta Aquifer (Layer 1)
    2. Weches confining unit (Layer 2)
    3. Queen City Aquifer (Layer 3)
    4. Reklaw confining unit (Layer 4)
    5. Carrizo Aquifer (Layer 5)
    6. Upper Wilcox Aquifer (Layer 6)
    7. Middle Wilcox Aquifer (Layer 7)
    8. Lower Wilcox Aquifer (Layer 8)
- In the Sabine Uplift area, a portion of Layer 8, though active in the model, is outside the extent of the Lower Wilcox unit of the Carrizo-Wilcox Aquifer as described in Kelley and others (2004). Because of this, results for Layer 8 in

this area were not included when determining the average drawdown over Groundwater Management Area 11.

- Cells were assigned to individual counties and groundwater conservation districts as shown in the September 14, 2009 version of the cell assignment model grid for the northern portion of the Carrizo-Wilcox, Queen City, and Sparta aquifers.
- Recharge rates are based on average (1961 to 1990) precipitation (Kelley and others, 2004).

Yegua-Jackson Aquifer

The parameters and assumptions for the model run using the groundwater availability model for the Yegua-Jackson Aquifer are described below:

- Version 1.01 of the groundwater availability model for the Yegua-Jackson Aquifer was used for this analysis. See Deeds and others (2010) for assumptions and limitations of the groundwater availability model.
- The model includes five layers representing the Yegua-Jackson Aquifer and the overlying Catahoula unit.
- Cells were assigned to individual counties and groundwater conservation districts as shown in the March 23, 2010 version of the cell assignment model grid for the Yegua-Jackson Aquifer.
- The recharge used for the model run represents average recharge as described in Deeds and others (2010).

MODELED AVAILABLE GROUNDWATER AND PERMITTING:

As defined in Chapter 36 of the Texas Water Code, "modeled available groundwater" is the estimated average amount of water that may be produced annually to achieve a desired future condition. This is distinct from "managed available groundwater", which was a permitting value and accounted for the estimated use of the aquifer exempt from permitting. This change was made to reflect changes in statute by the 82nd Texas Legislature, effective September 1, 2011.

Groundwater conservation districts are required to consider modeled available groundwater, along with several other factors, when issuing permits in order to

manage groundwater production to achieve the desired future condition(s). The other factors districts must consider include annual precipitation and production patterns, the estimated amount of pumping exempt from permitting, existing permits, and a reasonable estimate of actual groundwater production under existing permits. The estimated amount of pumping exempt from permitting, which the TWDB is now required to develop after soliciting input from applicable groundwater conservation districts, will be provided in a separate report.

RESULTS:

The modeled available groundwater in Groundwater Management Area 11 from the Carrizo-Wilcox, Queen City, Sparta, and Yegua-Jackson aquifers that achieves the desired future condition declines from approximately 559,000 acre-feet per year in 2010 to 543,000 acre-feet per year in 2060. Tables 1 through 4 contain the estimates of total pumping for the Carrizo-Wilcox, Queen City, Sparta, and Yegua-Jackson aquifers, respectively. In these tables, results have been subdivided by county, regional water planning area, and river basin for use in the regional water planning process.

Tables 5 through 7 show the modeled available groundwater for all aquifers summarized by county, regional water planning area, and river basin, respectively, within Groundwater Management Area 11. The modeled available groundwater for all aquifers within and outside the groundwater conservation districts in Groundwater Management Area 11 are presented in Table 8. Tables 9 through 15 show the modeled available groundwater for each model layer—Lower Wilcox Formation, Middle Wilcox Formation, Upper Wilcox Formation, Carrizo Formation, Queen City Aquifer, Sparta Aquifer, and Yegua-Jackson Aquifer– within and outside the groundwater conservation districts in Groundwater Management Area 11.

LIMITATIONS:

The groundwater model used in completing this analysis is the best available scientific tool that can be used to meet the stated objective(s). To the extent that this analysis will be used for planning purposes and/or regulatory purposes related to pumping in the past and into the future, it is important to recognize the assumptions and limitations associated with the use of the results. In reviewing the use of models in environmental regulatory decision-making, the National Research Council (2007) noted:

> "Models will always be constrained by computational limitations, assumptions, and knowledge gaps. They can best be viewed as tools to help inform decisions rather than as machines to generate truth or make decisions. Scientific advances will never make it possible to build a perfect model that accounts for every aspect of reality or to prove that a given model is correct in all respects for a particular regulatory application. These characteristics make evaluation of a regulatory model more complex than solely a comparison of measurement data with model results."

A key aspect of using the groundwater model to evaluate historic groundwater flow conditions includes the assumptions about the location in the aquifer where historic pumping was placed. Understanding the amount and location of historic pumping is as important as evaluating the volume of groundwater flow into and out of the district, between aquifers within the district (as applicable), interactions with surface water (as applicable), recharge to the aquifer system (as applicable), and other metrics that describe the impacts of that pumping. In addition, assumptions regarding precipitation, recharge, and streamflow are specific to a particular historic time period.

Because the application of the groundwater model was designed to address regional scale questions, the results are most effective on a regional scale. The TWDB makes no warranties or representations relating to the actual conditions of any aquifer at a particular location or at a particular time.

It is important for groundwater conservation districts to monitor groundwater pumping and overall conditions of the aquifer. Because of the limitations of the groundwater model and the assumptions in this analysis, it is important that the groundwater conservation districts work with the TWDB to refine this analysis in the future given the reality of how the aquifer responds to the actual amount and location of pumping now and in the future. Historic precipitation patterns also need to be placed in context as future climatic conditions, such as dry and wet year precipitation patterns, may differ and affect groundwater flow conditions.

REFERENCES:

Deeds, N.E., Yan, T., Singh, A., Jones, T.L., Kelley, V.A., Knox, P.R., Young, S.C., 2010, Groundwater availability model for the Yegua-Jackson Aquifer: Final report prepared for the Texas Water Development Board by INTERA, Inc., 582 p.

Fryar, D., Senger, R., Deeds, N., Pickens, J., Jones, T., Whallon, A. J., and Dean, K. E., 2003, Groundwater Availability Model for the Northern Carrizo-Wilcox Aquifer: contract report to the Texas Water Development Board, 529 p.

Kelley, V. A., Deeds, N. E., Fryar, D. G., and Nicot, J. P., 2004, Groundwater availability models for the Queen City and Sparta aquifers: contract report to the Texas Water Development Board, 867 p.

National Research Council, 2007, Models in Environmental Regulatory Decision Making. Committee on Models in the Regulatory Decision Process, National Academies Press, Washington D.C., 287 p.

Oliver, W., 2010, Texas Water Development Board, GAM Task 10-009 Model Run Report, 11 p.

Texas Water Development Board, 2007, Water for Texas - 2007—Volumes I-III; Texas Water Development Board Document No. GP-8-1, 392 p.

TABLE 1. MODELED AVAILABLE GROUNDWATER FOR THE CARRIZO-WILCOX AQUIFER IN GROUNDWATER MANAGEMENT AREA 11. RESULTS ARE IN ACRE-FEET PER YEAR AND ARE DIVIDED BY COUNTY, REGIONAL WATER PLANNING AREA, AND RIVER BASIN.

County	Region	Basin	Year					
			2010	2020	2030	2040	2050	2060
Anderson	I	Neches	4,393	4,393	4,393	4,393	4,393	4,393
		Trinity	5,684	5,684	5,684	5,684	5,684	5,684
Angelina	I	Neches	26,414	26,414	26,414	26,414	26,414	26,414
Bowie	D	Sulphur	11,126	8,216	7,976	7,533	7,533	7,083
Camp	D	Cypress	4,041	4,041	4,041	4,041	4,041	4,041
Cass	D	Cypress	2,955	2,955	2,955	2,955	2,955	2,955
		Sulphur	578	578	578	578	578	578
Cherokee	I	Neches	11,222	11,222	11,222	11,222	11,222	11,222
Franklin	D	Cypress	7,794	7,736	7,736	7,736	7,736	7,736
		Sulphur	1,952	1,748	1,748	1,748	1,748	1,748
Gregg	D	Cypress	820	820	820	820	820	820
		Sabine	6,829	6,829	6,829	6,829	6,829	6,829
Harrison	D	Cypress	4,892	4,873	4,839	4,787	4,772	4,728
		Sabine	4,019	3,964	3,947	3,911	3,911	3,911
Henderson	C	Trinity	5,254	5,187	5,187	5,187	5,187	5,187
	I	Neches	3,999	3,999	3,999	3,999	3,999	3,999
Hopkins	D	Cypress	253	253	253	253	253	253
		Sabine	2,043	2,001	2,001	2,001	2,001	2,001
		Sulphur	1,137	1,137	1,137	1,137	1,137	1,137
Houston	I	Neches	1,924	1,924	1,924	1,924	1,924	1,924
		Trinity	3,432	3,432	3,432	3,432	3,432	3,432
Marion	D	Cypress	2,077	2,077	2,077	2,077	2,077	2,077
Morris	D	Cypress	2,196	2,196	2,174	2,174	2,174	2,174
		Sulphur	420	420	384	384	384	384
Nacogdoches	I	Neches	21,385	21,385	21,385	21,385	21,385	21,385
Panola	I	Cypress	6	6	6	6	6	6
		Sabine	9,091	8,221	8,221	8,063	8,063	8,063
Rains	D	Sabine	1,703	1,703	1,620	1,620	1,620	1,583
Red River	D	Sulphur	0	0	0	0	0	0
Rusk	I	Neches	11,776	11,776	11,766	11,766	11,766	11,747
		Sabine	9,067	9,067	9,067	9,067	9,067	9,067
Sabine	I	Neches	1,254	1,254	1,254	1,254	1,254	1,254
		Sabine	5,612	5,604	5,604	5,604	5,604	5,604
San Augustine	I	Neches	1,490	1,490	1,490	1,490	1,490	1,490
		Sabine	291	291	291	291	291	291
Shelby	I	Neches	2,900	2,736	2,578	2,288	2,152	2,019
		Sabine	9,144	8,481	8,323	8,159	8,159	7,710
Smith	D	Sabine	12,245	12,245	12,245	12,235	12,221	12,221
	I	Neches	21,004	21,004	21,004	21,004	21,004	21,004

TABLE 1. CONTINUED.

County	Region	Basin	Year					
			2010	2020	2030	2040	2050	2060
Titus	D	Cypress	8,051	7,516	7,214	7,063	6,833	6,833
		Sulphur	2,805	2,805	2,805	2,805	2,805	2,805
Trinity	H	Trinity	1,101	1,101	1,101	1,101	1,101	1,101
	I	Neches	1,114	1,114	1,114	1,114	1,114	1,114
Upshur	D	Cypress	5,426	5,426	5,426	5,426	5,426	5,426
		Sabine	1,689	1,689	1,689	1,689	1,689	1,689
Van Zandt	D	Neches	4,288	4,288	4,288	4,288	4,288	4,288
		Sabine	4,942	4,611	4,611	4,611	4,611	4,379
		Trinity	1,384	1,384	1,384	1,384	1,384	1,384
Wood	D	Cypress	2,053	2,053	2,053	2,053	2,053	2,053
		Sabine	19,663	19,486	19,398	19,355	19,280	19,258
Total			**274,938**	**268,835**	**267,687**	**266,340**	**265,870**	**264,484**

TABLE 2. MODELED AVAILABLE GROUNDWATER FOR THE QUEEN CITY AQUIFER IN GROUNDWATER MANAGEMENT AREA 11. RESULTS ARE IN ACRE-FEET PER YEAR AND ARE DIVIDED BY COUNTY, REGIONAL WATER PLANNING AREA, AND RIVER BASIN.

County	Region	Basin	Year					
			2010	2020	2030	2040	2050	2060
Anderson	I	Neches	9,762	9,762	9,762	9,762	9,762	9,762
		Trinity	9,039	9,039	9,039	9,039	9,039	9,039
Angelina	I	Neches	1,093	1,093	1,093	1,093	1,093	1,093
Camp	D	Cypress	3,705	3,542	3,542	3,542	3,542	3,542
Cass	D	Cypress	35,970	35,970	35,970	35,970	35,970	35,970
		Sulphur	3,223	3,223	3,223	3,223	3,223	3,223
Cherokee	I	Neches	22,396	22,396	22,396	22,396	22,396	22,396
Gregg	D	Cypress	1,359	1,359	1,359	1,359	1,359	1,359
		Sabine	6,214	6,214	6,214	6,214	6,214	6,214
Harrison	D	Cypress	7,890	7,890	7,890	7,890	7,890	7,890
		Sabine	2,483	2,483	2,483	2,483	2,483	2,483
Henderson	C	Trinity	3,533	3,533	3,533	3,533	3,533	3,533
	I	Neches	12,316	12,316	12,316	12,316	12,316	12,316
Houston	I	Neches	131	131	131	131	131	131
		Trinity	279	279	279	279	279	279
Marion	D	Cypress	15,549	15,549	15,549	15,549	15,549	15,549
Morris	D	Cypress	9,652	9,652	9,652	9,652	9,537	9,537
Nacogdoches	I	Neches	5,002	5,002	5,002	5,002	5,002	5,002
Panola	I	Sabine	0	0	0	0	0	0
Rusk	I	Neches	40	40	40	40	40	40
		Sabine	18	18	18	18	18	18
Sabine	I	Neches	0	0	0	0	0	0
		Sabine	0	0	0	0	0	0
San Augustine	I	Neches	7	7	7	7	7	7
		Sabine	0	0	0	0	0	0
Shelby	I	Sabine	0	0	0	0	0	0
Smith	D	Sabine	25,994	25,994	25,994	25,994	25,994	25,994
	I	Neches	28,259	28,259	28,259	28,259	28,259	28,259
Titus	D	Cypress	138	138	138	138	138	138
Trinity	H	Trinity	0	0	0	0	0	0
	I	Neches	0	0	0	0	0	0
Upshur	D	Cypress	18,324	18,324	18,324	18,324	18,143	18,143
		Sabine	7,246	7,246	7,246	7,246	7,246	7,246
Van Zandt	D	Neches	3,814	3,814	3,814	3,814	3,814	3,814
Wood	D	Cypress	1,009	1,009	1,009	1,009	1,009	1,009
		Sabine	9,103	9,103	9,103	9,103	9,103	9,103
Total			**243,548**	**243,385**	**243,385**	**243,385**	**243,089**	**243,089**

TABLE 3. MODELED AVAILABLE GROUNDWATER FOR THE SPARTA AQUIFER IN GROUNDWATER MANAGEMENT AREA 11. RESULTS ARE IN ACRE-FEET PER YEAR AND ARE DIVIDED BY COUNTY, REGIONAL WATER PLANNING AREA, AND RIVER BASIN.

County	Region	Basin	Year					
			2010	2020	2030	2040	2050	2060
Anderson	I	Neches	344	344	344	344	344	344
		Trinity	272	272	272	272	272	272
Angelina	I	Neches	689	689	689	689	689	689
Cherokee	I	Neches	359	359	359	359	359	359
Houston	I	Neches	302	302	302	302	302	302
		Trinity	594	594	594	594	594	594
Nacogdoches	I	Neches	409	409	409	409	409	409
Rusk	I	Neches	4,362	0	0	0	0	0
Sabine	I	Neches	61	61	61	61	61	61
		Sabine	235	235	235	235	235	235
San Augustine	I	Neches	202	202	202	202	202	202
		Sabine	3	3	3	3	3	3
Smith	I	Neches	0	0	0	0	0	0
	D	Sabine	0	0	0	0	0	0
Trinity	I	Neches	313	313	313	313	313	313
	H	Trinity	302	302	302	302	302	302
Upshur	D	Sabine	0	0	0	0	0	0
Wood	D	Sabine	0	0	0	0	0	0
Total			**8,447**	**4,085**	**4,085**	**4,085**	**4,085**	**4,085**

TABLE 4. MODELED AVAILABLE GROUNDWATER FOR THE YEGUA-JACKSON AQUIFER IN GROUNDWATER MANAGEMENT AREA 11. RESULTS ARE IN ACRE-FEET PER YEAR AND ARE DIVIDED BY COUNTY, REGIONAL WATER PLANNING AREA, AND RIVER BASIN.

County	Region	Basin	Year					
			2010	2020	2030	2040	2050	2060
Angelina	I	Neches	16,890	16,890	16,890	16,890	16,890	16,507
Houston	I	Neches	1,324	1,324	1,324	1,324	1,324	1,324
		Trinity	4,061	4,061	4,061	4,061	4,061	4,061
Nacogdoches	I	Neches	235	235	235	235	235	235
Sabine	I	Neches	3,724	3,724	3,724	3,724	3,724	3,724
		Sabine	575	575	575	575	575	575
San Augustine	I	Neches	2,102	2,102	2,102	2,102	2,102	2,102
		Sabine	9	9	9	9	9	9
Trinity	H	Trinity	2,191	2,191	2,191	2,191	2,191	2,191
	I	Neches	700	700	700	700	700	700
Total			**31,811**	**31,811**	**31,811**	**31,811**	**31,811**	**31,428**

TABLE 5. MODELED AVAILABLE GROUNDWATER FOR THE CARRIZO-WILCOX, QUEEN CITY, SPARTA, AND YEGUA-JACKSON AQUIFERS BY COUNTY FOR EACH DECADE BETWEEN 2010 AND 2060. RESULTS ARE IN ACRE-FEET PER YEAR.

County	Year					
	2010	2020	2030	2040	2050	2060
Anderson	29,494	29,494	29,494	29,494	29,494	29,494
Angelina	45,086	45,086	45,086	45,086	45,086	44,703
Bowie	11,126	8,216	7,976	7,533	7,533	7,083
Camp	7,746	7,583	7,583	7,583	7,583	7,583
Cass	42,726	42,726	42,726	42,726	42,726	42,726
Cherokee	33,977	33,977	33,977	33,977	33,977	33,977
Franklin	9,746	9,484	9,484	9,484	9,484	9,484
Gregg	15,222	15,222	15,222	15,222	15,222	15,222
Harrison	19,284	19,210	19,159	19,071	19,056	19,012
Henderson	25,102	25,035	25,035	25,035	25,035	25,035
Hopkins	3,433	3,391	3,391	3,391	3,391	3,391
Houston	12,047	12,047	12,047	12,047	12,047	12,047
Marion	17,626	17,626	17,626	17,626	17,626	17,626
Morris	12,268	12,268	12,210	12,210	12,095	12,095
Nacogdoches	27,031	27,031	27,031	27,031	27,031	27,031
Panola	9,097	8,227	8,227	8,069	8,069	8,069
Rains	1,703	1,703	1,620	1,620	1,620	1,583
Red River	0	0	0	0	0	0
Rusk	25,263	20,901	20,891	20,891	20,891	20,872
Sabine	11,461	11,453	11,453	11,453	11,453	11,453
San Augustine	4,104	4,104	4,104	4,104	4,104	4,104
Shelby	12,044	11,217	10,901	10,447	10,311	9,729
Smith	87,502	87,502	87,502	87,492	87,478	87,478
Titus	10,994	10,459	10,157	10,006	9,776	9,776
Trinity	5,721	5,721	5,721	5,721	5,721	5,721
Upshur	32,685	32,685	32,685	32,685	32,504	32,504
Van Zandt	14,428	14,097	14,097	14,097	14,097	13,865
Wood	31,828	31,651	31,563	31,520	31,445	31,423
Total	**558,744**	**548,116**	**546,968**	**545,621**	**544,855**	**543,086**

TABLE 6. MODELED AVAILABLE GROUNDWATER FOR THE CARRIZO-WILCOX, QUEEN CITY, SPARTA, AND YEGUA-JACKSON AQUIFERS BY REGIONAL WATER PLANNING AREA FOR EACH DECADE BETWEEN 2010 AND 2060. RESULTS ARE IN ACRE-FEET PER YEAR.

Region	Year					
	2010	2020	2030	2040	2050	2060
C	8,787	8,720	8,720	8,720	8,720	8,720
D	269,054	264,560	263,738	263,003	262,373	261,588
H	3,594	3,594	3,594	3,594	3,594	3,594
I	277,309	271,242	270,916	270,304	270,168	269,184
Total	**558,744**	**548,116**	**546,968**	**545,621**	**544,855**	**543,086**

TABLE 7. MODELED AVAILABLE GROUNDWATER FOR THE CARRIZO-WILCOX, QUEEN CITY, SPARTA, AND YEGUA-JACKSON AQUIFERS BY RIVER BASIN FOR EACH DECADE BETWEEN 2010 AND 2060. RESULTS ARE IN ACRE-FEET PER YEAR.

Basin	Year					
	2010	2020	2030	2040	2050	2060
Cypress	134,160	133,385	133,027	132,824	132,283	132,239
Neches	227,999	223,473	223,305	223,015	222,879	222,344
Sabine	138,218	136,072	135,726	135,315	135,226	134,486
Sulphur	21,241	18,127	17,851	17,408	17,408	16,958
Trinity	37,126	37,059	37,059	37,059	37,059	37,059
Total	**558,744**	**548,116**	**546,968**	**545,621**	**544,855**	**543,086**

TABLE 8. MODELED AVAILABLE GROUNDWATER FOR THE CARRIZO-WILCOX, QUEEN CITY, SPARTA, AND YEGUA-JACKSON AQUIFERS BY GROUNDWATER CONSERVATION DISTRICT (GCD) FOR EACH DECADE BETWEEN 2010 AND 2060. RESULTS ARE IN ACRE-FEET PER YEAR. UWCD REFERS TO UNDERGROUND WATER CONSERVATION DISTRICT.

District	Year					
	2010	2020	2030	2040	2050	2060
Anderson County UWCD	1,361	1,361	1,361	1,361	1,361	1,361
Neches & Trinity Valleys GCD	87,212	87,145	87,145	87,145	87,145	87,145
Panola GCD	9,097	8,227	8,227	8,069	8,069	8,069
Pineywoods GCD	72,117	72,117	72,117	72,117	72,117	71,734
Rusk County GCD	25,263	20,901	20,891	20,891	20,891	20,872
Total (excluding non-district areas)	**195,050**	**189,751**	**189,741**	**189,583**	**189,583**	**189,181**
No District	363,694	358,365	357,227	356,038	355,272	353,905
Total (including non-district areas)	**558,744**	**548,116**	**546,968**	**545,621**	**544,855**	**543,086**

TABLE 9. MODELED AVAILABLE GROUNDWATER FOR THE LOWER WILCOX FORMATION BY GROUNDWATER CONSERVATION DISTRICT (GCD) FOR EACH DECADE BETWEEN 2010 AND 2060. RESULTS ARE IN ACRE-FEET PER YEAR. UWCD REFERS TO UNDERGROUND WATER CONSERVATION DISTRICT.

District	Year					
	2010	2020	2030	2040	2050	2060
Anderson County UWCD	7	7	7	7	7	7
Neches & Trinity Valleys GCD	1,886	1,886	1,886	1,886	1,886	1,886
Panola GCD	725	725	725	725	725	725
Pineywoods GCD	0	0	0	0	0	0
Rusk County GCD	0	0	0	0	0	0
Total (excluding non-district areas)	**2,618**	**2,618**	**2,618**	**2,618**	**2,618**	**2,618**
No District	2,717	2,717	2,717	2,717	2,717	2,717
Total (including non-district areas)	**5,335**	**5,335**	**5,335**	**5,335**	**5,335**	**5,335**

TABLE 10. MODELED AVAILABLE GROUNDWATER FOR THE MIDDLE WILCOX FORMATION BY GROUNDWATER CONSERVATION DISTRICT (GCD) FOR EACH DECADE BETWEEN 2010 AND 2060. RESULTS ARE IN ACRE-FEET PER YEAR. UWCD REFERS TO UNDERGROUND WATER CONSERVATION DISTRICT.

District	Year					
	2010	2020	2030	2040	2050	2060
Anderson County UWCD	15	15	15	15	15	15
Neches & Trinity Valleys GCD	1,719	1,719	1,719	1,719	1,719	1,719
Panola GCD	5,764	5,764	5,764	5,764	5,764	5,764
Pineywoods GCD	678	678	678	678	678	678
Rusk County GCD	8,731	8,731	8,731	8,731	8,731	8,731
Total (excluding non-district areas)	**16,907**	**16,907**	**16,907**	**16,907**	**16,907**	**16,907**
No District	44,427	44,223	44,194	44,179	44,179	44,165
Total (including non-district areas)	**61,334**	**61,130**	**61,101**	**61,086**	**61,086**	**61,072**

TABLE 11. MODELED AVAILABLE GROUNDWATER FOR THE UPPER WILCOX FORMATION BY GROUNDWATER CONSERVATION DISTRICT (GCD) FOR EACH DECADE BETWEEN 2010 AND 2060. RESULTS ARE IN ACRE-FEET PER YEAR. UWCD REFERS TO UNDERGROUND WATER CONSERVATION DISTRICT.

District	Year					
	2010	2020	2030	2040	2050	2060
Anderson County UWCD	107	107	107	107	107	107
Neches & Trinity Valleys GCD	9,652	9,652	9,652	9,652	9,652	9,652
Panola GCD	770	770	770	770	770	770
Pineywoods GCD	12,581	12,581	12,581	12,581	12,581	12,581
Rusk County GCD	5,156	5,156	5,156	5,156	5,156	5,156
Total (excluding non-district areas)	**28,266**	**28,266**	**28,266**	**28,266**	**28,266**	**28,266**
No District	45,600	42,690	42,396	41,968	41,968	41,495
Total (including non-district areas)	**73,866**	**70,956**	**70,662**	**70,234**	**70,234**	**69,761**

TABLE 12. MODELED AVAILABLE GROUNDWATER FOR THE CARRIZO FORMATION BY GROUNDWATER CONSERVATION DISTRICT (GCD) FOR EACH DECADE BETWEEN 2010 AND 2060. RESULTS ARE IN ACRE-FEET PER YEAR. UWCD REFERS TO UNDERGROUND WATER CONSERVATION DISTRICT.

District	Year					
	2010	2020	2030	2040	2050	2060
Anderson County UWCD	281	281	281	281	281	281
Neches & Trinity Valleys GCD	16,885	16,818	16,818	16,818	16,818	16,818
Panola GCD	1,838	968	968	810	810	810
Pineywoods GCD	34,540	34,540	34,540	34,540	34,540	34,540
Rusk County GCD	6,956	6,956	6,946	6,946	6,946	6,927
Total (excluding non-district areas)	**60,500**	**59,563**	**59,553**	**59,395**	**59,395**	**59,376**
No District	73,903	71,851	71,036	70,290	69,820	68,940
Total (including non-district areas)	**134,403**	**131,414**	**130,589**	**129,685**	**129,215**	**128,316**

TABLE 13. MODELED AVAILABLE GROUNDWATER FOR THE QUEEN CITY AQUIFER BY GROUNDWATER CONSERVATION DISTRICT (GCD) FOR EACH DECADE BETWEEN 2010 AND 2060. RESULTS ARE IN ACRE-FEET PER YEAR. UWCD REFERS TO UNDERGROUND WATER CONSERVATION DISTRICT.

District	Year					
	2010	2020	2030	2040	2050	2060
Anderson County UWCD	951	951	951	951	951	951
Neches & Trinity Valleys GCD	56,095	56,095	56,095	56,095	56,095	56,095
Panola GCD	0	0	0	0	0	0
Pineywoods GCD	6,095	6,095	6,095	6,095	6,095	6,095
Rusk County GCD	58	58	58	58	58	58
Total (excluding non-district areas)	**63,199**	**63,199**	**63,199**	**63,199**	**63,199**	**63,199**
No District	180,349	180,186	180,186	180,186	179,890	179,890
Total (including non-district areas)	**243,548**	**243,385**	**243,385**	**243,385**	**243,089**	**243,089**

TABLE 14. MODELED AVAILABLE GROUNDWATER FOR THE SPARTA AQUIFER BY GROUNDWATER CONSERVATION DISTRICT (GCD) FOR EACH DECADE BETWEEN 2010 AND 2060. RESULTS ARE IN ACRE-FEET PER YEAR. UWCD REFERS TO UNDERGROUND WATER CONSERVATION DISTRICT.

District	Year					
	2010	2020	2030	2040	2050	2060
Anderson County UWCD	0	0	0	0	0	0
Neches & Trinity Valleys GCD	975	975	975	975	975	975
Panola GCD	0	0	0	0	0	0
Pineywoods GCD	1,098	1,098	1,098	1,098	1,098	1,098
Rusk County GCD	4,362	0	0	0	0	0
Total (excluding non-district areas)	**6,435**	**2,073**	**2,073**	**2,073**	**2,073**	**2,073**
No District	2,012	2,012	2,012	2,012	2,012	2,012
Total (including non-district areas)	**8,447**	**4,085**	**4,085**	**4,085**	**4,085**	**4,085**

TABLE 15. MODELED AVAILABLE GROUNDWATER FOR THE YEGUA-JACKSON AQUIFER BY GROUNDWATER CONSERVATION DISTRICT (GCD) FOR EACH DECADE BETWEEN 2010 AND 2060. RESULTS ARE IN ACRE-FEET PER YEAR. UWCD REFERS TO UNDERGROUND WATER CONSERVATION DISTRICT.

District	Year					
	2010	2020	2030	2040	2050	2060
Anderson County UWCD	0	0	0	0	0	0
Neches & Trinity Valleys GCD	0	0	0	0	0	0
Panola GCD	0	0	0	0	0	0
Pineywoods GCD	17,125	17,125	17,125	17,125	17,125	16,742
Rusk County GCD	0	0	0	0	0	0
Total (excluding non-district areas)	**17,125**	**17,125**	**17,125**	**17,125**	**17,125**	**16,742**
No District	14,686	14,686	14,686	14,686	14,686	14,686
Total (including non-district areas)	**31,811**	**31,811**	**31,811**	**31,811**	**31,811**	**31,428**

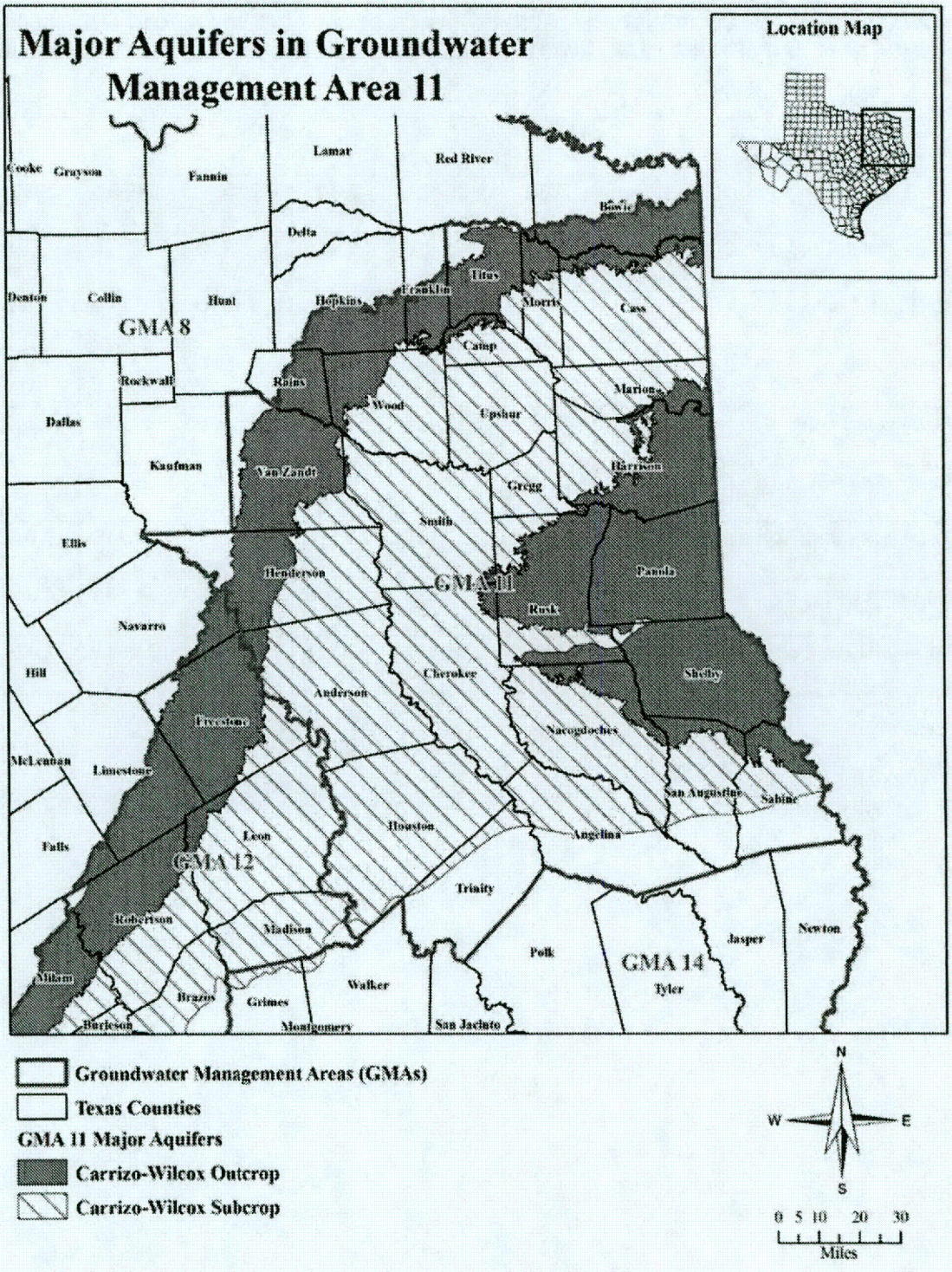


FIGURE 1. MAP SHOWING THE BOUNDARY OF THE CARRIZO-WILCOX AQUIFER ACCORDING TO THE 2007 STATE WATER PLAN (TWDB, 2007).

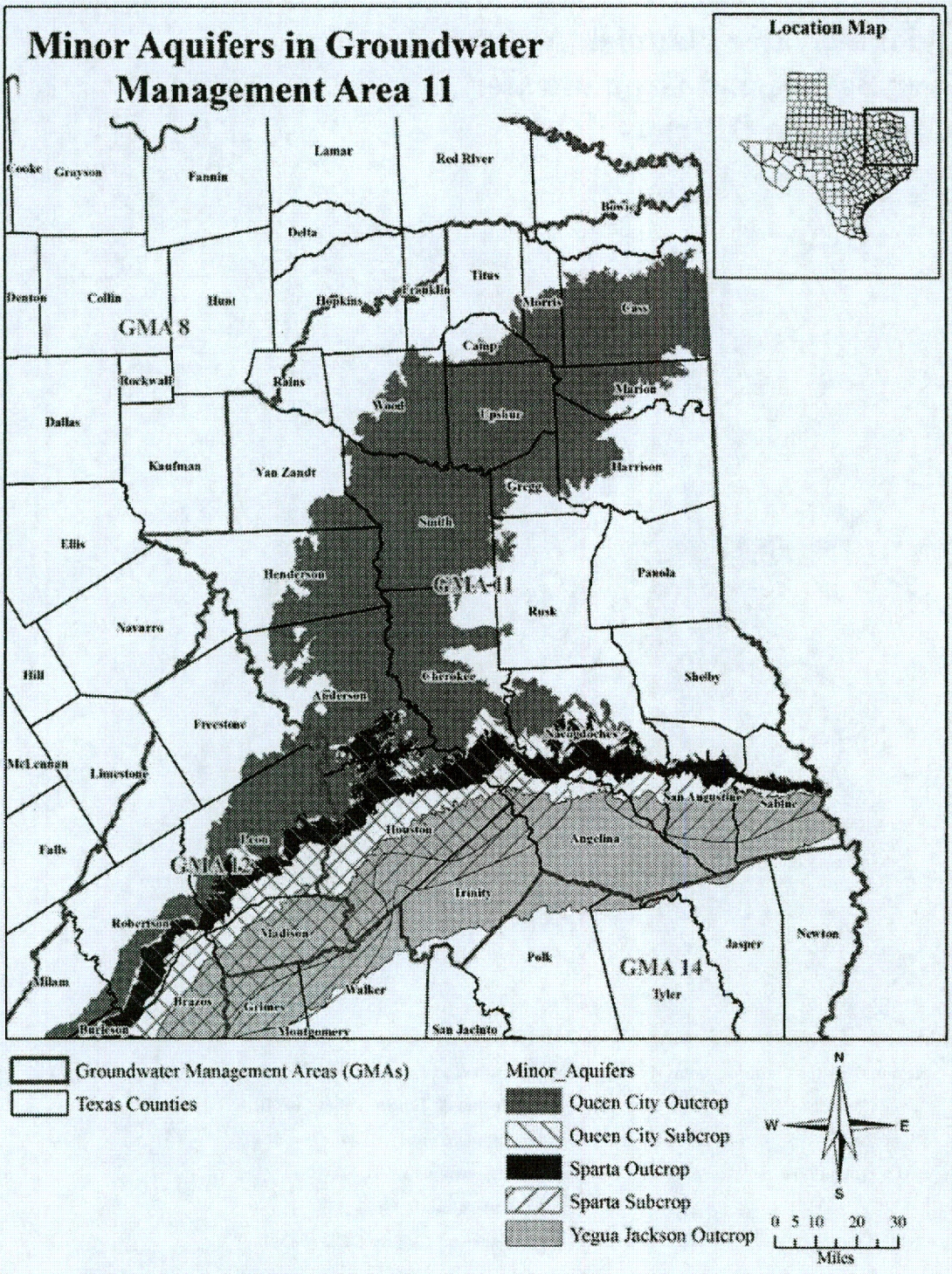


FIGURE 2. MAP SHOWING THE BOUNDARIES OF THE QUEEN CITY, SPARTA, AND YEGUA-JACKSON AQUIFERS ACCORDING TO THE 2007 STATE WATER PLAN (TWDB, 2007).

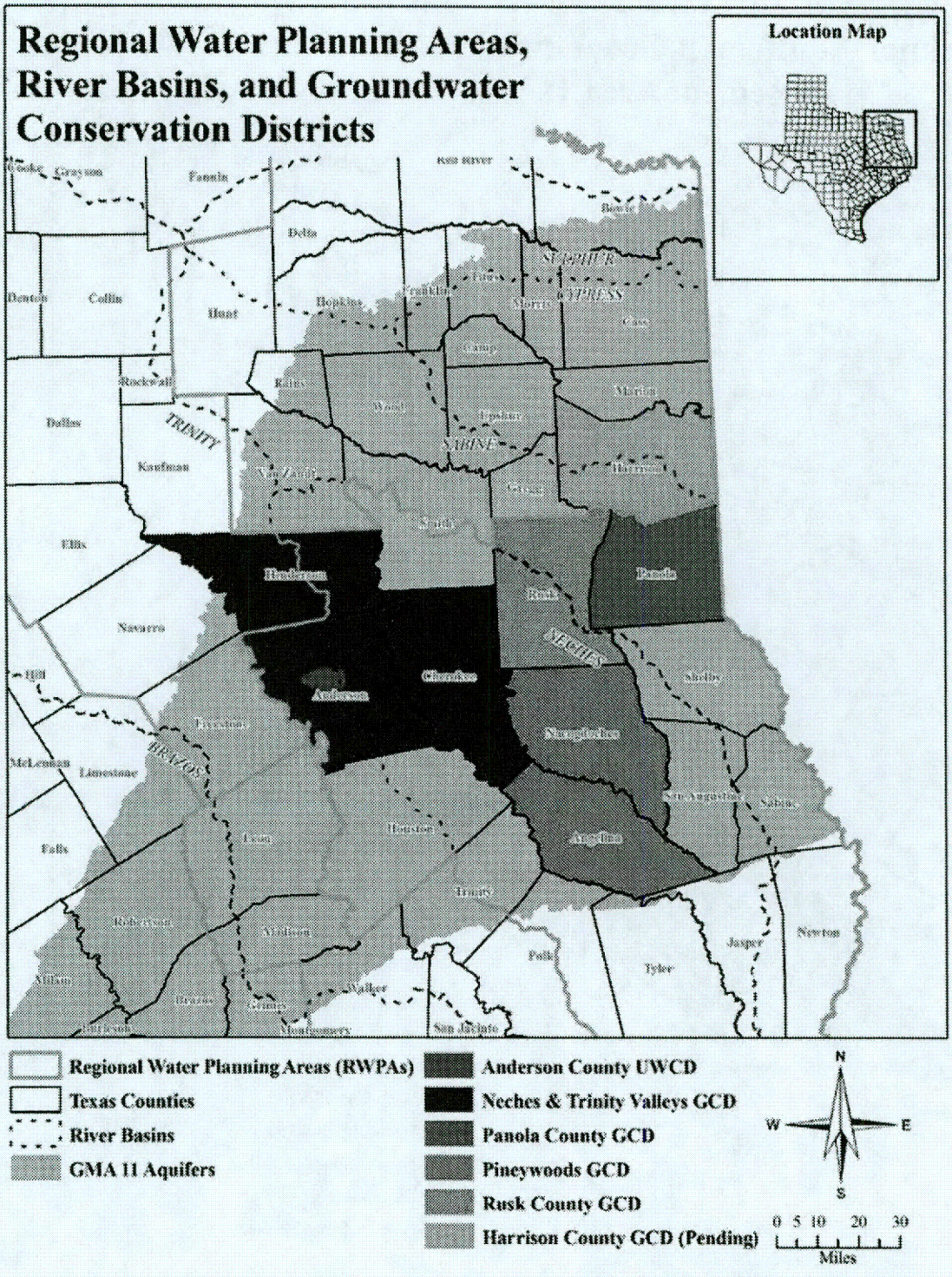


FIGURE 3. MAP SHOWING REGIONAL WATER PLANNING AREAS, GROUNDWATER CONSERVATION DISTRICTS, COUNTIES, AND RIVER BASINS IN AND NEIGHBORING OF GROUNDWATER MANAGEMENT AREA 11.

Appendix

TABLE A1. AVERAGE DRAWDOWN OVER THE 51-YEAR PREDICTIVE GROUNDWATER AVAILABILITY MODEL RUN IN GROUNDWATER MANAGEMENT AREA 11 FOR THE CARRIZO-WILCOX, QUEEN CITY, AND SPARTA AQUIFERS AND WECHES AND REKLAW CONFINING UNITS. ALL VALUES ARE IN FEET. "ANDERSON (ACUWCD)" REFERS TO THE ANDERSON COUNTY UNDERGROUND WATER CONSERVATION DISTRICT WITHIN ANDERSON COUNTY. "ANDERSON (NTVGCD)" REFERS TO THE PORTION OF NECHES AND TRINITY VALLEYS GROUNDWATER CONSERVATION DISTRICT IN ANDERSON COUNTY. NEGATIVE VALUES INDICATE A RISE IN WATER LEVELS.

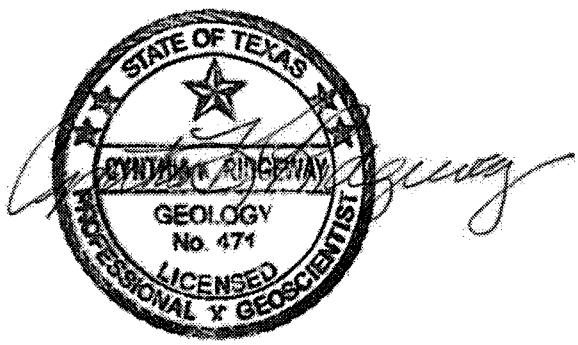
County	Sparta	Weches (CU)	Queen City	Reklaw (CU)	Carrizo	Upper Wilcox	Middle Wilcox	Lower Wilcox	Overall
Anderson (ACUWCD)			1	12	35	26	12	5	15
Anderson (NTVGCD)	-2	1	7	15	36	26	11	4	16
Angelina	10	11	16	22	42	5	-18	-3	11
Bowie						21	0	0	1
Camp			12	0	18	17	39	0	19
Cass			8	6	10	7	7	0	8
Cherokee	7	14	11	11	32	32	15	10	18
Franklin				-16	-3	7	19	0	11
Gregg			7	11	42	49	56	79	35
Harrison			0	2	24	13	5	4	9
Henderson			4	15	41	32	27	15	23
Hopkins				-22	-12	-15	-28	0	-26
Houston	2	1	2	15	35	12	2	-2	8
Marion			17	11	21	15	15	0	16
Morris			13	10	29	25	23	0	21
Nacogdoches	3	3	11	10	14	11	-10	-6	4
Panola			-11	-19	11	2	1	4	2
Rains						7	-10	-5	-8
Rusk	0	-46	-15	-2	6	6	23	21	12
Sabine	5	5	7	15	24	13	6	5	10
San Augustine	-4	-4	-3	11	20	9	-3	-2	3
Shelby			-18	-19	23	-3	3	1	1
Smith	-5	-5	11	34	103	118	92	76	68
Titus			-1	-3	31	14	5	0	9
Trinity	5	4	4	12	33	-3	-7	-1	6
Upshur	-5	-5	5	17	56	66	66	97	44
Van Zandt			7	11	31	13	17	11	14
Wood	-5	-7	-2	36	110	83	55	114	59
Total	**3**	**4**	**7**	**15**	**38**	**26**	**15**	**11**	**17**

GAM Run 10-038 MAG

By Mohammad Masud Hassan, P.E.

Edited and finalized by Shirley Wade to reflect statutory changes effective September 1, 2011

Texas Water Development Board
Groundwater Availability Modeling Section
(512) 936-0883
November 18, 2011



Cynthia K. Ridgeway, the Manager of the Groundwater Availability Modeling Section and Interim Director of the Groundwater Resources Division, is responsible for oversight of work performed by employees under her direct supervision. The seal appearing on this document was authorized by Cynthia K. Ridgeway, P.G. 471 on November 18, 2011.

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EXECUTIVE SUMMARY:

The modeled available groundwater for the Gulf Coast Aquifer as a result of the desired future conditions adopted by the members of Groundwater Management Area 14 declines from approximately 978,000 acre-feet per year to 844,000 acre-feet per year between 2010 and 2060. This is shown divided by county, regional water planning area, and river basin in Table 2 for use in the regional water planning process. Modeled available groundwater is summarized by county, regional water planning area, river basin, and groundwater conservation district for each unit of the Gulf Coast Aquifer in tables 3 through 18. The estimates were extracted from Groundwater Availability Modeling Run 10-023, Scenario 3, which meets the desired future conditions adopted by Groundwater Management Area 14.

REQUESTOR:

Mr. Lloyd Behm of the Bluebonnet Groundwater Conservation District on behalf of Groundwater Management Area 14

DESCRIPTION OF REQUEST:

In a letter dated August 25, 2010, Mr. Lloyd Behm provided the Texas Water Development Board (TWDB) with the desired future conditions of the Gulf Coast Aquifer adopted by the members of Groundwater Management Area 14. As shown in Resolution No. 2010-01, the desired future conditions for the Gulf Coast Aquifer within Groundwater Management Area 14 were stated as average water-level declines (drawdowns) over a specified time period. The average drawdowns (in feet) specified as desired future conditions for Groundwater Management Area 14 are shown in Table 1.

Table 1: Desired future conditions (average drawdown in feet) for the Gulf Coast Aquifer in Groundwater Management Area 14. Negative values indicate a water level rise.

County	Austin	Brazoria	Brazos	Chambers	Grimes	Hardin	Jasper	Jefferson	Liberty
Duration (years)	52	52	52	52	52	52	52	52	52
	Base year 2008								
Chicot Aquifer	17	45	-	43	0	17	10	25	32
Evangeline Aquifer	10	40	-	36	5	27	23	26	37
Burkeville Confining Unit	11	-	-	-	10	23	24	-	28
Jasper Aquifer	20	-	7	-	28	37	21	-	64

Table 1: Continued.

County	Montgomery		Newtown	Orange	Polk	San Jacinto	Tyler	Walker	Waller	Washington
Duration (years)	8	44	52	52	52	52	52	52	52	52
	Base year 2008	Base year 2016	Base year 2008							
Chicot Aquifer	3	6	9	14	4	5	3	-	7	-
Evangeline Aquifer	13	25	20	19	4	7	16	10	8	1
Burkeville Confining Unit	10	23	22	-	20	18	19	5	9	17
Jasper Aquifer	61	-38	18	-	41	72	33	33	25	20

In response to receiving the adopted desired future conditions, the Texas Water Development Board has estimated the modeled available groundwater in Groundwater Management Area 14. Since the desired future conditions were divided by unit within the Gulf Coast Aquifer (Chicot Aquifer, Evangeline Aquifer, Burkeville Confining Unit, and Jasper Aquifer), modeled available groundwater is presented separately for each unit.

METHODS:

The Texas Water Development Board previously completed several predictive groundwater availability model simulations of the Gulf Coast Aquifer to assist the members of Groundwater Management Area 14 in developing desired future conditions. The location of Groundwater Management Area 14, the Gulf Coast Aquifer, and the groundwater availability model cells that represent the aquifer are shown in Figure 1. As described in Resolution No. 2010-01, the management area considered Scenario 3 of GAM Run 10-023 when developing desired future conditions for the Gulf Coast Aquifer (Oliver, 2010). Since each of the above desired future conditions is met in Scenario 3 of GAM Run 10-023, the estimated pumping for Groundwater Management Area 14 presented here was taken directly from that simulation. The pumping was then divided by county, regional water planning area, river basin, and groundwater conservation district (Figure 2).

PARAMETERS AND ASSUMPTIONS:

The parameters and assumptions for the model run using the groundwater availability model for the northern portion of the Gulf Coast Aquifer are described below:

- The results presented in this report are based on Scenario 3 in GAM Run 10-023 (Oliver, 2010). See GAM Run 10-023 for a full description of the methods, assumptions, and results for the groundwater availability model run.
- We used version 2.01 of the groundwater availability model for the northern portion of the Gulf Coast Aquifer. See Kasmarek and Robinson (2004) and Kasmarek and others (2005) for assumptions and limitations of the model.
- The model includes four layers representing the Chicot Aquifer (Layer 1), the Evangeline Aquifer (Layer 2), the Burkeville Confining Unit (Layer 3), and the

Jasper Aquifer, which includes the more transmissive portions of the Catahoula Formation (Layer 4).

- Cells were assigned to individual counties, river basins, regional water planning areas, and groundwater conservation districts as shown in the August 12, 2010 version of the file that associates the model grid with political and natural boundaries for the Gulf Coast Aquifer.

Modeled Available Groundwater and Permitting

As defined in Chapter 36 of the Texas Water Code, "modeled available groundwater" is the estimated average amount of water that may be produced annually to achieve a desired future condition. This is distinct from "managed available groundwater," shown in the draft version of this report dated December 29, 2010, which was a permitting value and accounted for the estimated use of the aquifer exempt from permitting. This change was made to reflect changes in statute by the 82nd Texas Legislature, effective September 1, 2011.

Groundwater conservation districts are required to consider modeled available groundwater, along with several other factors, when issuing permits in order to manage groundwater production to achieve the desired future condition(s). The other factors districts must consider include annual precipitation and production patterns, the estimated amount of pumping exempt from permitting, existing permits, and a reasonable estimate of actual groundwater production under existing permits. The estimated amount of pumping exempt from permitting, which the Texas Water Development Board is now required to develop after soliciting input from applicable groundwater conservation districts, will be provided in a separate report.

RESULTS:

The modeled available groundwater for the Gulf Coast Aquifer in Groundwater Management Area 14 as a result of the desired future conditions declines from approximately 978,000 acre-feet per year in 2010 to 844,000 acre-feet per year in 2060. This has been divided by county, regional water planning area, and river basin for each decade between 2010 and 2060 for use in the regional water planning process (Table 2).

The modeled available groundwater for the four units of the Gulf Coast Aquifer is also summarized by county (tables 3 through 6), regional water planning area (tables 7 through 10), river basin (tables 11 through 14), and groundwater conservation district (tables 15 through 18). In tables 15 through 18, the modeled available groundwater both excluding and including areas outside of a groundwater conservation district is shown.

LIMITATIONS:

The groundwater model used in developing estimates of modeled available groundwater is the best available scientific tool that can be used to estimate the pumping that will achieve the desired future conditions. Although the groundwater model used in this analysis is the best available scientific tool for this purpose, it, like all models, has limitations. In reviewing the use of models in environmental regulatory decision-making, the National Research Council (2007) noted:

> "Models will always be constrained by computational limitations, assumptions, and knowledge gaps. They can best be viewed as tools to help inform decisions rather than as machines to generate truth or make decisions. Scientific advances will never make it possible to build a perfect model that accounts for every aspect of reality or to prove that a given model is correct in all respects for a particular regulatory application. These characteristics make evaluation of a regulatory model more complex than solely a comparison of measurement data with model results."

A key aspect of using the groundwater model to develop estimates of modeled available groundwater is the need to make assumptions about the location in the aquifer where future pumping will occur. As actual pumping changes in the future, it will be necessary to evaluate the amount of that pumping as well as its location in the context of the assumptions associated with this analysis. Evaluating the amount and location of future pumping is as important as evaluating the changes in groundwater levels, spring flows, and other metrics that describe the condition of the groundwater resources in the area that relate to the adopted desired future condition(s).

Given these limitations, users of this information are cautioned that the modeled available groundwater numbers should not be considered a definitive, permanent description of the amount of groundwater that can be pumped to meet the adopted desired future condition. Because the application of the groundwater model was designed to address regional scale questions, the results are most effective on a regional scale. The TWDB makes no warranties or representations relating to the actual conditions of any aquifer at a particular location or at a particular time.

It is important for groundwater conservation districts to monitor future groundwater pumping as well as whether or not they are achieving their desired future conditions. Because of the limitations of the model and the assumptions in this analysis, it is important that the groundwater conservation districts work with the TWDB to refine the modeled available groundwater numbers given the reality of how the aquifer responds to the actual amount and location of pumping now and in the future.

REFERENCES:

Oliver, W., 2010, GAM Run 10-023: Texas Water Development Board, GAM Run 10-023 Report, 32 p.

Kasmarek, M.C., and Robinson, J.L., 2004, Hydrogeology and simulation of groundwater flow and land-surface subsidence in the northern part of the Gulf Coast aquifer system, Texas: U.S. Geological Survey Scientific Investigations Report 2004-5102, 111 p.

Kasmarek, M.C., Reece, B.D., and Houston, N.A., 2005, Evaluation of groundwater flow and land-surface subsidence caused by hypothetical withdrawals in the northern part of the northern part of the Gulf Coast aquifer system, Texas: U.S. Geological Survey Scientific Investigations Report 2005-5024, 70 p.

National Research Council, 2007, Models in Environmental Regulatory Decision Making. Committee on Models in the Regulatory Decision Process, National Academies Press, Washington D.C., 287 p.

Texas Water Development Board, 2007, Water for Texas – 2007-Volumes I-III; Texas Water Development Board Document No. GP-8-1, 392 p.

Table 2: Modeled available groundwater for the Gulf Coast Aquifer in Groundwater Management Area 14. Results are in acre-feet per year and are divided by county, regional water planning area, and river basin.

County	Regional Water Planning Area	River Basin	Year					
			2010	2020	2030	2040	2050	2060
Austin	H	Brazos	6,585	6,585	6,585	6,585	6,585	6,585
		Brazos-Colorado	15,608	15,608	15,608	15,608	15,608	15,608
		Colorado	121	121	121	121	121	121
Brazoria	H	Brazos	6,658	6,658	6,658	6,658	6,658	6,658
		Brazos-Colorado	11,648	11,648	11,648	11,648	11,648	11,648
		San Jacinto-Brazos	32,090	32,090	32,090	32,090	32,090	32,090
Brazos	G	Brazos	1,189	1,189	1,189	1,189	1,189	1,189
Chambers	H	Neches-Trinity	9,527	9,527	9,527	9,527	9,527	9,527
		San Jacinto-Brazos	0	0	0	0	0	0
		Trinity	10,112	10,112	10,112	10,112	10,112	10,112
		Trinity-San Jacinto	2,068	2,068	2,068	2,068	2,068	2,068
Fort Bend	H	Brazos	60,217	52,923	43,673	43,189	42,862	42,953
		Brazos-Colorado	20,633	22,023	18,095	17,715	17,043	17,077
		San Jacinto	9,723	9,524	9,043	8,809	8,642	8,650
		San Jacinto-Brazos	23,356	24,235	21,266	22,457	23,765	23,810
Galveston	H	Neches-Trinity	0	0	0	0	0	0
		San Jacinto-Brazos	4,774	5,257	5,867	5,841	5,814	5,815
		Trinity-San Jacinto	0	0	0	0	0	0
Grimes	G	Brazos	10,889	10,889	10,889	10,889	10,889	10,889
		San Jacinto	2,197	2,197	2,197	2,197	2,197	2,197
		Trinity	764	764	223			
Hardin	I	Neches	34,821	34,821	34,821	34,821	34,821	34,821
		Trinity	138	138	138	138	138	138
Harris	H	San Jacinto	293,855	249,851	197,553	197,326	196,992	197,270
		San Jacinto-Brazos	4,801	7,202	6,798	7,563	8,428	8,440
		Trinity-San Jacinto	6,894	5,893	5,026	5,141	5,259	5,266
Jasper	I	Neches	37,659	37,620	37,541	37,541	37,541	37,541
		Sabine	29,953	29,953	29,953	29,953	29,953	29,953
Jefferson	I	Neches	804	804	804	804	804	804
		Neches-Trinity	1,641	1,641	1,641	1,641	1,641	1,641
Liberty	H	Neches	5,074	5,074	5,074	5,074	5,074	5,074
		Neches-Trinity	364	364	364	364	364	364
		San Jacinto	5,852	5,852	5,852	5,852	5,852	5,852
		Trinity	22,887	22,887	22,887	22,887	22,887	22,887
		Trinity-San Jacinto	8,856	8,856	8,856	8,856	8,856	8,856

Table 2: Continued.

County	Regional Water Planning Area	River Basin	Year					
			2010	2020	2030	2040	2050	2060
Montgomery	H	San Jacinto	73,264	61,629	61,629	61,629	61,629	61,629
Newton	I	Neches	176	176	175	176	176	176
		Sabine	34,001	34,001	33,963	33,963	33,963	33,963
Orange	I	Neches	3,925	3,925	3,925	3,925	3,925	3,925
		Neches-Trinity	256	256	256	256	256	256
		Sabine	15,832	15,832	15,832	15,832	15,832	15,832
Polk	H	Trinity	21,830	21,830	21,830	21,783	21,783	21,783
		Neches	14,912	11,886	11,886	11,886	11,276	11,224
San Jacinto	H	San Jacinto	10,368	10,368	10,368	10,368	10,368	10,368
		Trinity	10,611	8,811	8,811	8,811	8,811	8,811
Tyler	I	Neches	38,199	38,199	38,155	38,156	38,156	38,156
Walker	H	San Jacinto	9,139	9,116	9,116	9,116	9,116	9,116
		Trinity	8,873	8,873	8,873	8,797	8,797	8,797
Waller	H	Brazos	14,933	14,933	14,933	14,933	14,933	14,933
		San Jacinto	26,694	26,694	26,694	26,694	26,694	26,694
Washington	G	Brazos	12,972	12,972	12,972	12,604	12,604	12,604
		Colorado	73	73	73	73	73	73
Total			**977,816**	**913,948**	**843,660**	**843,666**	**843,820**	**844,244**

Table 3: Modeled available groundwater for the Chicot Aquifer portion of the Gulf Coast Aquifer summarized by county in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

County	Year					
	2010	2020	2030	2040	2050	2060
Austin	1,300	1,300	1,300	1,300	1,300	1,300
Brazoria	48,125	48,125	48,125	48,125	48,125	48,125
Chambers	21,328	21,328	21,328	21,328	21,328	21,328
Fort Bend	83,006	75,916	61,657	61,004	60,061	60,177
Galveston	4,303	4,697	5,233	5,194	5,152	5,153
Grimes	0	0	0	0	0	0
Hardin	1,263	1,263	1,263	1,263	1,263	1,263
Harris	70,219	68,839	56,850	58,641	61,185	61,272
Jasper	10,835	10,835	10,835	10,835	10,835	10,835
Jefferson	2,345	2,345	2,345	2,345	2,345	2,345
Liberty	14,576	14,576	14,576	14,576	14,576	14,576
Montgomery	1,482	1,722	1,722	1,722	1,722	1,722
Newton	501	501	501	501	501	501
Orange	18,809	18,809	18,809	18,809	18,809	18,809
Polk	0	0	0	0	0	0
San Jacinto	0	0	0	0	0	0
Tyler	0	0	0	0	0	0
Walker	0	0	0	0	0	0
Waller	300	300	300	300	300	300
Total	**278,392**	**270,556**	**244,844**	**245,943**	**247,502**	**247,706**

Table 4: Modeled available groundwater for the Evangeline Aquifer portion of the Gulf Coast Aquifer summarized by county in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

County	Year					
	2010	2020	2030	2040	2050	2060
Austin	20,013	20,013	20,013	20,013	20,013	20,013
Brazoria	2,271	2,271	2,271	2,271	2,271	2,271
Chambers	379	379	379	379	379	379
Fort Bend	30,923	32,789	30,420	31,166	32,251	32,313
Galveston	471	560	634	647	662	662
Grimes	3,002	3,002	3,002	3,002	3,002	3,002
Hardin	33,696	33,696	33,696	33,696	33,696	33,696
Harris	234,977	193,759	152,256	151,126	149,225	149,435
Jasper	40,755	40,755	40,755	40,755	40,755	40,755
Jefferson	100	100	100	100	100	100
Liberty	27,669	27,669	27,669	27,669	27,669	27,669
Montgomery	39,381	38,293	38,293	38,293	38,293	38,293
Newton	21,288	21,288	21,288	21,288	21,288	21,288
Orange	1,204	1,204	1,204	1,204	1,204	1,204
Polk	8,311	8,311	8,311	8,311	8,311	8,311
San Jacinto	8,178	8,178	8,178	8,178	8,178	8,178
Tyler	20,592	20,592	20,592	20,592	20,592	20,592
Walker	2,001	2,001	2,001	2,001	2,001	2,001
Waller	41,027	41,027	41,027	41,027	41,027	41,027
Washington	3,239	3,239	3,239	3,239	3,239	3,239
Total	**539,477**	**499,126**	**455,328**	**454,957**	**454,156**	**454,428**

Table 5: Modeled available groundwater for the Burkeville Confining Unit portion of the Gulf Coast Aquifer summarized by county in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

County	Year					
	2010	2020	2030	2040	2050	2060
Austin	0	0	0	0	0	0
Fort Bend	0	0	0	0	0	0
Grimes	0	0	0	0	0	0
Hardin	0	0	0	0	0	0
Harris	335	329	256	249	254	254
Jasper	1	1	1	1	1	1
Liberty	0	0	0	0	0	0
Montgomery	0	0	0	0	0	0
Newton	0	0	0	0	0	0
Polk	744	744	744	744	744	744
San Jacinto	2,699	899	899	899	899	899
Tyler	1	1	1	1	1	1
Walker	0	0	0	0	0	0
Waller	0	0	0	0	0	0
Washington	368	368	368	0	0	0
Total	**4,148**	**2,342**	**2,269**	**1,894**	**1,899**	**1,899**

Table 6: Modeled available groundwater for the Jasper Aquifer portion of the Gulf Coast Aquifer summarized by county in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

County	Year					
	2010	2020	2030	2040	2050	2060
Austin	1,001	1,001	1,001	1,001	1,001	1,001
Brazos	1,189	1,189	1,189	1,189	1,189	1,189
Fort Bend	0	0	0	0	0	0
Grimes	10,848	10,848	10,307	10,084	10,084	10,084
Hardin	0	0	0	0	0	0
Harris	19	19	15	14	15	15
Jasper	16,021	15,982	15,903	15,903	15,903	15,903
Liberty	788	788	788	788	788	788
Montgomery	32,401	21,614	21,614	21,614	21,614	21,614
Newton	12,388	12,388	12,350	12,350	12,350	12,350
Polk	27,687	24,661	24,661	24,614	24,004	23,952
San Jacinto	10,102	10,102	10,102	10,102	10,102	10,102
Tyler	17,606	17,606	17,563	17,563	17,563	17,563
Walker	16,011	15,988	15,988	15,912	15,912	15,912
Waller	300	300	300	300	300	300
Washington	9,438	9,438	9,438	9,438	9,438	9,438
Total	**155,799**	**141,924**	**141,219**	**140,872**	**140,263**	**140,211**

Table 7: Modeled available groundwater for the Chicot Aquifer portion of the Gulf Coast Aquifer summarized by regional water planning area in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

Regional Water Planning Area	Year					
	2010	2020	2030	2040	2050	2060
G	0	0	0	0	0	0
H	244,639	236,803	211,091	212,190	213,749	213,953
I	33,753	33,753	33,753	33,753	33,753	33,753
Total	**278,392**	**270,556**	**244,844**	**245,943**	**247,502**	**247,706**

Table 8: Modeled available groundwater for the Evangeline Aquifer portion of the Gulf Coast Aquifer, summarized by regional water planning area in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

Regional Water Planning Area	Year					
	2010	2020	2030	2040	2050	2060
G	6,241	6,241	6,241	6,241	6,241	6,241
H	412,014	371,663	327,865	327,494	326,693	326,965
I	121,222	121,222	121,222	121,222	121,222	121,222
Total	**539,477**	**499,126**	**455,328**	**454,957**	**454,156**	**454,428**

Table 9: Modeled available groundwater for the Burkeville Confining Unit portion of the Gulf Coast Aquifer summarized by regional water planning area in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

Regional Water Planning Area	Year					
	2010	2020	2030	2040	2050	2060
G	368	368	368	0	0	0
H	3,660	1,854	1,781	1,774	1,779	1,779
I	120	120	120	120	120	120
Total	**4,148**	**2,342**	**2,269**	**1,894**	**1,899**	**1,899**

Table 10: Modeled available groundwater for the Jasper Aquifer portion of the Gulf Coast Aquifer, summarized by regional water planning area in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

Regional Water Planning Area	Year					
	2010	2020	2030	2040	2050	2060
G	21,475	21,475	20,934	20,711	20,711	20,711
H	77,102	66,292	66,288	66,164	66,165	66,165
I	57,222	54,157	53,997	53,997	53,387	53,335
Total	**155,799**	**141,924**	**141,219**	**140,872**	**140,263**	**140,211**

Table 11: Modeled available groundwater for the Chicot Aquifer portion of the Gulf Coast Aquifer, summarized by river basin in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

River Basin	Year					
	2010	2020	2030	2040	2050	2060
Brazos	56,046	48,386	40,433	39,803	39,240	39,305
Brazos-Colorado	33,286	34,676	30,748	30,368	29,696	29,730
Colorado	0	0	0	0	0	0
Neches	15,293	15,293	15,293	15,293	15,293	15,293
Neches-Trinity	11,751	11,751	11,751	11,751	11,751	11,751
Sabine	19,368	19,368	19,368	19,368	19,368	19,368
San Jacinto	66,403	63,365	51,927	52,931	54,591	54,665
San Jacinto-Brazos	50,045	51,558	49,627	50,634	51,578	51,604
Trinity	17,646	17,646	17,646	17,646	17,646	17,646
Trinity-San Jacinto	8,554	8,513	8,051	8,149	8,339	8,344
Total	**278,392**	**270,556**	**244,844**	**245,943**	**247,502**	**247,706**

Table 12: Modeled available groundwater for the Evangeline Aquifer portion of the Gulf Coast Aquifer, summarized by river basin in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

River Basin	Year					
	2010	2020	2030	2040	2050	2060
Brazos	36,717	37,083	35,786	35,932	36,168	36,194
Brazos-Colorado	14,527	14,527	14,527	14,527	14,527	14,527
Colorado	23	23	23	23	23	23
Neches	78,653	78,653	78,653	78,653	78,653	78,653
Neches-Trinity	37	37	37	37	37	37
Sabine	44,700	44,700	44,700	44,700	44,700	44,700
San Jacinto	317,937	275,930	234,666	233,209	231,042	231,254
San Jacinto-Brazos	14,976	17,226	16,394	17,317	18,519	18,551
Trinity	22,643	22,643	22,643	22,643	22,643	22,643
Trinity-San Jacinto	9,264	8,304	7,899	7,916	7,844	7,846
Total	**539,477**	**499,126**	**455,328**	**454,957**	**454,156**	**454,428**

Table 13: Modeled available groundwater for the Burkeville Confining Unit portion of the Gulf Coast Aquifer, summarized by river basin in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

River Basin	Year					
	2010	2020	2030	2040	2050	2060
Brazos	368	368	368	0	0	0
Brazos-Colorado	0	0	0	0	0	0
Colorado	0	0	0	0	0	0
Neches	119	119	119	119	119	119
Sabine	1	1	1	1	1	1
San Jacinto	335	329	256	249	254	254
San Jacinto-Brazos	0	0	0	0	0	0
Trinity	3,325	1,525	1,525	1,525	1,525	1,525
Trinity-San Jacinto	0	0	0	0	0	0
Total	**4,148**	**2,342**	**2,269**	**1,894**	**1,899**	**1,899**

Table 14: Modeled available groundwater for the Jasper Aquifer portion of the Gulf Coast Aquifer, summarized by river basin in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

River Basin	Year					
	2010	2020	2030	2040	2050	2060
Brazos	20,312	20,312	20,312	20,312	20,312	20,312
Brazos-Colorado	76	76	76	76	76	76
Colorado	171	171	171	171	171	171
Neches	41,505	38,440	38,318	38,318	37,708	37,656
Sabine	15,717	15,717	15,679	15,679	15,679	15,679
San Jacinto	46,417	35,607	35,603	35,602	35,603	35,603
San Jacinto-Brazos	0	0	0	0	0	0
Trinity	31,601	31,601	31,060	30,714	30,714	30,714
Trinity-San Jacinto	0	0	0	0	0	0
Total	**155,799**	**141,924**	**141,219**	**140,872**	**140,263**	**140,211**

Table 15: Modeled available groundwater for the Chicot Aquifer portion of the Gulf Coast Aquifer, summarized by groundwater conservation district (GCD) in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

Groundwater Conservation District	Year					
	2010	2020	2030	2040	2050	2060
Bluebonnet GCD	1,600	1,600	1,600	1,600	1,600	1,600
Brazoria County GCD	48,125	48,125	48,125	48,125	48,125	48,125
Brazos Valley GCD	0	0	0	0	0	0
Lone Star GCD	1,482	1,722	1,722	1,722	1,722	1,722
Lower Trinity GCD	0	0	0	0	0	0
Southeast Texas GCD	12,599	12,599	12,599	12,599	12,599	12,599
Total (groundwater conservation districts)	**63,806**	**64,046**	**64,046**	**64,046**	**64,046**	**64,046**
Fort Bend Subsidence District	83,006	75,916	61,657	61,004	60,061	60,177
Harris-Galveston Coastal Subsidence District	74,522	73,536	62,083	63,835	66,337	66,425
No District	57,058	57,058	57,058	57,058	57,058	57,058
Total (all areas)	**278,392**	**270,556**	**244,844**	**245,943**	**247,502**	**247,706**

Table 16: Modeled available groundwater forthe Evangeline Aquifer portion of the Gulf Coast Aquifer, summarized by groundwater conservation district (GCD) in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

Groundwater Conservation District	Year					
	2010	2020	2030	2040	2050	2060
Bluebonnet GCD	66,043	66,043	66,043	66,043	66,043	66,043
Brazoria County GCD	2,271	2,271	2,271	2,271	2,271	2,271
Brazos Valley GCD	0	0	0	0	0	0
Lone Star GCD	39,381	38,293	38,293	38,293	38,293	38,293
Lower Trinity GCD	16,489	16,489	16,489	16,489	16,489	16,489
Southeast Texas GCD	116,331	116,331	116,331	116,331	116,331	116,331
Total (groundwater conservation districts)	**240,515**	**239,427**	**239,427**	**239,427**	**239,427**	**239,427**
Fort Bend Subsidence District	30,923	32,789	30,420	31,166	32,251	32,313
Harris-Galveston Coastal Subsidence District	235,448	194,319	152,890	151,773	149,887	150,097
No District	32,591	32,591	32,591	32,591	32,591	32,591
Total (all areas)	**539,477**	**499,126**	**455,328**	**454,957**	**454,156**	**454,428**

Table 17: Modeled available groundwater for the Burkeville Confining Unit portion of the Gulf Coast Aquifer, summarized by groundwater conservation district (GCD) in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

Groundwater Conservation District	Year					
	2010	2020	2030	2040	2050	2060
Bluebonnet GCD	0	0	0	0	0	0
Brazoria County GCD	0	0	0	0	0	0
Brazos Valley GCD	0	0	0	0	0	0
Lone Star GCD	0	0	0	0	0	0
Lower Trinity GCD	3,443	1,643	1,643	1,643	1,643	1,643
Southeast Texas GCD	2	2	2	2	2	2
Total (groundwater conservation districts)	**3,445**	**1,645**	**1,645**	**1,645**	**1,645**	**1,645**
Fort Bend Subsidence District	0	0	0	0	0	0
Harris-Galveston Coastal Subsidence District	335	329	256	249	254	254
No District	368	368	368	0	0	0
Total (all areas)	**4,148**	**2,342**	**2,269**	**1,894**	**1,899**	**1,899**

Table 18: Modeled available groundwater for the Jasper Aquifer portion of the Gulf Coast Aquifer, summarized by groundwater conservation district (GCD) in Groundwater Management Area 14 for each decade between 2010 and 2060. Results are in acre-feet per year.

Groundwater Conservation District	Year					
	2010	2020	2030	2040	2050	2060
Bluebonnet GCD	28,160	28,137	27,596	27,297	27,297	27,297
Brazoria County GCD	0	0	0	0	0	0
Brazos Valley GCD	1,189	1,189	1,189	1,189	1,189	1,189
Lone Star GCD	32,401	21,614	21,614	21,614	21,614	21,614
Lower Trinity GCD	37,789	34,763	34,763	34,716	34,106	34,054
Southeast Texas GCD	46,015	45,976	45,816	45,816	45,816	45,816
Total (groundwater conservation districts)	**145,554**	**131,679**	**130,978**	**130,632**	**130,022**	**129,970**
Fort Bend Subsidence District	**0**	**0**	**0**	**0**	**0**	**0**
Harris-Galveston Coastal Subsidence District	**19**	**19**	**15**	**14**	**15**	**15**
No District	10,226	10,226	10,226	10,226	10,226	10,226
Total (all areas)	**155,799**	**141,924**	**141,219**	**140,872**	**140,263**	**140,211**

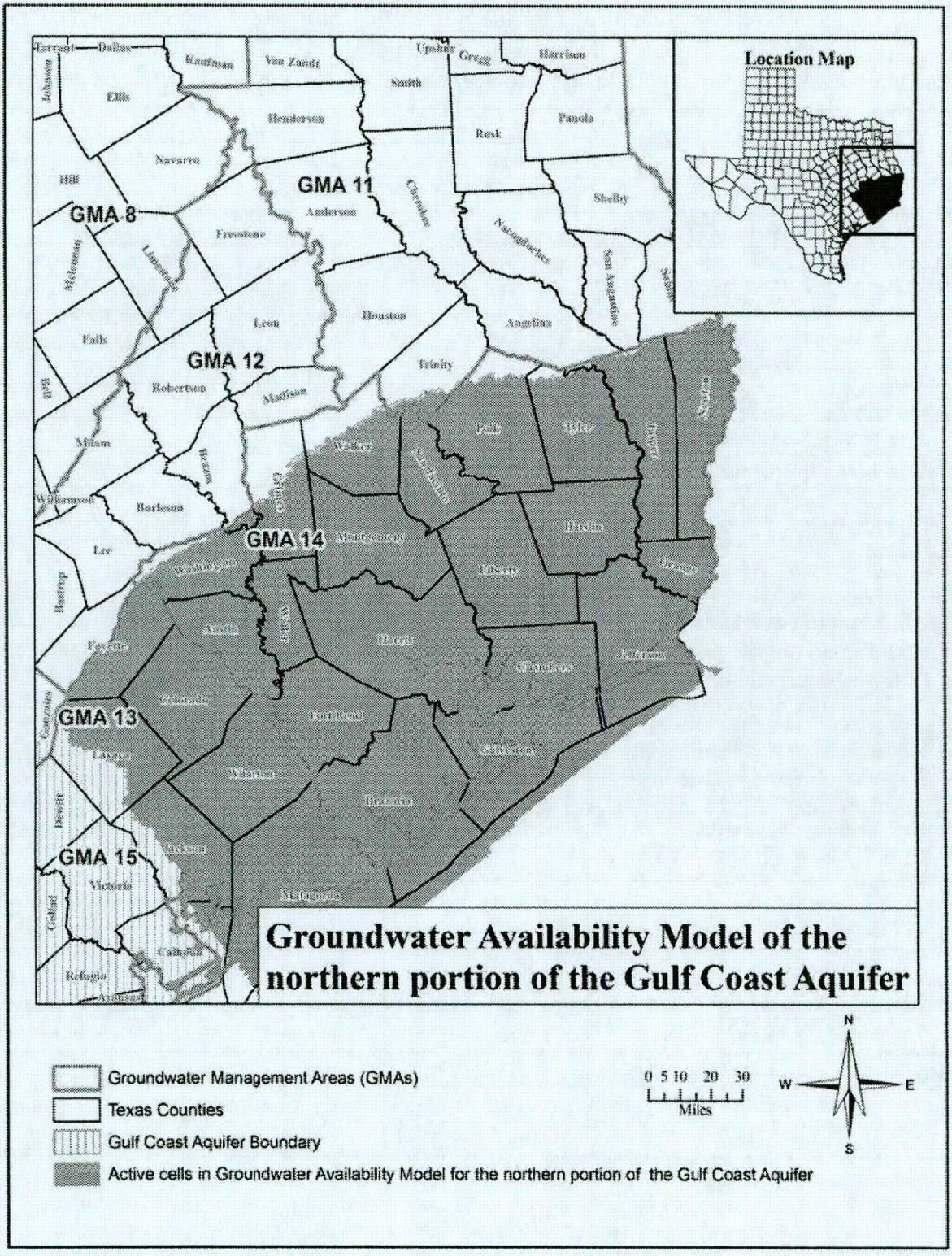

Figure 1: Map showing the areas covered by the groundwater availability model for the northern portion of the Gulf Coast Aquifer.

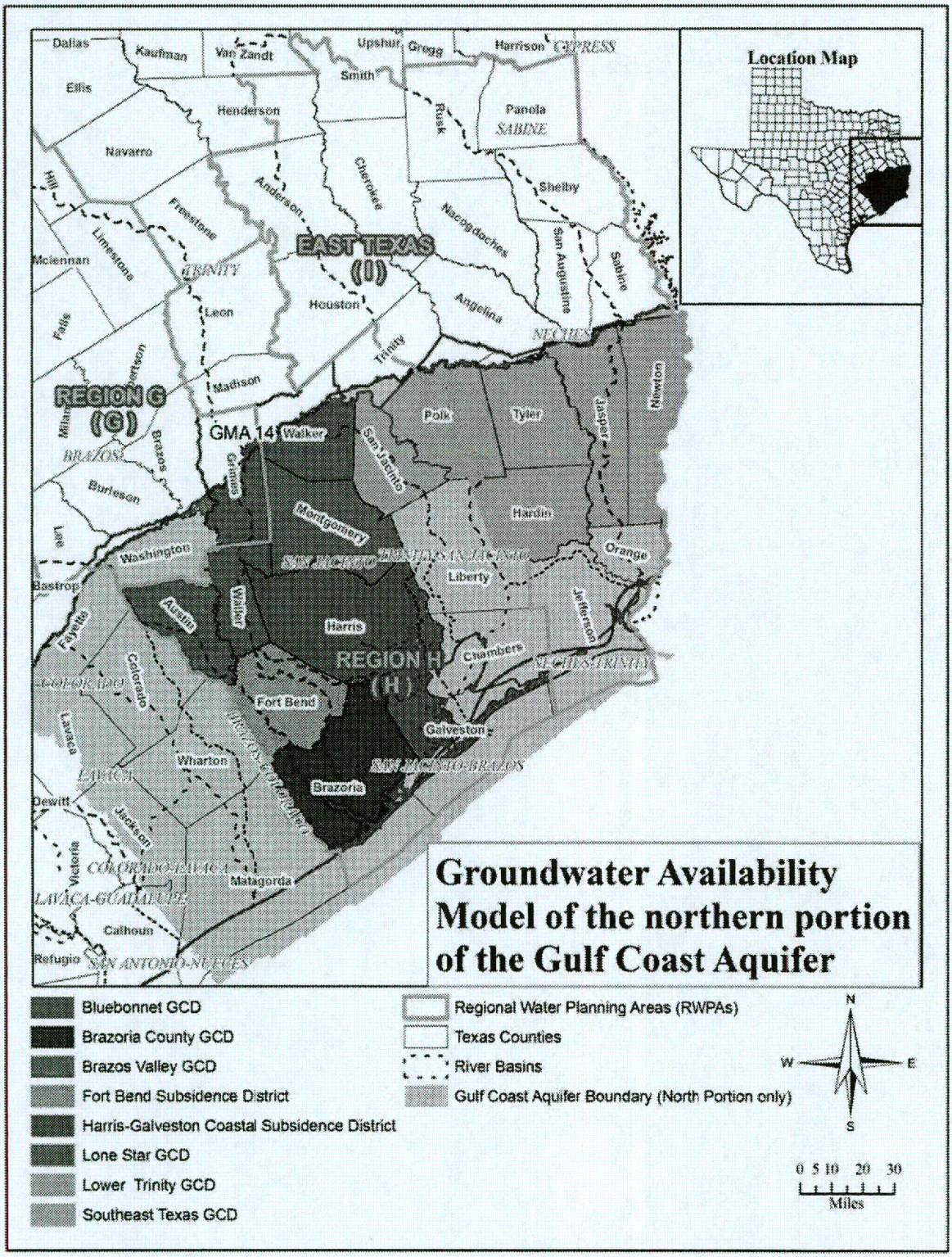

Figure 2: Map showing regional water planning areas (RWPAs), groundwater conservation districts (GCDs), subsidence districts, counties, and river basins in Groundwater Management Area 14.

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Appendix 3-D

Water Availability Model Technical Memorandum

The memorandum included as attachment 3-D describes the method used to determine available supplies from the Neches River for the City of Beaumont for regional water planning. Water availability modeling was used to analyze the supply from the Neches run-of-river and the natural flows of the Neches River.

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MEMORANDUM

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TO: File

CC: Simone Kiel

FROM: Jon Albright

SUBJECT: Beaumont Supplies from Neches River

DATE: November 21, 2013

PROJECT: Region I PLU12102

Summary

1. This memorandum describes the method used to determine available supplies from the Neches River for the City of Beaumont for regional water planning. The method is based on a daily analysis of flows in 1956 made by Tom Gooch of Freese and Nichols as part of the negotiations between the City of Beaumont and the Lower Neches Valley Authority (LNVA) in 2011. The 2011 analysis was provided to the TCEQ in response to a priority call by the LNVA. A comparison of results using the Neches WAM is part of the analysis.

2. The calculations for the available supply to Beaumont for regional water planning are preliminary. These calculations will be refined once the City of Beaumont and LNVA demands have been finalized.

3. The City of Beaumont owns Certificate of Adjudication (CA) 06-4415, which authorizes 56,467 acre-feet per year of diversion from the Neches River. The City also has supplies of 9,000 acre-feet per year from the Gulf Coast aquifer and a contract with the Lower Neches Valley Authority (LNVA) for 6,000 acre-feet of water from the Neches River and the Steinhagen/Rayburn system.

4. Table 1 compares the available supplies to preliminary demands for the City of Beaumont for the years 2020 and 2070. Table 1a uses supplies from the Neches WAM Run 3 for 1956, the year with the minimum supply available under the City of Beaumont's water rights. Table 1b shows the same analysis using the results of the daily analysis. Note that the daily analysis shows greater shortages than the WAM analysis.

5. In order to properly calculate the need in the database, Beaumont's supply from the Neches River will need to change from year to year. For example, instead of the maximum supply of 22,234 acre-feet per year, the year 2020 Neches River supply will be 15,934 acre-feet per year and the 2070 Neches River supply will be 21,588 acre-feet per year. This is necessary because the analysis uses a shorter time step (monthly) than the database (yearly).

Table 1a: 2020 and 2070 Supply and Demand – Worst Year Supplies from WAM Run 3
Values in Acre-Feet

Month	CA 4415 Available Supplies from WAM	2020 Conditions				2070 Conditions			
		Beaumont Demand	CA4415 Supplies Used to Meet Demand	Supplies from Other Sources	Shortage	Beaumont Demand	CA4415 Supplies Used to Meet Demand	Supplies from Other Sources	Shortage
Jan-56	4,669	2,723	2,723	0	0	3,962	3,962	0	0
Feb-56	4,132	2,419	2,419	0	0	3,518	3,518	0	0
Mar-56	4,495	2,623	2,623	0	0	3,816	3,816	0	0
Apr-56	4,390	2,579	2,579	0	0	3,749	3,749	0	0
May-56	4,832	2,842	2,842	0	0	4,131	4,131	0	0
Jun-56	26	2,817	26	2,791	0	4,098	26	4,072	0
Jul-56	8	3,034	8	3,026	0	4,409	8	4,401	0
Aug-56	6	3,006	6	3,000	0	4,370	6	4,364	0
Sep-56	5	2,886	5	2,881	0	4,197	5	2,163	2,029
Oct-56	484	2,874	484	2,390	0	4,177	484	0	3,693
Nov-56	4,485	2,621	2,621	0	0	3,812	3,812	0	0
Dec-56	4,579	2,678	2,678	0	0	3,900	3,900	0	0
Total	*32,111*	*33,102*	*19,014*	*14,088*	*0*	*48,139*	*27,417*	*15,000*	*5,722*

Table 1b: 2020 and 2070 Supply and Demand – Worst Year Supplies from Daily Analysis
Values in Acre-Feet

Month	CA 4415 Available Supplies from Daily Analysis	2020 Conditions				2070 Conditions			
		Beaumont Demand	CA4415 Supplies Used to Meet Demand	Supplies from Other Sources	Shortage	Beaumont Demand	CA4415 Supplies Used to Meet Demand	Supplies from Other Sources	Shortage
Jan-56	3,901	2,723	2,723	0	0	3,962	3,901	61	0
Feb-56	4,164	2,419	2,419	0	0	3,518	3,518	0	0
Mar-56	3,765	2,623	2,623	0	0	3,816	3,765	51	0
Apr-56	3,701	2,579	2,579	0	0	3,749	3,701	48	0
May-56	3,955	2,842	2,842	0	0	4,131	3,955	176	0
Jun-56	775	2,817	775	2,042	0	4,098	775	3,323	0
Jul-56	0	3,034	0	3,034	0	4,409	0	4,409	0
Aug-56	0	3,006	0	3,006	0	4,370	0	4,370	0
Sep-56	0	2,886	0	2,886	0	4,197	0	2,562	1,635
Oct-56	0	2,874	0	2,874	0	4,177	0	0	4,177
Nov-56	116	2,621	116	1,158	1,347	3,812	116	0	3,696
Dec-56	1,857	2,678	1,857	0	821	3,900	1,857	0	2,043
Total	*22,234*	*33,102*	*15,934*	*15,000*	*2,168*	*48,139*	*21,588*	*15,000*	*11,551*

6. The remainder of this memorandum describes the calculations in more detail. Attachment 1 contains the actual daily calculations of available supply.

Water Rights

7. Table 2 is a summary of the Beaumont (CA 06-4415) and LNVA water rights (CA 06-4411). These two water rights are the primary run-of-the-river diversions from the lower Neches River. LNVA rights are for diversions from both the Neches River and Pine Island Bayou. A canal connects the main stem of the Neches River to the LNVA diversion point on Pine Island Bayou. The LNVA right contains a complex set of maximum diversion rates for the various priorities which vary by location which are discussed in the section on the daily analysis. The LNVA rights also include authorization for Steinhagen and Rayburn Reservoirs, which are not included in Table 2.

Table 2: Beaumont and LNVA Water Rights

Number	Owner	Priority Date	Diversion Amount	Type of Use
CA 06-4415	City of Beaumont	5-Apr-15	6,570	Municipal
		8-Jan-25	49,897	Municipal and Industrial
		Total	*56,467*	
CA 06-4411	LNVA	12-Aug-13	107,108	Municipal, Industrial, Irrigation, Mining
		8-Nov-13	219,252	
		31-Dec-24	55,516	
		Total	*326,360*	

Available Supplies Using WAM

8. Figure 2 shows the annual diversions from the Neches River under the Beaumont water right from the Neches WAM plus the 15,000 acre-feet per year available from other sources (LNVA contract and groundwater). The Beaumont 2020 and 2070 annual demands are included for reference. The Beaumont diversion of 56,567 acre-feet per year is approximately 89% reliable.

9. Figures 3a and 3b are annual summaries comparing 2020 and 2070 Beaumont demands to available supplies, using the monthly availability from the WAM. For this analysis, each month in the WAM simulation is compared to the projected Beaumont demand for that month. If there is not enough water available from the Neches River, then the 15,000 acre-feet per year

from alternative sources is used if available. Once this supply is used up there is a shortage. In 2020 the three sources are sufficient to meet all Beaumont demands. In 2070, there are shortages in 1966, 1967 and 1971. The maximum shortage of 5,722 acre-feet is in 1956.

Figure 2: Annual Available Supply from Beaumont Sources Based on Neches WAM

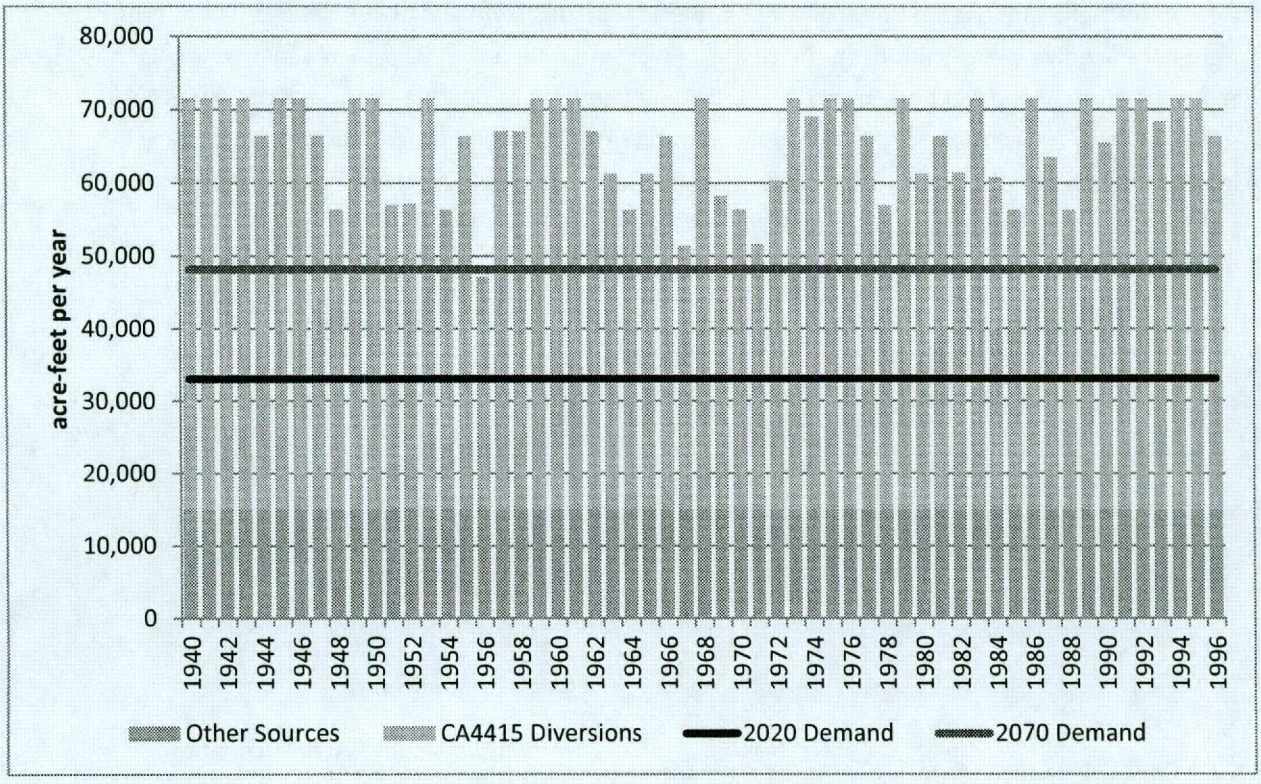


Figure 3a: Annual Source of Supply Based on Monthly Analysis using WAM – 2020 Conditions

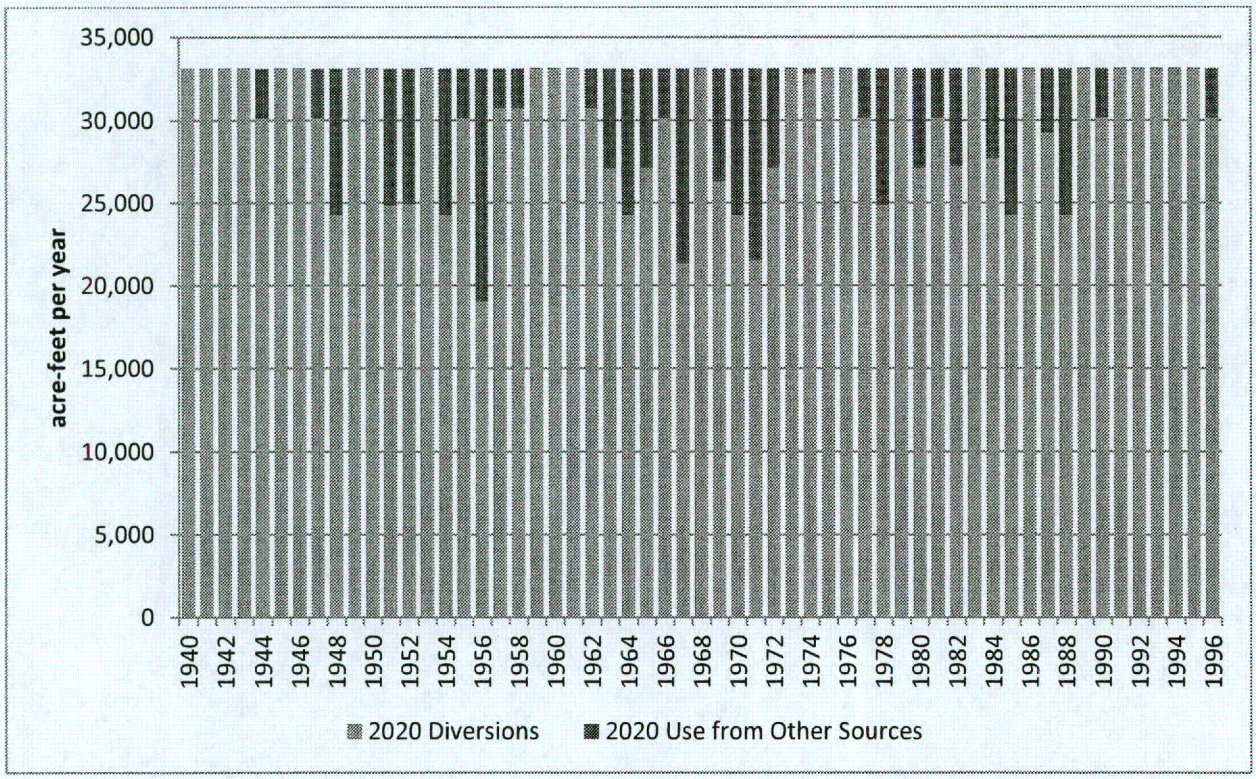
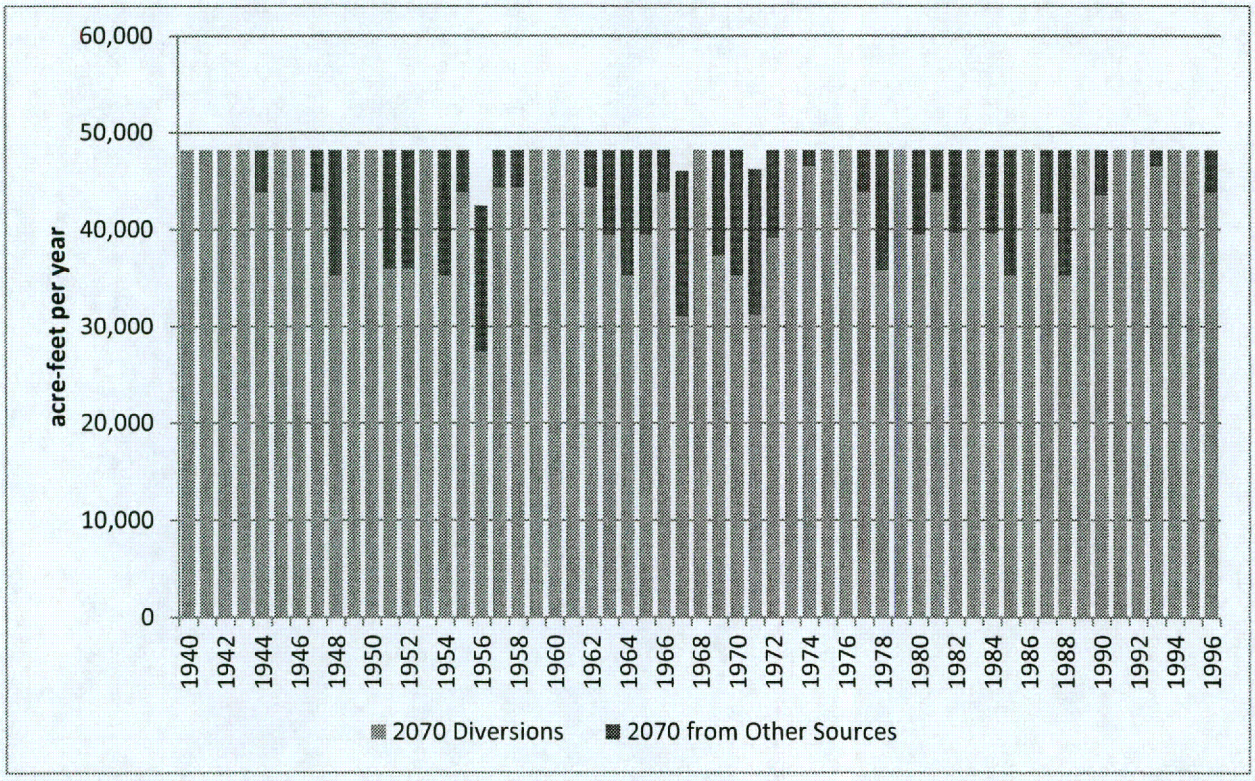


Figure 3b: Annual Source of Supply Based on Monthly Analysis using WAM – 2070 Conditions



Daily Analysis

10. The preferred method for calculating availability for Beaumont is based on an analysis performed during the negotiations between LNVA and Beaumont in 2011. These negotiations were overseen by TCEQ. Attachment 1 contains a detailed description of the calculations performed as part of the negotiations. The analysis uses daily historical flows for the years 1956, 1967, 2000, 2010 and 2011. 1956 had the lowest availability for Beaumont and was selected for the basis of water availability for Region I.

ATTACHMENT 1: DESCRIPTION OF DAILY ANALYSIS SPREADSHEET

The daily analysis spreadsheet includes the following worksheets:

Worksheet 1 (Analysis of Available Flow at the Salt Water Barrier) – This worksheet estimates the natural flows for the Neches River at the Salt Water Barrier based on inflow and outflow data from Sam Rayburn and B.A. Steinhagen Reservoirs and USGS streamflow data.

Worksheet 2 (Adjusted LNVA Analysis of Diversions Assigned to Water Rights) – This worksheet assigns diversions to various water rights using a modified version of the analysis performed by LNVA. The analysis preserves LNVA's logic and philosophy for allocating flow and diversions by water right. However, the analysis substitutes Freese and Nichols' calculations for available flow (see Worksheet 1, above); uses actual daily diversions by the City of Beaumont (Worksheet 5) instead of the hypothetical diversion in the original LNVA analysis; and divides Beaumont's diversions between 1915 and 1925 priority.

Worksheet 3 (Corps Data) – presents the raw inflow and outflow data for Sam Rayburn Reservoir and inflow data for B.A. Steinhagen Reservoir, as extracted from the Corps of Engineers' website: http://www.swf-wc.usace.army.mil/cgi-in/rcshtml.pl?page=Hydrologic. These data are provided as backup for calculations in Worksheet 1.

Worksheet 4 (USGS Data) – presents gage flow in cubic feet per second, as extracted from the U.S. Geological Survey website: http://waterdata.usgs.gov/tx/nwis/current/?type=flow. These data are provided as backup for calculations in Worksheet 1.

Worksheet 5 (Beaumont Diversions) – presents the daily diversions by the City of Beaumont from the Neches River. This data was provided by Karin Warren of the City of Beaumont to Freese and Nichols, Inc. by Beaumont. Worksheet 5 converts the raw data, provided in million gallons per day, to cubic feet per second (cfs) using the factor 1 MGD = 1.55 cfs. These data are presented as backup for calculations in Worksheet 2.

Worksheets 1 and 2 are discussed in greater detail below.

WORKSHEET 1 –ANALYSIS OF AVAILABLE FLOW AT THE SALT WATER BARRIER

This table estimates natural flows above the Salt Water Barrier. The columns in the worksheet are developed as follows:

(A) Date. This is the date to which the data apply.

(B) Inflow to Sam Rayburn Reservoir. Obtained from the U.S. Army Corps of Engineers' website. "Adjusted" inflows in cubic feet per second are used for 1 January 2010 through 30 September

2010. Adjusted inflows are not available for dates later than 30 September 2010; calculated inflows from the same data set are used for the period 1 October 2010 through 14 November 2011.

(C) Flow at the Rockland USGS Gage. Daily flow in cfs from the U.S. Geological Survey website.

(D) Estimated Inflow to BA Steinhagen Reservoir (Not Including Releases from Sam Rayburn). This is the estimated inflow to B.A. Steinhagen Reservoir downstream from Sam Rayburn Reservoir and is based on the flow at the Rockland USGS gage multiplied by the drainage area ratio. The drainage area of B.A. Steinhagen Reservoir downstream from Sam Rayburn Reservoir is 4,124 square miles, and the drainage area of the Rockland gage is 3,636 square miles, resulting in a ratio of 1.1342.

(E) Total Natural Inflow above Dams. Calculated in the spreadsheet as the sum of Column B and Column D. This value, expressed in cfs, represents inflow from the portion of the Neches River watershed above Sam Rayburn Reservoir and B. A. Steinhagen Reservoirs.

(F) Natural Inflow above Dams with Negatives set to Zero. As noted previously, natural inflow may be zero during dry periods but cannot be negative. Negative numbers in the spreadsheet represent inconsistent data. This column replicates Column G with the difference that any negative value has been reset to zero.

(G) Flow at Town Bluff Gage. Daily flow in cfs from the U.S. Geological Survey website. Data points after 7/25/2011 are provisional; all prior data are approved. Note that the datum for 10/5/2011 is missing. We have filled in 598 cfs, which is the average of flows for 10/4 and 10/6.

(H) Flow at Evadale Gage. Daily flow in cfs from the U. S. Geological Survey website. Data points after 7/25/2011 are provisional; all prior data are approved. Note that the datum for 10/5/2011 is missing. We have filled in 635 cfs, which is the average of flows for 10/4 and 10/6.

(I) Evadale less Town Bluff (Lagged 1.5 days). Calculated in the spreadsheet as Column H minus the average of the Column G value from one and two days prior. This use of previous days' values for Town Bluff flows represents travel time between the two gages. Scenarios of 1, 1.5, 2, 2.5, and 3 days travel time were tested; 1.5 days travel time produced the fewest negative values and appears to be the best fit.

(J) Corrected Flow from Town Bluff to Evadale. In certain cases, Column I contains negative numbers (highlighted in pink). While flow between the two gages may be zero under some conditions, it should not be negative. We believe these negative numbers are an artifact of varying travel times. Column J represents a manual adjustment to Column I to remove negative inflows by adjusting the inflows of adjacent dates such that no entry is less than zero and the total volume remains unchanged.

(K) Flow at Village Creek near Kountze Gage. Daily flow in cfs from the U.S. Geological Survey website. Data from 10/4/2010 on are provisional. All prior data are approved. Note that the datum for 10/5/2011 is missing. We have filled in 15 cfs, which is the average of flows for 10/4 and 10/6.

(M) Flow at Pine Island Bayou near Sour Lake Gage. Daily flow in cfs from the U.S. Geological Survey website. Data from 10/5/2010 on are provisional; all prior data are approved.

(N) Ungaged Flow. Estimates the ungaged flow between Lake B.A. Steinhagen and the Salt Water Barrier by using a drainage area ratio and flows for the gaged portion of the watershed. The watershed above the Salt Water Barrier (9,789 square miles) minus the portion of the watershed above B.A. Steinhagen Reservoir (7,574 square miles) reflects 2,215 square miles of total watershed below B.A. Steinhagen Reservoir. The gaged portion of this drainage area is the gaged portion of the Pine Island Bayou watershed (336 square miles) plus the gaged portion of the Village Creek watershed (860 square miles) plus the gaged portion of the main stem watershed between the Evadale and Town gages (7,951 square miles minus 7,574 square miles, or 377 square miles). The total gaged portion of the watershed below B.A. Steinhagen is therefore 1,573 square miles (336 + 860 + 377). The ungaged portion of the watershed is 642 square miles (2,215 total – 1,573 gaged). The ratio of 642 square miles (ungaged area) to the gaged portion (1,573 square miles) is 0.41. (The drainage area of each gage is taken from the USGS website.) The spreadsheet accordingly multiplies (Column (H) + Column (K) + Column (L)) by 0.41 to calculate Column N.

(O) Flow Between BA Steinhagen and Neches at the Salt Water Barrier. Computes the total flow between Lake B.A. Steinhagen and the Salt Water Barrier by adding gaged and ungaged flow and is equal to Column (J) + Column (K) + Column (L) + Column (M).

(P) Estimated Natural Flow on Neches at Salt Water Barrier (O + F (Lagged 1.5 Days)). Estimates the total natural flow in the Neches River at the Salt Water Barrier by adding the estimated natural flow from the portion of the watershed below B.A. Steinhagen Reservoir (Column O) to estimated natural flow above the dams (Column F) with a 1.5 day lag for the flow values from the upper portion of the watershed (average of Column F values for 1 and 2 days prior).

WORKSHEET 2 – ADJUSTED LNVA ANALYSIS OF DIVERSIONS ASSIGNED TO WATER RIGHTS

Unless otherwise indicated, the procedures used to divide available flows among water rights and priorities are the same as the procedures followed by the LNVA in its spreadsheet.

(A) Date. This is the date to which the data apply.

(B) Estimated Natural Flow in the Neches River at the Salt Water Barrier – from Worksheet 1. Calculated by FNI as described in Worksheet 1. Data from Column Q, Worksheet 1, is copied to Column B, Worksheet 2. The computations are described under Worksheet 1 above. The data are different from the data used by LNVA.

(C) LNVA Pumpage at Neches First. Actual LNVA pumping at the Neches First Lift Pump Station, as reported by LNVA on a daily basis, in cfs.

(D) Neches First Year to Date. Cumulative pumping by LNVA at Neches First Pump Station for the year. This value is expressed in acre-feet. It is computed in the spreadsheet by multiplying diversions in cfs by 1.98347 (to convert to acre-feet) and adding each day's value to the prior

day's to determine a cumulative running total.

(E) LNVA Pumpage at Neches BI First. Actual LNVA pumping at the BI First Lift Pump Station, as reported by LNVA on a daily basis, in cfs.

(F) BI First Year to Date. Cumulative pumping by LNVA at BI First Lift Pump Station for the year. This value is expressed in acre-feet. It is computed in the spreadsheet by multiplying diversions in cfs by 1.98347 (to convert to acre-feet) and adding each day's value to the prior day's to determine a cumulative running total.

(G) 8/12/1913 BI First Run-of-the-River Right (up to 450 cfs). Allocates LNVA's diversion at BI First (in cfs) to the most senior water right for that location, limited by the available flow (Column B), the total diversion at BI First lift (Column E), the maximum allowable diversion rate at this priority, and the maximum annual diversion at this location and priority.

(H) Year to Date Use of 1913 BI (Ac-Ft). Cumulative pumping by LNVA at BI First Lift Pump Station at the 1913 priority for the year. This value is expressed in acre-feet. It is computed in the spreadsheet by multiplying diversions in cfs by 1.98347 (to convert to acre-feet) and adding each day's value to the prior day's to determine a cumulative running total. It is used to assure that diversions at the 1913 priority cease when the maximum annual diversion at that priority is reached.

(I) 11/8/1913 Neches First Run-of-the-River Right (up to 588 cfs). Allocates LNVA's diversion at Neches First (in cfs) to the most senior water right for that location, limited by the available flow less flow allocated to BI First 1913 (Column B – Column G), the total diversion at Neches First lift (Column C), the maximum allowable diversion rate at this priority, and the maximum annual diversion at this location and priority.

(J) Year to Date Use of 1913 Neches (Ac-Ft). Cumulative pumping by LNVA at Neches First Lift Pump Station at the 1913 priority for the year. This value is expressed in acre-feet. It is computed in the spreadsheet by multiplying diversions in cfs by 1.98347 (to convert to acre-feet) and adding each day's value to the prior day's to determine a cumulative running total. It is used to assure that diversions at the 1913 priority cease when the maximum annual diversion at that priority is reached.

(K) Beaumont Diversion from Neches (cfs). Actual diversion by the City of Beaumont, expressed in cfs. Data for diversions in mgd were provided by the City of Beaumont by email from Karen Warren to Tom Gooch, FNI, dated 14 November 2011. The original data are included in Worksheet 5 as Column B. This column was on in LNVA's computations.

(L) 4/15/1915 City of Beaumont Right Diversion. The portion of Beaumont's diversion that can be made with available water at a 1915 priority. It is limited to the lesser of actual diversions; available flow less diversions by LNVA under their 1913 rights (The lesser of Column K and Column B – Column G – Column I); the maximum allowable diversion rate at this priority; and the maximum annual diversion at this priority. In their computations, LNVA used an assumed 50 cfs diversion by LNVA rather than actual diversions (which were always less than 50 cfs) in this column.

(M) Year to Date Use of 1915 Beaumont (Ac-Ft) (Acre-feet). Cumulative pumping by Beaumont at Neches First Lift Pump Station at the 1913 priority for the year. This value is expressed in acre-feet. It is computed in the spreadsheet by multiplying cumulative diversions in cfs by 1.98347 (to convert to acre-feet). It is used to assure that diversions at the 1915 priority cease when the maximum annual diversion at that priority is reached.

(N) 12/31/1924 BI First Right. These are diversions by LNVA at the BI First Lift Pump Station that are allocated to LNVA's 1924 water right. They are limited by the difference between total diversions at BI First Lift (Column E) and diversions allocated to the 1913 priority (Column G), the difference between total available flow (Column B) and flows allocated to prior water rights (Columns G, I, and L), the 30 cfs diversion rate available under this right, and the total annual amount available under this right. There is a slight difference from the LNVA spreadsheet in this column. Rather than limiting diversions to (Column B – Column G – Column I – Column L), LNVA limited diversions to (Column B – Column G – Column I). This difference (correcting what appears to be a minor miscalculation by LNVA) does not significantly affect the results.

(O) 12/31/1924 Neches First Right. These are diversions by LNVA at the Neches First Lift Pump Station that are allocated LNVA's 1924 water right. They are limited by the difference between total diversions at BI First Lift (Column C) and diversions allocated to the 1913 priority (Column I), the difference between total available flow (Column B) and flows allocated to prior water rights (Columns G, I, L, and N), the 45 cfs diversion rate available under this right, and the total annual amount available under this right.

(P) Total of 1924 BI and Neches First Lift Year to Date Diversions. Cumulative pumping by LNVA at BI and Neches First Lift Pump Stations at the 1924 priority for the year. This value is expressed in acre-feet. It is computed in the spreadsheet by multiplying 1924 priority diversions in cfs at both pump stations by 1.98347 (to convert to acre-feet) and adding each day's value to the prior day's to determine a cumulative running total. It is used to assure that diversions at the 1924 priority cease when the maximum annual diversion at that priority is reached.

(Q) 1/8/1925 City of Beaumont Right Diversion. The portion of Beaumont's diversion that can be made with available water at a 1925 priority. It is limited to the lesser of actual diversions less diversions at the 1915 priority (Column K – Column L); available flow less diversions by LNVA under their 1913 and 1924 rights and by Beaumont at its 1915 right (Column B – Column G – Column I – Column L – Column N – Column O); and the maximum allowable diversion rate less diversions at the 1915 priority.

(R) Diversions by Beaumont in Excess of Available Flow. This is equal to Column K – Column L – Column Q. These diversions could be taken from channel storage or, as LNVA points out, could come from LNVA's releases from upstream reservoirs.

(S) 11/12/1963 Actual Diversions of Water from Storage. The amount of water LNVA diverts from releases of stored water on the day in question. It is equal to LNVA's total diversions (Column C + Column E) less the diversions allocated to run-of-the-river water rights (Column G + Column I + Column N + Column O).

(T) Total Year to Date Diversions from Storage. Cumulative diversions by LNVA of water released

from reservoir storage for the year. This value is expressed in acre-feet. It is computed in the spreadsheet by multiplying diversions of water released from storage (Column S) in cfs by 1.98347 (to convert to acre-feet) and adding each day's value to the prior day's to determine a cumulative running total. It is used to assure that diversions of water released from storage do not exceed the maximum annual amount.

(U) 11/12/1963 – Called Releases of Water from Storage. The amount of water that was released from storage in upstream reservoirs for the day. This was provided by LNVA.

(V) Total Year to Date Diversions from Storage. Cumulative water released from reservoir storage for the year. This value is expressed in acre-feet. It is computed in the spreadsheet by multiplying water released from storage (Column U) in cfs by 1.98347 (to convert to acre-feet) and adding each day's value to the prior day's to determine a cumulative running total. It is used to assure that water released from storage does not exceed the maximum annual amount.

Appendix 4-A

Identified Water Needs/Surplus

DB17 Report

The following appendix includes a copy of the Water User Group Identified Needs/Surplus data from the TWDB Data Web Interface known as the DB17. The summary is divided by Water User Group, county, and basin.

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Water User Group (WUG) Needs/Surplus

REGION I	WUG (NEEDS)/SURPLUS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
ANDERSON COUNTY						
NECHES BASIN						
BRUSHY CREEK WSC	147	150	155	158	158	158
FRANKSTON	149	142	140	136	130	124
PALESTINE	0	0	0	0	0	0
WALSTON SPRINGS WSC	8	11	16	22	23	23
COUNTY-OTHER	48	48	48	48	48	48
MANUFACTURING	0	0	0	0	0	0
MINING	0	0	0	0	0	0
STEAM ELECTRIC POWER	(11,306)	(13,218)	(15,549)	(18,390)	(21,853)	(25,968)
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	263	263	263	263	263	263
TRINITY BASIN						
BRUSHY CREEK WSC	293	295	298	300	301	301
ELKHART	179	177	178	181	182	182
FOUR PINES WSC	213	213	218	222	223	224
PALESTINE	0	0	0	0	0	0
THE CONSOLIDATED WSC	167	169	172	174	173	171
WALSTON SPRINGS WSC	0	0	0	0	0	0
COUNTY-OTHER	260	260	260	260	260	260
MANUFACTURING	0	0	0	0	0	0
MINING	53	33	29	50	72	89
LIVESTOCK	21	21	21	21	21	21
IRRIGATION	1,104	1,104	1,104	1,104	1,104	1,104
ANGELINA COUNTY						
NECHES BASIN						
ANGELINA WSC	272	272	268	258	248	239
BURKE	0	0	0	0	0	0
CENTRAL WCID OF ANGELINA COUNTY	397	382	355	330	308	288
DIBOLL	2,042	2,024	2,007	1,976	1,948	1,922
FOUR WAY SUD	726	707	689	670	650	631
HUDSON	254	245	236	224	209	216
HUDSON WSC	750	722	698	676	657	639
HUNTINGTON	826	821	816	810	800	792
LUFKIN	0	0	0	0	0	0
REDLAND WSC	577	579	570	561	553	546
ZAVALLA	0	0	0	0	0	0
COUNTY-OTHER	397	359	313	224	144	69
MANUFACTURING	(10,722)	(12,009)	(13,313)	(14,470)	(15,705)	(17,037)
MINING	(473)	(572)	(397)	(299)	(224)	(167)
STEAM ELECTRIC POWER	15,802	15,802	15,802	15,802	15,802	15,802
LIVESTOCK	89	89	89	89	89	89
IRRIGATION	331	331	331	331	331	331
CHEROKEE COUNTY						
NECHES BASIN						
ALTO	259	242	224	200	173	142
ALTO RURAL WSC	98	58	2	(66)	(137)	(215)
BULLARD	15	13	11	9	7	6
CRAFT-TURNEY WSC	0	0	0	0	0	0

Water User Group (WUG) Needs/Surplus

REGION I	WUG (NEEDS)/SURPLUS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
CHEROKEE COUNTY						
NECHES BASIN						
JACKSONVILLE	0	0	0	0	0	0
NEW SUMMERFIELD	97	87	76	61	44	25
NORTH CHEROKEE WSC	0	0	0	0	0	0
RUSK	383	314	241	143	31	8
RUSK RURAL WSC	192	174	155	124	87	45
SOUTHERN UTILITIES COMPANY	0	0	0	0	0	0
TROUP	0	0	0	0	0	0
WELLS	243	234	225	212	197	181
WRIGHT CITY WSC	33	29	24	18	11	0
COUNTY-OTHER	675	625	571	495	404	304
MANUFACTURING	11	11	11	11	11	11
MINING	(238)	(247)	(210)	(147)	(84)	(40)
STEAM ELECTRIC POWER	3,210	2,907	2,538	2,088	1,540	1,165
LIVESTOCK	132	132	132	132	132	132
IRRIGATION	81	76	72	68	65	65
HARDIN COUNTY						
NECHES BASIN						
KOUNTZE	786	795	803	807	807	807
LUMBERTON	0	0	0	0	0	0
LUMBERTON MUD	3,601	3,392	3,246	3,130	3,021	2,937
NORTH HARDIN WSC	1,362	1,345	1,320	1,301	1,287	1,276
SILSBEE	724	736	748	753	748	742
SOUR LAKE	654	649	645	642	637	633
WEST HARDIN WSC	502	498	495	491	488	485
COUNTY-OTHER	11	11	11	11	11	11
MANUFACTURING	6	6	6	6	6	6
MINING	0	0	0	0	0	0
LIVESTOCK	63	63	63	63	63	63
IRRIGATION	0	0	0	0	0	0
TRINITY BASIN						
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	0	0	0	0	0	0
WEST HARDIN WSC	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
HENDERSON COUNTY						
NECHES BASIN						
ATHENS	(2)	(3)	(2)	(1)	(17)	(33)
BERRYVILLE	0	0	0	0	0	0
BETHEL-ASH WSC	334	283	245	201	161	125
BROWNSBORO	0	0	0	0	0	0
BRUSHY CREEK WSC	0	0	0	0	0	0
CHANDLER	269	154	57	(77)	(196)	(312)
FRANKSTON	6	8	9	11	13	15
MURCHISON	0	0	0	0	0	0
R-P-M WSC	(3)	(17)	(26)	(39)	(52)	(63)
VIRGINIA HILL WSC	104	87	72	50	27	0
COUNTY-OTHER	540	540	540	540	540	540

Water User Group (WUG) Needs/Surplus

REGION I	WUG (NEEDS)/SURPLUS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
HENDERSON COUNTY						
NECHES BASIN						
MANUFACTURING	24	16	8	1	1	1
MINING	42	33	42	60	79	91
LIVESTOCK	1,612	1,539	1,481	1,406	1,016	765
IRRIGATION	388	372	366	362	310	278
HOUSTON COUNTY						
NECHES BASIN						
GRAPELAND	202	203	207	208	209	208
THE CONSOLIDATED WSC	561	570	579	583	580	577
COUNTY-OTHER	12	15	16	16	16	16
MANUFACTURING	12	10	9	8	7	6
MINING	0	0	0	0	0	0
LIVESTOCK	608	566	521	472	419	351
IRRIGATION	6	(22)	(51)	(84)	(121)	(170)
TRINITY BASIN						
CROCKETT	727	742	755	757	743	725
GRAPELAND	311	314	315	317	316	316
LOVELADY	105	105	107	108	109	108
THE CONSOLIDATED WSC	800	826	850	861	855	847
COUNTY-OTHER	179	182	181	181	181	180
MANUFACTURING	24	25	26	26	27	27
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	(756)	(974)	(1,213)	(1,478)	(1,770)	(2,169)
JASPER COUNTY						
NECHES BASIN						
JASPER	3,091	3,091	3,114	3,130	3,133	3,133
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	352	(3,049)	(6,021)	(8,250)	(8,335)	(8,420)
MINING	0	0	0	0	0	0
LIVESTOCK	217	217	217	217	217	217
IRRIGATION	58	58	58	58	58	58
SABINE BASIN						
JASPER COUNTY WCID #1	849	861	866	866	866	866
KIRBYVILLE	182	183	189	194	194	194
MAURICEVILLE SUD	43	43	41	39	38	38
COUNTY-OTHER	192	233	310	353	362	362
MANUFACTURING	4	3	1	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	217	217	217	217	217	217
IRRIGATION	33	33	33	33	33	33
JEFFERSON COUNTY						
NECHES BASIN						
BEAUMONT	0	0	(169)	(759)	(1,488)	(2,331)
BEVIL OAKS	0	0	0	0	0	0
CHINA	0	0	0	0	0	0
GROVES	0	0	0	0	0	0
JEFFERSON COUNTY WCID #10	0	0	0	0	0	0

Water User Group (WUG) Needs/Surplus

REGION I	WUG (NEEDS)/SURPLUS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
JEFFERSON COUNTY						
NECHES BASIN						
MEEKER MUD	20	17	13	6	3	0
NEDERLAND	0	0	0	0	0	0
NOME	0	0	0	0	0	0
PORT ARTHUR	0	0	0	0	0	0
PORT NECHES	0	0	0	0	0	0
COUNTY-OTHER	18	18	15	(22)	(57)	(89)
MANUFACTURING	(93,772)	(135,897)	(141,948)	(148,018)	(154,093)	(160,406)
MINING	0	0	0	0	0	0
STEAM ELECTRIC POWER	(13,426)	(15,696)	(18,464)	(21,838)	(25,951)	(30,839)
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	3,253	2,608	2,166	2,009	2,172	2,422
NECHES-TRINITY BASIN						
BEAUMONT	0	0	(331)	(1,486)	(2,914)	(4,565)
CHINA	0	0	0	0	0	0
GROVES	0	0	0	0	0	0
JEFFERSON COUNTY WCID #10	0	0	0	0	0	0
MEEKER MUD	61	50	38	19	8	0
NEDERLAND	0	0	0	0	0	0
NOME	0	0	0	0	0	0
PORT ARTHUR	0	0	0	0	0	0
PORT NECHES	0	0	0	0	0	0
WEST JEFFERSON COUNTY MWD	0	0	0	0	0	0
COUNTY-OTHER	359	414	412	(658)	(1,867)	(3,207)
MANUFACTURING	(86,689)	(125,576)	(131,158)	(136,761)	(142,368)	(148,197)
MINING	0	0	0	0	0	0
LIVESTOCK	63	63	63	63	63	63
IRRIGATION	43,228	34,660	28,777	26,689	28,867	32,178
NACOGDOCHES COUNTY						
NECHES BASIN						
APPLEBY WSC	285	222	157	82	0	0
CUSHING	105	94	82	69	53	37
D&M WSC	289	200	108	4	(112)	(234)
GARRISON	340	318	296	270	241	211
LILLY GROVE SUD	332	292	250	202	148	90
MELROSE WSC	304	259	213	158	95	28
NACOGDOCHES	0	0	0	0	0	0
SWIFT WSC	238	201	163	116	63	6
WODEN WSC	440	414	386	352	312	269
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	10,000	10,000	10,000	10,000	10,000	10,000
MINING	(5,475)	(2,975)	(118)	226	567	818
STEAM ELECTRIC POWER	369	(799)	(2,224)	(3,961)	(6,078)	(8,594)
LIVESTOCK	(1,644)	(1,837)	(2,061)	(2,320)	(2,617)	(3,059)
IRRIGATION	109	109	109	109	109	109
NEWTON COUNTY						
SABINE BASIN						
MAURICEVILLE SUD	40	38	37	35	35	34

Water User Group (WUG) Needs/Surplus

REGION I	WUG (NEEDS)/SURPLUS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
NEWTON COUNTY						
SABINE BASIN						
NEWTON	40	49	57	62	63	63
SOUTH NEWTON WSC	144	144	144	144	144	144
COUNTY-OTHER	456	500	538	547	550	550
MANUFACTURING	0	0	0	0	0	0
MINING	(115)	(59)	35	105	168	207
STEAM ELECTRIC POWER	(690)	(3,080)	(5,994)	(9,545)	(13,875)	(19,021)
LIVESTOCK	138	138	138	138	138	138
IRRIGATION	5	5	5	5	5	5
ORANGE COUNTY						
NECHES BASIN						
BRIDGE CITY	10	11	13	12	11	10
MAURICEVILLE SUD	71	71	69	68	68	68
ORANGEFIELD WSC	0	0	0	0	0	0
PORT ARTHUR	0	0	0	0	0	0
ROSE CITY	498	497	497	495	494	493
VIDOR	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	(89)	(208)	(314)	(433)	(561)
MINING	10	8	8	8	5	0
STEAM ELECTRIC POWER	825	(14)	(1,038)	(2,286)	(3,807)	(4,846)
LIVESTOCK	102	102	102	102	102	102
IRRIGATION	(932)	(996)	(1,039)	(1,054)	(1,038)	(1,014)
NECHES-TRINITY BASIN						
BRIDGE CITY	4	5	7	6	5	4
COUNTY-OTHER	0	0	0	0	0	0
SABINE BASIN						
BRIDGE CITY	0	9	18	13	7	2
MAURICEVILLE SUD	838	838	823	815	806	800
ORANGE	0	0	0	0	0	0
ORANGEFIELD WSC	0	0	0	0	0	0
PINEHURST	0	0	0	0	0	0
SOUTH NEWTON WSC	0	0	0	0	0	0
VIDOR	0	0	0	0	0	0
WEST ORANGE	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	(2,532)	(8,390)	(14,231)	(19,416)	(25,247)	(31,550)
MINING	8	5	6	5	3	0
LIVESTOCK	16	16	16	16	16	16
IRRIGATION	(1,500)	(1,689)	(1,819)	(1,866)	(1,817)	(1,744)
PANOLA COUNTY						
CYPRESS BASIN						
COUNTY-OTHER	1	0	0	0	0	0
MINING	2	2	2	2	4	4
LIVESTOCK	15	15	15	15	15	15
SABINE BASIN						
BECKVILLE	448	437	431	425	419	414
CARTHAGE	0	0	0	0	0	0

Water User Group (WUG) Needs/Surplus

REGION I	WUG (NEEDS)/SURPLUS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
PANOLA COUNTY						
SABINE BASIN						
GILL WSC	74	75	77	76	75	74
TATUM	0	0	0	0	0	0
COUNTY-OTHER	179	165	171	155	125	98
MANUFACTURING	(134)	(156)	(176)	(194)	(230)	(309)
MINING	3,317	3,639	4,263	4,576	5,833	5,706
LIVESTOCK	175	175	175	175	175	175
IRRIGATION	510	510	510	510	510	510
POLK COUNTY						
NECHES BASIN						
CORRIGAN	67	51	39	23	11	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	9	9	9	9	9	9
MINING	63	89	114	140	166	177
LIVESTOCK	277	277	277	277	277	277
IRRIGATION	341	341	341	341	341	341
RUSK COUNTY						
NECHES BASIN						
HENDERSON	2,682	2,371	2,062	1,710	1,325	922
NEW LONDON	118	98	76	52	27	0
OVERTON	39	34	28	22	15	7
WRIGHT CITY WSC	27	22	18	12	6	0
COUNTY-OTHER	753	647	534	379	195	0
MANUFACTURING	31	31	31	31	31	31
MINING	(1,075)	(1,814)	(1,742)	(1,666)	(1,603)	(1,598)
LIVESTOCK	289	280	267	255	242	242
IRRIGATION	245	245	245	245	245	245
SABINE BASIN						
CHALK HILL SUD	720	700	679	650	615	579
CROSS ROADS SUD	407	395	383	363	336	309
EASTON	0	0	0	0	0	0
ELDERVILLE WSC	73	61	48	34	18	1
HENDERSON	447	394	340	278	212	142
KILGORE	148	422	356	277	182	78
NEW LONDON	95	77	61	42	21	0
OVERTON	79	33	(12)	(65)	(123)	(184)
TATUM	118	87	59	28	0	2
WEST GREGG SUD	10	10	9	7	5	3
COUNTY-OTHER	689	614	535	426	297	159
MANUFACTURING	1	1	1	1	1	1
MINING	0	(278)	(213)	(143)	(83)	(79)
STEAM ELECTRIC POWER	16,743	12,099	6,439	(462)	(8,873)	(18,868)
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	253	253	253	253	253	253
SABINE COUNTY						
NECHES BASIN						
G M WSC	4	3	3	3	3	3
PINELAND	5	10	13	14	14	14

Water User Group (WUG) Needs/Surplus

REGION I	WUG (NEEDS)/SURPLUS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
SABINE COUNTY						
NECHES BASIN						
COUNTY-OTHER	214	214	215	215	215	215
MANUFACTURING	380	311	241	179	123	62
MINING	124	145	171	196	222	240
LIVESTOCK	57	48	37	25	11	11
SABINE BASIN						
G M WSC	0	0	0	0	0	0
HEMPHILL	437	441	445	448	448	448
COUNTY-OTHER	398	408	413	414	414	414
MINING	654	768	904	1,036	1,168	1,262
LIVESTOCK	516	467	410	344	273	273
SAN AUGUSTINE COUNTY						
NECHES BASIN						
SAN AUGUSTINE	0	9	17	18	19	19
COUNTY-OTHER	417	442	462	472	475	475
MANUFACTURING	9	8	7	6	5	4
MINING	(2,102)	(1,102)	419	718	1,014	1,236
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
SABINE BASIN						
G M WSC	28	28	28	28	28	28
COUNTY-OTHER	81	82	82	82	82	82
MINING	0	0	0	0	0	0
LIVESTOCK	18	18	18	18	18	18
IRRIGATION	0	0	0	0	0	0
SHELBY COUNTY						
NECHES BASIN						
TIMPSON	0	0	0	0	0	0
COUNTY-OTHER	188	183	177	171	163	155
MINING	12	24	64	209	72	178
LIVESTOCK	(564)	(756)	(991)	(1,276)	(1,625)	(1,625)
IRRIGATION	9	9	9	9	9	9
SABINE BASIN						
CENTER	8	8	8	8	8	7
JOAQUIN	46	46	46	46	46	46
TENAHA	215	204	194	183	171	159
TIMPSON	386	379	372	365	356	347
COUNTY-OTHER	117	110	103	93	82	72
MANUFACTURING	311	323	334	344	357	370
MINING	30	63	165	536	186	460
LIVESTOCK	(803)	(1,619)	(2,611)	(3,823)	(5,299)	(5,299)
IRRIGATION	63	63	63	63	63	63
SMITH COUNTY						
NECHES BASIN						
ARP	0	0	0	0	0	0
BULLARD	(51)	(223)	(397)	(587)	(783)	(985)
CRYSTAL SYSTEMS INC	(12)	(105)	(219)	(356)	(510)	(642)
DEAN WSC	0	0	0	0	0	0

Water User Group (WUG) Needs/Surplus

REGION I	WUG (NEEDS)/SURPLUS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
SMITH COUNTY						
NECHES BASIN						
JACKSON WSC	0	0	0	0	0	0
LINDALE	(52)	(180)	(310)	(451)	(596)	(746)
LINDALE RURAL WSC	0	0	0	0	0	0
NEW CHAPEL HILL	0	0	0	0	0	0
NOONDAY	0	0	0	0	0	0
OVERTON	0	0	0	0	0	0
R-P-M WSC	(1)	(6)	(10)	(15)	(19)	(23)
SOUTHERN UTILITIES COMPANY	0	0	0	0	0	0
TROUP	0	0	0	0	0	0
TYLER	0	0	0	0	0	0
WALNUT GROVE WSC	917	773	622	449	264	71
WHITEHOUSE	0	0	0	0	0	0
WRIGHT CITY WSC	130	108	84	55	22	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	(1,464)	(1,655)	(1,838)	(1,993)	(2,206)	(2,437)
MINING	(108)	(113)	(114)	(83)	(54)	(32)
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
TRINITY COUNTY						
NECHES BASIN						
GROVETON	254	252	254	257	254	255
COUNTY-OTHER	765	762	761	767	756	746
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	(330)	(330)	(330)	(330)	(330)	(330)
TYLER COUNTY						
NECHES BASIN						
COLMESNEIL	207	209	212	213	213	213
IVANHOE	125	127	129	130	130	130
IVANHOE NORTH	155	157	158	159	159	159
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	0	0	0	0	0	0
TYLER COUNTY WSC	390	412	433	445	447	447
WOODVILLE	5,013	5,021	5,031	5,037	5,038	5,038
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	77	39	87	134	182	208
STEAM ELECTRIC POWER	0	0	0	0	0	0
LIVESTOCK	26	26	26	26	26	26
IRRIGATION	7	7	7	7	7	7

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WWP (NEEDS)/SURPLUS

WHOLESALE WATER PROVIDER	WWP (NEEDS)/SURPLUS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
ANGELINA NECHES RIVER AUTHORITY	(68,492)	(72,629)	(73,386)	(73,032)	(72,831)	(128,775)
ANGELINA NACOGDOCHES WCID #1	7,077	6,250	(2,866)	(3,692)	(4,519)	(5,305)
ATHENS MUNICIPAL WATER AUTHORITY	1,283	920	599	170	(2,597)	(5,986)
CITY OF BEAUMONT	0	0	(578)	(2,570)	(4,994)	(7,754)
CITY OF CARTHAGE	2,839	2,799	2,767	2,730	2,653	2,570
CITY OF CENTER	756	511	278	55	(196)	(450)
HOUSTON COUNTY WCID #1	(1,813)	(1,843)	(2,122)	(2,147)	(2,429)	(2,463)
CITY OF JACKSONVILLE	2,915	2,635	2,344	1,947	1,475	955
LOWER NECHES VALLEY AUTHORITY	642,968	514,337	498,421	482,660	466,462	449,560
CITY OF LUFKIN	8,894	8,307	7,757	7,213	6,627	6,035
CITY OF NACOGDOCHES	13,415	12,163	10,898	9,562	8,066	6,510
PANOLA COUNTY FRESH WATER SUPPLY DISTRICT	4,201	3,648	3,546	3,425	3,226	2,464
CITY OF PORT ARTHUR	0	0	0	0	0	0
SABINE RIVER AUTHORITY	642,875	624,319	346,838	124,727	86,754	9,196
CITY OF TYLER	12,394	10,178	7,861	5,238	2,204	(1,014)
UPPER NECHES RIVER MUNICIPAL WATER AUTHORITY	(4,831)	(6,849)	(8,869)	(10,892)	(60,169)	(62,190)
TOTAL WWP NEEDS/SURPLUS	**1,264,481**	**1,104,746**	**793,488**	**545,394**	**429,732**	**263,353**

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Appendix 4-B

Second-Tier Identified Water Need DB17 Report

This appendix will include a copy of the Second-Tier Identified Water Need data from the TWDB Data Web Interface known as the DB17. The summary will be divided by Wholesale Water Provider and Wholesale Water Provider, county, and river basin after implementation of conservation and direct reuse water management strategies. The TWDB will make this DB17 report available to RWPGs after submittal of the 2016 Initially Prepared Plan.

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Water User Group (WUG) Second-Tier Identified Water Need

REGION I	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
ANDERSON COUNTY						
NECHES BASIN						
BRUSHY CREEK WSC	0	0	0	0	0	0
FRANKSTON	0	0	0	0	0	0
PALESTINE	0	0	0	0	0	0
WALSTON SPRINGS WSC	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	0	0	0	0	0	0
STEAM ELECTRIC POWER	11,306	13,218	15,549	18,390	21,853	25,968
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
TRINITY BASIN						
BRUSHY CREEK WSC	0	0	0	0	0	0
ELKHART	0	0	0	0	0	0
FOUR PINES WSC	0	0	0	0	0	0
PALESTINE	0	0	0	0	0	0
THE CONSOLIDATED WSC	0	0	0	0	0	0
WALSTON SPRINGS WSC	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
ANGELINA COUNTY						
NECHES BASIN						
ANGELINA WSC	0	0	0	0	0	0
BURKE	0	0	0	0	0	0
CENTRAL WCID OF ANGELINA COUNTY	0	0	0	0	0	0
DIBOLL	0	0	0	0	0	0
FOUR WAY SUD	0	0	0	0	0	0
HUDSON	0	0	0	0	0	0
HUDSON WSC	0	0	0	0	0	0
HUNTINGTON	0	0	0	0	0	0
LUFKIN	0	0	0	0	0	0
REDLAND WSC	0	0	0	0	0	0
ZAVALLA	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	10,722	12,009	13,313	14,470	15,705	17,037
MINING	473	572	397	299	224	167
STEAM ELECTRIC POWER	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
CHEROKEE COUNTY						
NECHES BASIN						
ALTO	0	0	0	0	0	0
ALTO RURAL WSC	0	0	0	59	128	204
BULLARD	0	0	0	0	0	0
CRAFT-TURNEY WSC	0	0	0	0	0	0
JACKSONVILLE	0	0	0	0	0	0

Water User Group (WUG) Second-Tier Identified Water Need

REGION I	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
CHEROKEE COUNTY						
NECHES BASIN						
NEW SUMMERFIELD	0	0	0	0	0	0
NORTH CHEROKEE WSC	0	0	0	0	0	0
RUSK	0	0	0	0	0	0
RUSK RURAL WSC	0	0	0	0	0	0
SOUTHERN UTILITIES COMPANY	0	0	0	0	0	0
TROUP	0	0	0	0	0	0
WELLS	0	0	0	0	0	0
WRIGHT CITY WSC	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	238	247	210	147	84	40
STEAM ELECTRIC POWER	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
HARDIN COUNTY						
NECHES BASIN						
KOUNTZE	0	0	0	0	0	0
LUMBERTON	0	0	0	0	0	0
LUMBERTON MUD	0	0	0	0	0	0
NORTH HARDIN WSC	0	0	0	0	0	0
SILSBEE	0	0	0	0	0	0
SOUR LAKE	0	0	0	0	0	0
WEST HARDIN WSC	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
TRINITY BASIN						
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	0	0	0	0	0	0
WEST HARDIN WSC	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
HENDERSON COUNTY						
NECHES BASIN						
ATHENS	1	2	0	0	14	29
BERRYVILLE	0	0	0	0	0	0
BETHEL-ASH WSC	0	0	0	0	0	0
BROWNSBORO	0	0	0	0	0	0
BRUSHY CREEK WSC	0	0	0	0	0	0
CHANDLER	0	0	0	61	166	276
FRANKSTON	0	0	0	0	0	0
MURCHISON	0	0	0	0	0	0
R-P-M WSC	3	17	26	39	52	63
VIRGINIA HILL WSC	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	0	0	0	0	0	0

Water User Group (WUG) Second-Tier Identified Water Need

REGION I	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
HENDERSON COUNTY						
NECHES BASIN						
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
HOUSTON COUNTY						
NECHES BASIN						
GRAPELAND	0	0	0	0	0	0
THE CONSOLIDATED WSC	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	22	51	84	121	170
TRINITY BASIN						
CROCKETT	0	0	0	0	0	0
GRAPELAND	0	0	0	0	0	0
LOVELADY	0	0	0	0	0	0
THE CONSOLIDATED WSC	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	756	974	1,213	1,478	1,770	2,169
JASPER COUNTY						
NECHES BASIN						
JASPER	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	3,049	6,021	8,250	8,335	8,420
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
SABINE BASIN						
JASPER COUNTY WCID #1	0	0	0	0	0	0
KIRBYVILLE	0	0	0	0	0	0
MAURICEVILLE SUD	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
JEFFERSON COUNTY						
NECHES BASIN						
BEAUMONT	0	0	0	0	0	0
BEVIL OAKS	0	0	0	0	0	0
CHINA	0	0	0	0	0	0
GROVES	0	0	0	0	0	0
JEFFERSON COUNTY WCID #10	0	0	0	0	0	0
MEEKER MUD	0	0	0	0	0	0
NEDERLAND	0	0	0	0	0	0
NOME	0	0	0	0	0	0

Water User Group (WUG) Second-Tier Identified Water Need

REGION I	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
JEFFERSON COUNTY						
NECHES BASIN						
PORT ARTHUR	0	0	0	0	0	0
PORT NECHES	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	22	57	89
MANUFACTURING	93,772	135,897	141,948	148,018	154,093	160,406
MINING	0	0	0	0	0	0
STEAM ELECTRIC POWER	13,426	15,696	18,464	21,838	25,951	30,839
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
NECHES-TRINITY BASIN						
BEAUMONT	0	0	0	0	0	0
CHINA	0	0	0	0	0	0
GROVES	0	0	0	0	0	0
JEFFERSON COUNTY WCID #10	0	0	0	0	0	0
MEEKER MUD	0	0	0	0	0	0
NEDERLAND	0	0	0	0	0	0
NOME	0	0	0	0	0	0
PORT ARTHUR	0	0	0	0	0	0
PORT NECHES	0	0	0	0	0	0
WEST JEFFERSON COUNTY MWD	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	658	1,867	3,207
MANUFACTURING	86,689	125,576	131,158	136,761	142,368	148,197
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
NACOGDOCHES COUNTY						
NECHES BASIN						
APPLEBY WSC	0	0	0	0	0	0
CUSHING	0	0	0	0	0	0
D&M WSC	0	0	0	0	112	234
GARRISON	0	0	0	0	0	0
LILLY GROVE SUD	0	0	0	0	0	0
MELROSE WSC	0	0	0	0	0	0
NACOGDOCHES	0	0	0	0	0	0
SWIFT WSC	0	0	0	0	0	0
WODEN WSC	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	5,475	2,975	118	0	0	0
STEAM ELECTRIC POWER	0	799	2,224	3,961	6,078	8,594
LIVESTOCK	1,644	1,837	2,061	2,320	2,617	3,059
IRRIGATION	0	0	0	0	0	0
NEWTON COUNTY						
SABINE BASIN						
MAURICEVILLE SUD	0	0	0	0	0	0
NEWTON	0	0	0	0	0	0
SOUTH NEWTON WSC	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0

Water User Group (WUG) Second-Tier Identified Water Need

REGION I	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
NEWTON COUNTY						
SABINE BASIN						
MINING	115	59	0	0	0	0
STEAM ELECTRIC POWER	690	3,080	5,994	9,545	13,875	19,021
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
ORANGE COUNTY						
NECHES BASIN						
BRIDGE CITY	0	0	0	0	0	0
MAURICEVILLE SUD	0	0	0	0	0	0
ORANGEFIELD WSC	0	0	0	0	0	0
PORT ARTHUR	0	0	0	0	0	0
ROSE CITY	0	0	0	0	0	0
VIDOR	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	89	208	314	433	561
MINING	0	0	0	0	0	0
STEAM ELECTRIC POWER	0	14	1,038	2,286	3,807	4,846
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	932	996	1,039	1,054	1,038	1,014
NECHES-TRINITY BASIN						
BRIDGE CITY	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
SABINE BASIN						
BRIDGE CITY	0	0	0	0	0	0
MAURICEVILLE SUD	0	0	0	0	0	0
ORANGE	0	0	0	0	0	0
ORANGEFIELD WSC	0	0	0	0	0	0
PINEHURST	0	0	0	0	0	0
SOUTH NEWTON WSC	0	0	0	0	0	0
VIDOR	0	0	0	0	0	0
WEST ORANGE	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	2,532	8,390	14,231	19,416	25,247	31,550
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	1,500	1,689	1,819	1,866	1,817	1,744
PANOLA COUNTY						
CYPRESS BASIN						
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
SABINE BASIN						
BECKVILLE	0	0	0	0	0	0
CARTHAGE	0	0	0	0	0	0
GILL WSC	0	0	0	0	0	0
TATUM	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	134	156	176	194	230	309
MINING	0	0	0	0	0	0

Water User Group (WUG) Second-Tier Identified Water Need

REGION I	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
PANOLA COUNTY						
SABINE BASIN						
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
POLK COUNTY						
NECHES BASIN						
CORRIGAN	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
RUSK COUNTY						
NECHES BASIN						
HENDERSON	0	0	0	0	0	0
NEW LONDON	0	0	0	0	0	0
OVERTON	0	0	0	0	0	0
WRIGHT CITY WSC	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	1,075	1,814	1,742	1,666	1,603	1,598
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
SABINE BASIN						
CHALK HILL SUD	0	0	0	0	0	0
CROSS ROADS SUD	0	0	0	0	0	0
EASTON	0	0	0	0	0	0
ELDERVILLE WSC	0	0	0	0	0	0
HENDERSON	0	0	0	0	0	0
KILGORE	0	0	0	0	0	0
NEW LONDON	0	0	0	0	0	0
OVERTON	0	0	0	0	0	0
TATUM	0	0	0	0	0	0
WEST GREGG SUD	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	0	278	213	143	83	79
STEAM ELECTRIC POWER	0	0	0	462	8,873	18,868
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
SABINE COUNTY						
NECHES BASIN						
G M WSC	0	0	0	0	0	0
PINELAND	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
SABINE BASIN						
G M WSC	0	0	0	0	0	0

Water User Group (WUG) Second-Tier Identified Water Need

REGION I	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
SABINE COUNTY						
SABINE BASIN						
HEMPHILL	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
SAN AUGUSTINE COUNTY						
NECHES BASIN						
SAN AUGUSTINE	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	2,102	1,102	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
SABINE BASIN						
G M WSC	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
SHELBY COUNTY						
NECHES BASIN						
TIMPSON	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	564	756	991	1,276	1,625	1,625
IRRIGATION	0	0	0	0	0	0
SABINE BASIN						
CENTER	0	0	0	0	0	0
JOAQUIN	0	0	0	0	0	0
TENAHA	0	0	0	0	0	0
TIMPSON	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	803	1,619	2,611	3,823	5,299	5,299
IRRIGATION	0	0	0	0	0	0
SMITH COUNTY						
NECHES BASIN						
ARP	0	0	0	0	0	0
BULLARD	40	199	367	549	736	929
CRYSTAL SYSTEMS INC	10	102	215	351	504	634
DEAN WSC	0	0	0	0	0	0
JACKSON WSC	0	0	0	0	0	0
LINDALE	49	174	302	440	584	732
LINDALE RURAL WSC	0	0	0	0	0	0
NEW CHAPEL HILL	0	0	0	0	0	0
NOONDAY	0	0	0	0	0	0
OVERTON	0	0	0	0	0	0
R-P-M WSC	1	6	10	15	19	23

Water User Group (WUG) Second-Tier Identified Water Need

REGION I	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
SMITH COUNTY						
NECHES BASIN						
SOUTHERN UTILITIES COMPANY	0	0	0	0	0	0
TROUP	0	0	0	0	0	0
TYLER	0	0	0	0	0	0
WALNUT GROVE WSC	0	0	0	0	0	0
WHITEHOUSE	0	0	0	0	0	0
WRIGHT CITY WSC	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	1,464	1,655	1,838	1,993	2,206	2,437
MINING	108	113	114	83	54	32
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
TRINITY COUNTY						
NECHES BASIN						
GROVETON	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	330	330	330	330	330	330
TYLER COUNTY						
NECHES BASIN						
COLMESNEIL	0	0	0	0	0	0
IVANHOE	0	0	0	0	0	0
IVANHOE NORTH	0	0	0	0	0	0
LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	0	0	0	0	0	0
TYLER COUNTY WSC	0	0	0	0	0	0
WOODVILLE	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	0	0	0	0	0	0
STEAM ELECTRIC POWER	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0

***Second-tier needs are WUG split needs adjusted to include the implementation of recommended demand reduction and direct reuse water management strategies.**

Water User Group (WUG) Second-Tier Identified Water Need Summary

REGION I

	2020	2030	2040	2050	2060	2070
MUNICIPAL	104	500	920	1,514	2,315	3,124
COUNTY-OTHER	0	0	0	680	1,924	3,296
MANUFACTURING	195,313	286,821	308,893	329,416	348,617	368,917
MINING	9,586	7,160	2,794	2,338	2,048	1,916
STEAM ELECTRIC POWER	25,422	32,807	43,269	56,482	80,437	108,136
LIVESTOCK	3,011	4,212	5,663	7,419	9,541	9,983
IRRIGATION	3,518	4,011	4,452	4,812	5,076	5,427

*Second-tier needs are WUG split needs adjusted to include the implementation of recommended demand reduction and direct reuse water management strategies.

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Appendix 4-C

Source Water Balance DB17 Report

The following appendix includes a copy of the Source Water Balance data from the TWDB Data Web Interface known as the DB17. The summary is divided by source, county, basin, and salinity.

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Source Water Balance (Availability- WUG Supply)

REGION I

GROUNDWATER	COUNTY	BASIN	SALINITY	SOURCE WATER BALANCE (ACRE-FEET PER YEAR)					
				2020	2030	2040	2050	2060	2070
CARRIZO-WILCOX AQUIFER	ANDERSON	NECHES	FRESH	2,564	2,504	2,517	2,564	2,589	2,601
CARRIZO-WILCOX AQUIFER	ANDERSON	TRINITY	FRESH	976	932	977	1,035	1,045	1,044
CARRIZO-WILCOX AQUIFER	ANGELINA	NECHES	FRESH	3,152	2,808	2,485	2,166	1,820	1,760
CARRIZO-WILCOX AQUIFER	CHEROKEE	NECHES	FRESH	4,910	4,791	4,669	4,502	4,307	3,995
CARRIZO-WILCOX AQUIFER	HENDERSON	NECHES	FRESH	243	282	311	279	239	195
CARRIZO-WILCOX AQUIFER	HOUSTON	NECHES	FRESH	522	522	522	522	522	522
CARRIZO-WILCOX AQUIFER	HOUSTON	TRINITY	FRESH	1,709	1,602	1,487	1,362	1,227	1,054
CARRIZO-WILCOX AQUIFER	NACOGDOCHES	NECHES	FRESH	11,867	11,465	11,023	10,544	9,994	9,312
CARRIZO-WILCOX AQUIFER	PANOLA	CYPRESS	FRESH	0	0	0	0	0	0
CARRIZO-WILCOX AQUIFER	PANOLA	SABINE	FRESH	3,534	3,533	3,374	3,373	3,371	3,369
CARRIZO-WILCOX AQUIFER	RUSK	NECHES	FRESH	5,558	5,524	5,504	5,486	5,440	5,411
CARRIZO-WILCOX AQUIFER	RUSK	SABINE	FRESH	2,389	2,380	2,370	2,359	2,343	2,306
CARRIZO-WILCOX AQUIFER	SABINE	NECHES	FRESH	1,236	1,236	1,236	1,236	1,236	1,236
CARRIZO-WILCOX AQUIFER	SABINE	SABINE	FRESH	5,113	5,113	5,113	5,113	5,113	5,113
CARRIZO-WILCOX AQUIFER	SAN AUGUSTINE	NECHES	FRESH	629	541	441	324	196	196
CARRIZO-WILCOX AQUIFER	SAN AUGUSTINE	SABINE	FRESH	176	167	156	144	130	130
CARRIZO-WILCOX AQUIFER	SHELBY	NECHES	FRESH	877	719	429	292	159	159
CARRIZO-WILCOX AQUIFER	SHELBY	SABINE	FRESH	5,229	5,019	4,805	4,738	4,209	3,959
CARRIZO-WILCOX AQUIFER	SMITH	NECHES	FRESH	6,868	6,250	5,577	4,580	2,672	981
CARRIZO-WILCOX AQUIFER	TRINITY	NECHES	FRESH	1,114	1,114	1,114	1,114	1,114	1,114
GULF COAST AQUIFER	HARDIN	NECHES	FRESH	7,609	7,309	7,099	6,964	6,955	6,981
GULF COAST AQUIFER	HARDIN	TRINITY	FRESH	104	103	102	102	101	101
GULF COAST AQUIFER	JASPER	NECHES	FRESH	60	0	5	19	33	39
GULF COAST AQUIFER	JASPER	SABINE	FRESH	26,688	26,703	26,719	26,735	26,751	26,759
GULF COAST AQUIFER	JEFFERSON	NECHES	FRESH	443	426	406	365	331	293
GULF COAST AQUIFER	JEFFERSON	NECHES-TRINITY	FRESH	829	819	805	780	739	687
GULF COAST AQUIFER	NEWTON	NECHES	FRESH	176	176	176	176	176	176
GULF COAST AQUIFER	NEWTON	SABINE	FRESH	30,749	30,635	30,558	30,488	30,421	30,348
GULF COAST AQUIFER	ORANGE	NECHES	FRESH	222	183	161	132	54	0
GULF COAST AQUIFER	ORANGE	NECHES-TRINITY	FRESH	162	162	162	162	162	162
GULF COAST AQUIFER	ORANGE	SABINE	FRESH	279	232	134	40	0	0
GULF COAST AQUIFER	POLK	NECHES	FRESH	10,054	9,917	9,787	9,055	8,892	8,782

Source Water Balance (Availability- WUG Supply)

REGION I

GROUNDWATER	COUNTY	BASIN	SALINITY	SOURCE WATER BALANCE (ACRE-FEET PER YEAR)					
				2020	2030	2040	2050	2060	2070
GULF COAST AQUIFER	TYLER	NECHES	FRESH	32,171	32,167	32,204	32,222	32,221	32,216
OTHER AQUIFER | UNDIFFERENTIATED	ANDERSON	TRINITY	FRESH	0	0	0	0	0	0
OTHER AQUIFER | UNDIFFERENTIATED	ANGELINA	NECHES	FRESH	0	0	0	0	0	0
OTHER AQUIFER | UNDIFFERENTIATED	CHEROKEE	NECHES	FRESH	0	0	0	0	0	0
OTHER AQUIFER | UNDIFFERENTIATED	HENDERSON	NECHES	FRESH	0	0	0	0	0	0
OTHER AQUIFER | UNDIFFERENTIATED	HENDERSON	TRINITY	FRESH	81	81	81	81	81	81
OTHER AQUIFER | UNDIFFERENTIATED	HOUSTON	NECHES	FRESH	196	220	244	267	291	301
OTHER AQUIFER | UNDIFFERENTIATED	HOUSTON	TRINITY	FRESH	518	562	605	650	694	713
OTHER AQUIFER | UNDIFFERENTIATED	NACOGDOCHES	NECHES	FRESH	0	0	0	0	0	0
OTHER AQUIFER | UNDIFFERENTIATED	POLK	NECHES	FRESH	287	287	287	287	287	287
OTHER AQUIFER | UNDIFFERENTIATED	RUSK	NECHES	FRESH	0	0	0	0	0	0
OTHER AQUIFER | UNDIFFERENTIATED	RUSK	SABINE	FRESH	0	0	0	0	0	0
OTHER AQUIFER | UNDIFFERENTIATED	SABINE	SABINE	FRESH	99	99	99	99	99	99
OTHER AQUIFER | UNDIFFERENTIATED	SAN AUGUSTINE	NECHES	FRESH	0	0	0	0	0	0
OTHER AQUIFER | UNDIFFERENTIATED	SMITH	NECHES	FRESH	687	687	687	687	687	687
OTHER AQUIFER | UNDIFFERENTIATED	TRINITY	NECHES	FRESH	700	700	700	700	700	700
QUEEN CITY AQUIFER	ANDERSON	NECHES	FRESH	8,846	8,846	8,846	8,846	8,846	8,846
QUEEN CITY AQUIFER	ANDERSON	TRINITY	FRESH	8,405	8,405	8,405	8,405	8,405	8,405
QUEEN CITY AQUIFER	ANGELINA	NECHES	FRESH	1,093	1,093	1,093	1,093	1,093	1,093
QUEEN CITY AQUIFER	CHEROKEE	NECHES	FRESH	21,337	21,337	21,337	21,337	21,337	21,337
QUEEN CITY AQUIFER	HENDERSON	NECHES	FRESH	12,103	12,103	12,103	12,103	12,103	12,103
QUEEN CITY AQUIFER	HOUSTON	NECHES	FRESH	117	117	117	117	117	117
QUEEN CITY AQUIFER	HOUSTON	TRINITY	FRESH	216	216	216	216	216	216
QUEEN CITY AQUIFER	NACOGDOCHES	NECHES	FRESH	4,697	4,697	4,697	4,697	4,697	4,697
QUEEN CITY AQUIFER	RUSK	NECHES	FRESH	40	40	40	40	40	40
QUEEN CITY AQUIFER	RUSK	SABINE	FRESH	18	18	18	18	18	18
QUEEN CITY AQUIFER	SAN AUGUSTINE	NECHES	FRESH	7	7	7	7	7	7
QUEEN CITY AQUIFER	SAN AUGUSTINE	SABINE	FRESH	0	0	0	0	0	0
QUEEN CITY AQUIFER	SMITH	NECHES	FRESH	26,841	26,623	26,402	26,160	25,906	25,419
QUEEN CITY AQUIFER	TRINITY	NECHES	FRESH	0	0	0	0	0	0
SPARTA AQUIFER	ANDERSON	NECHES	FRESH	181	181	181	181	181	181
SPARTA AQUIFER	ANDERSON	TRINITY	FRESH	144	144	144	144	144	144
SPARTA AQUIFER	ANGELINA	NECHES	FRESH	501	501	501	501	501	501
SPARTA AQUIFER	CHEROKEE	NECHES	FRESH	202	202	202	202	202	202
SPARTA AQUIFER	HOUSTON	NECHES	FRESH	243	243	243	243	243	243

Source Water Balance (Availability- WUG Supply)

REGION I

GROUNDWATER	COUNTY	BASIN	SALINITY	SOURCE WATER BALANCE (ACRE-FEET PER YEAR)					
				2020	2030	2040	2050	2060	2070
SPARTA AQUIFER	HOUSTON	TRINITY	FRESH	494	494	494	494	494	494
SPARTA AQUIFER	NACOGDOCHES	NECHES	FRESH	253	253	253	253	253	253
SPARTA AQUIFER	SABINE	NECHES	FRESH	18	18	18	18	18	18
SPARTA AQUIFER	SABINE	SABINE	FRESH	232	232	232	232	232	232
SPARTA AQUIFER	SAN AUGUSTINE	NECHES	FRESH	111	111	111	111	111	111
SPARTA AQUIFER	SAN AUGUSTINE	SABINE	FRESH	3	3	3	3	3	3
SPARTA AQUIFER	TRINITY	NECHES	FRESH	313	313	313	313	313	313
YEGUA-JACKSON AQUIFER	ANGELINA	NECHES	FRESH	12,024	12,013	12,005	11,995	11,603	11,593
YEGUA-JACKSON AQUIFER	HOUSTON	NECHES	FRESH	1,324	1,324	1,324	1,324	1,324	1,324
YEGUA-JACKSON AQUIFER	HOUSTON	TRINITY	FRESH	3,810	3,810	3,810	3,810	3,810	3,810
YEGUA-JACKSON AQUIFER	NACOGDOCHES	NECHES	FRESH	209	209	209	209	209	209
YEGUA-JACKSON AQUIFER	POLK	NECHES	FRESH	354	354	354	354	354	354
YEGUA-JACKSON AQUIFER	SABINE	NECHES	FRESH	3,017	3,017	3,017	3,017	3,017	3,017
YEGUA-JACKSON AQUIFER	SABINE	SABINE	FRESH	565	565	565	565	565	565
YEGUA-JACKSON AQUIFER	SAN AUGUSTINE	NECHES	FRESH	1,871	1,871	1,871	1,871	1,871	1,871
YEGUA-JACKSON AQUIFER	SAN AUGUSTINE	SABINE	FRESH	0	0	0	0	0	0
YEGUA-JACKSON AQUIFER	TRINITY	NECHES	FRESH	3	3	3	3	3	3
GROUNDWATER TOTAL SOURCE WATER BALANCE				**280,372**	**277,333**	**274,265**	**270,626**	**265,637**	**261,608**

REGION I

REUSE	COUNTY	BASIN	SALINITY	SOURCE WATER BALANCE (ACRE-FEET PER YEAR)					
				2020	2030	2040	2050	2060	2070
DIRECT REUSE	ORANGE	SABINE	FRESH	0	0	0	0	0	0
DIRECT REUSE | IRRIGATION/MANUFACTURING	SHELBY	SABINE	FRESH	0	0	0	0	0	0
DIRECT REUSE | MANUFACTURING	SABINE	SABINE	FRESH	0	0	0	0	0	0
INDIRECT REUSE | IRRIGATION	JEFFERSON	NECHES-TRINITY	FRESH	0	0	0	0	0	0
REUSE TOTAL SOURCE WATER BALANCE				**0**	**0**	**0**	**0**	**0**	**0**

REGION I

SURFACE WATER	COUNTY	BASIN	SALINITY	SOURCE WATER BALANCE (ACRE-FEET PER YEAR)					
				2020	2030	2040	2050	2060	2070
ATHENS LAKE/RESERVOIR	RESERVOIR	NECHES	FRESH	1,911	1,693	1,574	1,441	1,000	673
BELLWOOD LAKE/RESERVOIR	RESERVOIR	NECHES	FRESH	550	550	550	550	550	550
CENTER LAKE/RESERVOIR	RESERVOIR	SABINE	FRESH	1,290	1,250	1,212	1,176	1,133	1,120
CHEROKEE LAKE/RESERVOIR	RESERVOIR	SABINE	FRESH	8,684	8,440	8,195	7,947	7,710	7,477

Source Water Balance (Availability- WUG Supply)

REGION I

SURFACE WATER	COUNTY	BASIN	SALINITY	SOURCE WATER BALANCE (ACRE-FEET PER YEAR)					
				2020	2030	2040	2050	2060	2070
CYPRESS LIVESTOCK LOCAL SUPPLY	PANOLA	CYPRESS	FRESH	0	0	0	0	0	0
HOUSTON COUNTY LAKE/RESERVOIR	RESERVOIR	TRINITY	FRESH	3,500	3,500	3,500	3,500	3,500	3,500
JACKSONVILLE LAKE/RESERVOIR	RESERVOIR	NECHES	FRESH	3,068	2,872	2,668	2,390	2,060	1,695
KURTH LAKE/RESERVOIR	RESERVOIR	NECHES	FRESH	7,487	7,253	7,033	6,815	6,581	6,035
LAKE NACONICHE/RESERVOIR	RESERVOIR	NECHES	FRESH	4,500	4,500	4,500	4,500	4,500	4,500
MARTIN LAKE/RESERVOIR	RESERVOIR	SABINE	FRESH	0	0	0	0	0	0
MURVAUL LAKE/RESERVOIR	RESERVOIR	SABINE	FRESH	14,882	14,290	14,157	14,000	13,725	12,923
NACOGDOCHES LAKE/RESERVOIR	RESERVOIR	NECHES	FRESH	9,656	8,698	7,742	6,741	5,645	4,521
NECHES LIVESTOCK LOCAL SUPPLY	ANDERSON	NECHES	FRESH	0	0	0	0	0	0
NECHES LIVESTOCK LOCAL SUPPLY	ANGELINA	NECHES	FRESH	0	0	0	0	0	0
NECHES LIVESTOCK LOCAL SUPPLY	CHEROKEE	NECHES	FRESH	0	0	0	0	0	0
NECHES LIVESTOCK LOCAL SUPPLY	HARDIN	NECHES	FRESH	0	0	0	0	0	0
NECHES LIVESTOCK LOCAL SUPPLY	HENDERSON	NECHES	FRESH	0	0	0	0	0	0
NECHES LIVESTOCK LOCAL SUPPLY	HOUSTON	NECHES	FRESH	0	0	0	0	0	0
NECHES LIVESTOCK LOCAL SUPPLY	JASPER	NECHES	FRESH	0	0	0	0	0	0
NECHES LIVESTOCK LOCAL SUPPLY	NACOGDOCHES	NECHES	FRESH	0	0	0	0	0	0
NECHES LIVESTOCK LOCAL SUPPLY	ORANGE	NECHES	FRESH	0	0	0	0	0	0
NECHES LIVESTOCK LOCAL SUPPLY	POLK	NECHES	FRESH	0	0	0	0	0	0
NECHES LIVESTOCK LOCAL SUPPLY	RUSK	NECHES	FRESH	0	0	0	0	0	0
NECHES LIVESTOCK LOCAL SUPPLY	SABINE	NECHES	FRESH	0	0	0	0	0	0
NECHES LIVESTOCK LOCAL SUPPLY	SAN AUGUSTINE	NECHES	FRESH	0	0	0	0	0	0
NECHES LIVESTOCK LOCAL SUPPLY	SHELBY	NECHES	FRESH	0	0	0	0	0	0
NECHES LIVESTOCK LOCAL SUPPLY	SMITH	NECHES	FRESH	0	0	0	0	0	0
NECHES LIVESTOCK LOCAL SUPPLY	TRINITY	NECHES	FRESH	0	0	0	0	0	0
NECHES LIVESTOCK LOCAL SUPPLY	TYLER	NECHES	FRESH	0	0	0	0	0	0
NECHES OTHER LOCAL SUPPLY	CHEROKEE	NECHES	FRESH	0	0	0	0	0	0
NECHES OTHER LOCAL SUPPLY	JEFFERSON	NECHES	FRESH	0	0	0	0	0	0
NECHES OTHER LOCAL SUPPLY	NACOGDOCHES	NECHES	FRESH	0	0	0	0	0	0
NECHES OTHER LOCAL SUPPLY	POLK	NECHES	FRESH	0	0	0	0	0	0

Source Water Balance (Availability- WUG Supply)

REGION I

SURFACE WATER	COUNTY	BASIN	SALINITY	SOURCE WATER BALANCE (ACRE-FEET PER YEAR)					
				2020	2030	2040	2050	2060	2070
NECHES OTHER LOCAL SUPPLY	TYLER	NECHES	FRESH	0	0	0	0	0	0
NECHES RUN-OF-RIVER	ANDERSON	NECHES	FRESH	0	0	0	0	0	0
NECHES RUN-OF-RIVER	ANGELINA	NECHES	FRESH	74	74	74	74	74	74
NECHES RUN-OF-RIVER	CHEROKEE	NECHES	FRESH	0	0	0	0	0	0
NECHES RUN-OF-RIVER	HARDIN	NECHES	FRESH	0	0	0	0	0	0
NECHES RUN-OF-RIVER	HOUSTON	NECHES	FRESH	0	0	0	0	0	0
NECHES RUN-OF-RIVER	JASPER	NECHES	FRESH	0	0	0	0	0	0
NECHES RUN-OF-RIVER	JEFFERSON	NECHES	BRACKISH	752,152	752,152	752,152	752,152	752,152	752,152
NECHES RUN-OF-RIVER	NACOGDOCHES	NECHES	FRESH	0	0	0	0	0	0
NECHES RUN-OF-RIVER	ORANGE	NECHES	BRACKISH	17,310	17,310	17,310	17,310	17,310	17,310
NECHES RUN-OF-RIVER	RUSK	NECHES	FRESH	0	0	0	0	0	0
NECHES RUN-OF-RIVER	SABINE	NECHES	FRESH	0	0	0	0	0	0
NECHES RUN-OF-RIVER	SMITH	NECHES	FRESH	0	0	0	0	0	0
NECHES RUN-OF-RIVER	TRINITY	NECHES	FRESH	0	0	0	0	0	0
NECHES RUN-OF-RIVER	TYLER	NECHES	FRESH	0	0	0	0	0	0
NECHES RUN-OF-RIVER | ANGELINA & NECHES RIVER AUTHORITY	SHELBY	NECHES	FRESH	1,000	1,000	1,000	1,000	1,000	1,000
NECHES RUN-OF-RIVER | BEAUMONT	JEFFERSON	NECHES	FRESH	0	0	0	0	0	0
NECHES RUN-OF-RIVER | PINE ISLAND BAYOU	JASPER	NECHES	FRESH	9,084	0	0	0	0	0
NECHES-TRINITY LIVESTOCK LOCAL SUPPLY	JEFFERSON	NECHES-TRINITY	FRESH	0	0	0	0	0	0
NECHES-TRINITY OTHER LOCAL SUPPLY	JEFFERSON	NECHES-TRINITY	FRESH	1,000	1,000	1,000	1,000	1,000	1,000
NECHES-TRINITY RUN-OF-RIVER	JEFFERSON	NECHES-TRINITY	FRESH	1,160	1,160	1,160	1,160	1,160	1,160
PALESTINE LAKE/RESERVOIR	RESERVOIR	NECHES	FRESH	189,452	186,766	184,049	181,225	178,289	175,309
PINKSTON LAKE/RESERVOIR	RESERVOIR	NECHES	FRESH	860	655	463	276	68	0
RUSK CITY LAKE/RESERVOIR	RESERVOIR	NECHES	FRESH	0	0	0	0	0	0
SABINE LIVESTOCK LOCAL SUPPLY	JASPER	SABINE	FRESH	0	0	0	0	0	0
SABINE LIVESTOCK LOCAL SUPPLY	NEWTON	SABINE	FRESH	0	0	0	0	0	0
SABINE LIVESTOCK LOCAL SUPPLY	ORANGE	SABINE	FRESH	0	0	0	0	0	0
SABINE LIVESTOCK LOCAL SUPPLY	PANOLA	SABINE	FRESH	0	0	0	0	0	0
SABINE LIVESTOCK LOCAL SUPPLY	RUSK	SABINE	FRESH	0	0	0	0	0	0
SABINE LIVESTOCK LOCAL SUPPLY	SABINE	SABINE	FRESH	0	0	0	0	0	0
SABINE LIVESTOCK LOCAL SUPPLY	SAN AUGUSTINE	SABINE	FRESH	0	0	0	0	0	0
SABINE LIVESTOCK LOCAL SUPPLY	SHELBY	SABINE	FRESH	0	0	0	0	0	0

Source Water Balance (Availability- WUG Supply)

REGION I

SURFACE WATER	COUNTY	BASIN	SALINITY	SOURCE WATER BALANCE (ACRE-FEET PER YEAR)					
				2020	2030	2040	2050	2060	2070
SABINE OTHER LOCAL SUPPLY	NEWTON	SABINE	FRESH	0	0	0	0	0	0
SABINE OTHER LOCAL SUPPLY	ORANGE	SABINE	FRESH	0	0	0	0	0	0
SABINE OTHER LOCAL SUPPLY	RUSK	SABINE	FRESH	0	0	0	0	0	0
SABINE RUN-OF-RIVER	NEWTON	SABINE	FRESH	0	0	0	0	0	0
SABINE RUN-OF-RIVER	ORANGE	SABINE	FRESH	0	0	0	0	0	0
SABINE RUN-OF-RIVER	ORANGE	SABINE	BRACKISH	267,000	267,000	267,000	267,000	267,000	267,000
SABINE RUN-OF-RIVER	PANOLA	SABINE	FRESH	0	0	0	0	0	0
SABINE RUN-OF-RIVER	RUSK	SABINE	FRESH	0	0	0	0	0	0
SABINE RUN-OF-RIVER | SRA CANAL	NEWTON	SABINE	FRESH	70,364	70,364	70,364	70,364	70,364	70,364
SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	RESERVOIR	NECHES	FRESH	661,066	569,519	554,181	540,411	526,638	512,023
SAN AUGUSTINE LAKE/RESERVOIR	RESERVOIR	NECHES	FRESH	0	0	0	0	0	0
STRIKER LAKE/RESERVOIR	RESERVOIR	NECHES	FRESH	7,077	6,250	5,423	4,597	3,770	2,984
TIMPSON LAKE/RESERVOIR	RESERVOIR	NECHES	FRESH	0	0	0	0	0	0
TOLEDO BEND LAKE/RESERVOIR	RESERVOIR	SABINE	FRESH	723,022	723,021	723,021	723,021	723,021	723,021
TOLEDO BEND LAKE/RESERVOIR | LOUISIANA PORTION	RESERVOIR	SABINE-LOUISIANA	FRESH	0	0	0	0	0	0
TRINITY LIVESTOCK LOCAL SUPPLY	ANDERSON	TRINITY	FRESH	0	0	0	0	0	0
TRINITY LIVESTOCK LOCAL SUPPLY	HOUSTON	TRINITY	FRESH	0	0	0	0	0	0
TRINITY RUN-OF-RIVER	ANDERSON	TRINITY	FRESH	0	0	0	0	0	0
TRINITY RUN-OF-RIVER	HOUSTON	TRINITY	FRESH	0	0	0	0	0	0
TYLER LAKE/RESERVOIR	RESERVOIR	NECHES	FRESH	18,571	17,791	16,974	16,045	14,988	13,875
SURFACE WATER TOTAL SOURCE WATER BALANCE				**2,774,720**	**2,667,108**	**2,645,302**	**2,624,695**	**2,603,238**	**2,580,266**
REGION I TOTAL SOURCE WATER BALANCE				**3,055,092**	**2,944,441**	**2,919,567**	**2,895,321**	**2,868,875**	**2,841,874**

Appendix 4-D

Supply vs Demand

The following appendix includes a copy of the Water User Group (WUG) Category summary report data from the TWDB Data Web Interface known as the DB17. The summary presents supply, demand, and population (where applicable) for each of the seven summary WUGs.

1. Municipal
2. County-Other
3. Manufacturing
4. Mining
5. Steam Electric Power
6. Livestock
7. Irrigation

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Water User Group (WUG) Category Summary

REGION I	2020	2030	2040	2050	2060	2070
MUNICIPAL						
POPULATION	887,998	950,261	1,007,610	1,068,183	1,129,870	1,193,676
DEMANDS (acre-feet per year)	158,273	164,784	171,262	179,762	189,621	200,182
EXISTING SUPPLIES (acre-feet per year)	199,616	204,378	208,309	212,559	217,462	222,918
NEEDS (acre-feet per year)*	(121)	(534)	(1,476)	(3,902)	(6,947)	(10,333)
COUNTY-OTHER						
POPULATION	263,558	283,712	302,071	320,684	339,973	359,976
DEMANDS (acre-feet per year)	30,373	31,518	32,895	34,778	37,001	39,425
EXISTING SUPPLIES (acre-feet per year)	37,322	38,350	39,563	39,947	40,397	40,885
NEEDS (acre-feet per year)*	0	0	0	(680)	(1,924)	(3,296)
MANUFACTURING						
DEMANDS (acre-feet per year)	608,667	800,989	838,639	874,546	909,373	945,886
EXISTING SUPPLIES (acre-feet per year)	424,528	524,922	540,430	555,752	571,334	587,497
NEEDS (acre-feet per year)*	(195,313)	(286,821)	(308,893)	(329,416)	(348,617)	(368,917)
MINING						
DEMANDS (acre-feet per year)	27,523	24,547	18,169	15,488	12,986	12,093
EXISTING SUPPLIES (acre-feet per year)	22,329	22,235	21,684	21,151	20,679	20,853
NEEDS (acre-feet per year)*	(9,586)	(7,160)	(2,794)	(2,338)	(2,048)	(1,916)
STEAM ELECTRIC POWER						
DEMANDS (acre-feet per year)	82,018	95,544	112,035	132,137	156,640	184,714
EXISTING SUPPLIES (acre-feet per year)	93,545	93,545	93,545	93,545	93,545	93,545
NEEDS (acre-feet per year)*	(25,422)	(32,807)	(43,269)	(56,482)	(80,437)	(108,136)
LIVESTOCK						
DEMANDS (acre-feet per year)	24,027	25,549	27,361	29,521	32,081	32,764
EXISTING SUPPLIES (acre-feet per year)	25,667	25,806	25,983	26,173	26,070	25,992
NEEDS (acre-feet per year)*	(3,011)	(4,212)	(5,663)	(7,419)	(9,541)	(9,983)
IRRIGATION						
DEMANDS (acre-feet per year)	177,919	187,894	194,851	197,546	195,445	192,186
EXISTING SUPPLIES (acre-feet per year)	224,688	224,930	225,111	225,193	225,114	225,033
NEEDS (acre-feet per year)*	(3,518)	(4,011)	(4,452)	(4,812)	(5,076)	(5,427)
REGION TOTALS						
POPULATION	1,151,556	1,233,973	1,309,681	1,388,867	1,469,843	1,553,652
DEMANDS (acre-feet per year)	1,108,800	1,330,825	1,395,212	1,463,778	1,533,147	1,607,250
EXISTING SUPPLIES (acre-feet per year)	1,027,695	1,134,166	1,154,625	1,174,320	1,194,601	1,216,723
NEEDS (acre-feet per year)*	(236,971)	(335,545)	(366,547)	(405,049)	(454,590)	(508,008)

*WUG supplies and projected demands are entered for each of a WUG's region-county-basin divisions. The needs shown in the WUG Category Summary report are calculated by first deducting the WUG split's projected demand from its total existing water supply volume. If the WUG split has a greater existing supply volume than projected demand in any given decade, this amount is considered a surplus volume. Before aggregating the difference between supplies and demands to the WUG category level, calculated surpluses are updated to zero so that only the WUGs with needs in the decade are included with the Needs totals.

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Appendix 4-E

Socioeconomic Impact Analysis

A socioeconomic impact analysis of not meeting identified water needs has been conducted by the TWDB. The following appendix includes the full report and analysis from the TWDB.

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WUG Unmet Need data report from the TWDB Data Web Interface (DB17)

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Water User Group (WUG) Unmet Needs

REGION I	WUG UNMET NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
ANDERSON COUNTY						
NECHES BASIN						
STEAM ELECTRIC POWER	0	0	0	0	0	4,336
ANGELINA COUNTY						
NECHES BASIN						
MANUFACTURING	4,722	0	0	0	0	0
HENDERSON COUNTY						
NECHES BASIN						
ATHENS	0	0	0	0	0	15
TRINITY COUNTY						
NECHES BASIN						
IRRIGATION	330	330	330	330	330	330

*WUG supplies and projected demands are entered for each of a WUG's region-county-basin divisions. The unmet needs shown in the WUG Unmet Needs report are calculated by first deducting the WUG split's projected demand from the sum of its total existing water supply volume and all associated recommended water management strategy water volumes. If the WUG split has a greater future supply volume than projected demand in any given decade, this amount is considered a surplus volume. In order to display only unmet needs associated with the WUG split, these surplus volumes are updated to a zero and the unmet needs water volumes are shown as absolute values.

Water User Group (WUG) Unmet Needs Summary

REGION I

	2020	2030	2040	2050	2060	2070
MUNICIPAL	0	0	0	0	0	15
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	4,722	0	0	0	0	0
MINING	0	0	0	0	0	0
STEAM ELECTRIC POWER	0	0	0	0	0	4,336
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	330	330	330	330	330	330

*WUG supplies and projected demands are entered for each of a WUG's region-county-basin divisions. The unmet needs shown in the WUG Unmet Needs Summary report are calculated by first deducting the WUG split's projected demand from the sum of its total existing water supply volume and all associated recommended water management strategy water volumes. If the WUG split has a greater future supply volume than projected demand in any given decade, this amount is considered a surplus volume. Before aggregating the difference between supplies and demands to the WUG category level, calculated surpluses are updated to zero so that only the WUGs with unmet needs in the decade are included with the Needs totals. Unmet needs water volumes are shown as absolute values.

Socioeconomic Impacts of Projected Water Shortages for the Region I Regional Water Planning Area

Prepared in Support of the 2016 Region I Regional Water Plan

Texas Water Development Board

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Executive Summary

Evaluating the social and economic impacts of not meeting identified water needs is a required part of the regional water planning process. The Texas Water Development Board (TWDB) estimates those impacts for regional water planning groups, and summarizes the impacts in the state water plan. The analysis presented is for the Region I Regional Water Planning Group.

Based on projected water demands and existing water supplies, the Region I planning group identified water needs (potential shortages) that would occur within its region under a repeat of the drought of record for six water use categories. The TWDB then estimated the socioeconomic impacts of those needs—if they are not met—for each water use category and as an aggregate for the region.

The analysis was performed using an economic modeling software package, IMPLAN (Impact for Planning Analysis), as well as other economic analysis techniques, and represents a snapshot of socioeconomic impacts that may occur during a single year during a drought of record within each of the planning decades. For each water use category, the evaluation focused on estimating income losses and job losses. The income losses represent an approximation of gross domestic product (GDP) that would be foregone if water needs are not met.

The analysis also provides estimates of financial transfer impacts, which include tax losses (state, local, and utility tax collections); water trucking costs; and utility revenue losses. In addition, social impacts were estimated, encompassing lost consumer surplus (a welfare economics measure of consumer wellbeing); as well as population and school enrollment losses.

It is estimated that not meeting the identified water needs in Region I would result in an annually combined lost income impact of approximately $20.4 billion in 2020, increasing to $28.1 billion in 2070 (Table ES-1). In 2020, the region would lose approximately 92,000 jobs, and by 2070 job losses would increase to approximately 111,000.

All impact estimates are in year 2013 dollars and were calculated using a variety of data sources and tools including the use of a region-specific IMPLAN model, data from the TWDB annual water use estimates, the U.S. Census Bureau, Texas Agricultural Statistics Service, and Texas Municipal League.

Table ES-1: Region I Socioeconomic Impact Summary

Regional Economic Impacts	2020	2030	2040	2050	2060	2070
Income losses ($ millions)*	$20,408	$24,297	$23,015	$24,409	$26,065	$28,108
Job losses	92,203	102,185	93,660	98,990	105,134	111,205
Financial Transfer Impacts	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
Tax losses on production and imports ($ millions)*	$1,779	$1,772	$1,410	$1,454	$1,504	$1,568
Water trucking costs ($ millions)*	-	-	-	-	$0	$0
Utility revenue losses ($ millions)*	$0	$1	$4	$12	$20	$34
Utility tax revenue losses ($ millions)*	$0	$0	$0	$0	$0	$0
Social Impacts	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
Consumer surplus losses ($ millions)*	$0	$0	$1	$2	$5	$9
Population losses	16,928	18,761	17,196	18,175	19,303	20,417
School enrollment losses	3,132	3,471	3,181	3,362	3,571	3,777

**** Year 2013 dollars, rounded. Entries denoted by a dash (-) indicate no economic impact. Entries denoted by a zero ($0) indicate income losses less than $500,000.***

1 Introduction

Water shortages during a repeat of the drought of record would likely curtail or eliminate certain economic activity in businesses and industries that rely heavily on water. Insufficient water supplies could not only have an immediate and real impact on existing businesses and industry, but they could also adversely and chronically affect economic development in Texas. From a social perspective, water supply reliability is critical as well. Shortages could disrupt activity in homes, schools and government and could adversely affect public health and safety. For these reasons, it is important to evaluate and understand how water supply shortages during drought could impact communities throughout the state.

Administrative rules (31 Texas Administrative Code §357.33 (c)) require that regional water planning groups evaluate the social and economic impacts of not meeting water needs as part of the regional water planning process, and rules direct the TWDB staff to provide technical assistance upon request. Staff of the TWDB's Water Use, Projections, & Planning Division designed and conducted this analysis in support of the Region I Regional Water Planning Group.

This document summarizes the results of the analysis and discusses the methodology used to generate the results. Section 1 summarizes the water needs calculation performed by the TWDB based on the regional water planning group's data. Section 2 describes the methodology for the impact assessment and discusses approaches and assumptions specific to each water use category (i.e., irrigation, livestock, mining, steam-electric, municipal and manufacturing). Section 3 presents the results for each water use category with results summarized for the region as a whole. Appendix A presents details on the socioeconomic impacts by county.

1.1 Identified Regional Water Needs (Potential Shortages)

As part of the regional water planning process, the TWDB adopted water demand projections for each water user group (WUG) with input from the planning groups. WUGs are composed of cities, utilities, combined rural areas (designated as county-other), and the county-wide water use of irrigation, livestock, manufacturing, mining and steam-electric power. The demands are then compared to the existing water supplies of each WUG to determine potential shortages, or needs, by decade. Existing water supplies are legally and physically accessible for immediate use in the event of drought. Projected water demands and existing supplies are compared to identify either a surplus or a need for each WUG.

Table 1-1 summarizes the region's identified water needs in the event of a repeat of drought of the record. Demand management, such as conservation, or the development of new infrastructure to increase supplies are water management strategies that may be recommended by the planning group to meet those needs. This analysis assumes that no strategies are implemented, and that the identified needs correspond to future water shortages. Note that projected water needs generally increase over time, primarily due to anticipated population and economic growth. To provide a general sense of proportion, total projected needs as an overall percentage of total demand by water use category are presented in aggregate in Table 1-1. Projected needs for individual water user groups within the aggregate vary greatly, and may reach 100% for a given WUG and water use category. Detailed water needs by WUG and county appear in Chapter 4 of the 2016 Region I Regional Water Plan.

Table 1-1 Regional Water Needs Summary by Water Use Category

Water Use Category		2020	2030	2040	2050	2060	2070
Irrigation	Water Needs (acre-feet per year)	3,518	4,011	4,452	4,812	5,076	5,427
	% of the category's total water demand	2%	2%	2%	2%	3%	3%
Livestock	Water Needs (acre-feet per year)	3,011	4,212	5,663	7,419	9,541	9,983
	% of the category's total water demand	13%	16%	21%	25%	30%	30%
Manufacturing	Water Needs (acre-feet per year)	196,450	287,997	310,077	330,608	349,817	370,080
	% of the category's total water demand	32%	36%	37%	38%	38%	39%
Mining	Water Needs (acre-feet per year)	9,796	7,160	2,794	2,338	2,048	1,916
	% of the category's total water demand	36%	29%	15%	15%	16%	16%
Municipal	Water Needs (acre-feet per year)	120	535	1,483	4,597	8,889	13,646
	% of the category's total water demand	<0.5%	<0.5%	1%	2%	4%	6%
Steam-electric power	Water Needs (acre-feet per year)	25,422	33,529	44,283	57,789	82,036	110,014
	% of the category's total water demand	31%	35%	40%	44%	52%	60%
Total water needs (acre-feet per year)		**238,317**	**337,444**	**368,752**	**407,563**	**457,407**	**511,066**

2 Economic Impact Assessment Methodology Summary

This portion of the report provides a summary of the methodology used to estimate the potential economic impacts of future water shortages. The general approach employed in the analysis was to obtain estimates for income and job losses on the smallest geographic level that the available data would support, tie those values to their accompanying historic water use estimate (volume), and thereby determine a maximum impact per acre-foot of shortage for each of the socioeconomic measures. The calculations of economic impacts were based on the overall composition of the economy using many underlying economic "sectors." Sectors in this analysis refer to one or more of the 440 specific production sectors of the economy designated within IMPLAN (Impact for Planning Analysis), the economic impact modeling software used for this assessment. Economic impacts within this report are

estimated for approximately 310 of those sectors, with the focus on the more water intense production sectors. The economic impacts for a single water use category consist of an aggregation of impacts to multiple related economic sectors.

2.1 Impact Assessment Measures

A required component of the regional and state water plans is to estimate the potential economic impacts of shortages due to a drought of record. Consistent with previous water plans, several key variables were estimated and are described in Table 2-1.

Table 2-1 Socioeconomic Impact Analysis Measures

Regional Economic Impacts	Description
Income losses - value added	The value of output less the value of intermediate consumption; it is a measure of the contribution to GDP made by an individual producer, industry, sector, or group of sectors within a year. For a shortage, value added is a measure of the income losses to the region, county, or WUG and includes the direct, indirect and induced monetary impacts on the region.
Income losses - electrical power purchase costs	Proxy for income loss in the form of additional costs of power as a result of impacts of water shortages.
Job losses	Number of part-time and full-time jobs lost due to the shortage.
Financial Transfer Impacts	**Description**
Tax losses on production and imports	Sales and excise taxes (not collected due to the shortage), customs duties, property taxes, motor vehicle licenses, severance taxes, other taxes, and special assessments less subsidies.
Water trucking costs	Estimate for shipping potable water.
Utility revenue losses	Foregone utility income due to not selling as much water.
Utility tax revenue losses	Foregone miscellaneous gross receipts tax collections.
Social Impacts	**Description**
Consumer surplus losses	A welfare measure of the lost value to consumers accompanying less water use.
Population losses	Population losses accompanying job losses.
School enrollment losses	School enrollment losses (K-12) accompanying job losses.

2.1.1 Regional Economic Impacts

Two key measures were included within the regional economic impacts classification: income losses and job losses. Income losses presented consist of the sum of value added losses and additional purchase costs of electrical power. Job losses are also presented as a primary economic impact measure.

Income Losses - Value Added Losses

Value added is the value of total output less the value of the intermediate inputs also used in production of the final product. Value added is similar to Gross Domestic Product (GDP), a familiar measure of the productivity of an economy. The loss of value added due to water shortages was estimated by input-output analysis using the IMPLAN software package, and includes the direct, indirect, and induced monetary impacts on the region.

Income Losses - Electric Power Purchase Costs

The electrical power grid and market within the state is a complex interconnected system. The industry response to water shortages, and the resulting impact on the region, are not easily modeled using traditional input/output impact analysis and the IMPLAN model. Adverse impacts on the region will occur, and were represented in this analysis by the additional costs associated with power purchases from other generating plants within the region or state. Consequently, the analysis employed additional power purchase costs as a proxy for the value added impacts for that water use category, and these are included as a portion of the overall income impact for completeness.

For the purpose of this analysis, it was assumed that power companies with insufficient water will be forced to purchase power on the electrical market at a projected higher rate of 5.60 cents per kilowatt hour. This rate is based upon the average day-ahead market purchase price of electricity in Texas from the recent drought period in 2011.

Job Losses

The number of jobs lost due to the economic impact was estimated using IMPLAN output associated with the water use categories noted in Table 1-1. Because of the difficulty in predicting outcomes and a lack of relevant data, job loss estimates were not calculated for the steam-electric power production or for certain municipal water use categories.

2.1.2 Financial Transfer Impacts

Several of the impact measures estimated within the analysis are presented as supplemental information, providing additional detail concerning potential impacts on a sub-portion of the economy or government. Measures included in this category include lost tax collections (on production and imports), trucking costs for imported water, declines in utility revenues, and declines in utility tax revenue collected by the state. Many of these measures are not solely adverse, with some having both positive and negative impacts. For example, cities and residents would suffer if forced to pay large costs for trucking in potable water. Trucking firms, conversely, would benefit from the transaction. Additional detail for each of these measures follows.

Tax Losses on Production and Imports

Reduced production of goods and services accompanying water shortages adversely impacts the collection of taxes by state and local government. The regional IMPLAN model was used to estimate reduced tax collections associated with the reduced output in the economy.

Water Trucking Costs

In instances where water shortages for a municipal water user group were estimated to be 80 percent or more of water demands, it was assumed that water would be trucked in to support basic consumption and sanitation needs. For water shortages of 80 percent or greater, a fixed cost of $20,000 per acre-foot of water was calculated and presented as an economic cost. This water trucking cost was applied for both the residential and non-residential portions of municipal water needs and only impacted a small number of WUGs statewide.

Utility Revenue Losses

Lost utility income was calculated as the price of water service multiplied by the quantity of water not sold during a drought shortage. Such estimates resulted from city-specific pricing data for both water and wastewater. These water rates were applied to the potential water shortage to determine estimates of lost utility revenue as water providers sold less water during the drought due to restricted supplies.

Utility Tax Losses

Foregone utility tax losses included estimates of uncollected miscellaneous gross receipts taxes. Reduced water sales reduce the amount of utility tax that would be collected by the State of Texas for water and wastewater service sales.

2.1.3 Social Impacts

Consumer Surplus Losses of Municipal Water Users

Consumer surplus loss is a measure of impact to the wellbeing of municipal water users when their water use is restricted. Consumer surplus is the difference between how much a consumer is willing and able to pay for the commodity (i.e., water) and how much they actually have to pay. The difference is a benefit to the consumer's wellbeing since they do not have to pay as much for the commodity as they would be willing to pay. However, consumer's access to that water may be limited, and the associated consumer surplus loss is an estimate of the equivalent monetary value of the negative impact to the consumer's wellbeing, for example, associated with a diminished quality of their landscape (i.e., outdoor use). Lost consumer surplus estimates for reduced outdoor and indoor use, as well as residential and commercial/institutional demands, were included in this analysis. Consumer surplus is an attempt to measure effects on wellbeing by monetizing those effects; therefore, these values should not be added to the other monetary impacts estimated in the analysis.

Lost consumer surplus estimates varied widely by location and type. For a 50 percent shortage, the estimated statewide consumer surplus values ranged from $55 to $2,500 per household (residential use), and from $270 to $17,400 per firm (non-residential).

Population and School Enrollment Losses

Population losses due to water shortages, as well as the related loss of school enrollment, were based upon the job loss estimates and upon a recent study of job layoffs and the resulting adjustment of the labor market, including the change in population.[1] The study utilized Bureau of Labor Statistics data regarding layoffs between 1996 and 2013, as well as Internal Revenue Service data regarding migration, to model an estimate of the change in the population as the result of a job layoff event. Layoffs impact both out-migration, as well as in-migration into an area, both of which can negatively affect the population of an area. In addition, the study found that a majority of those who did move following a layoff moved to another labor market rather than an adjacent county. Based on this study, a simplified ratio of job and net population losses was calculated for the state as a whole: for every 100 jobs lost, 18 people were assumed to move out of the area. School enrollment losses were estimated as a proportion of the population lost.

2.2 Analysis Context

The context of the economic impact analysis involves situations where there are physical shortages of surface or groundwater due to drought of record conditions. Anticipated shortages may be nonexistent in earlier decades of the planning horizon, yet population growth or greater industrial, agricultural or other sector demands in later decades may result in greater overall demand, exceeding the existing supplies. Estimated socioeconomic impacts measure what would happen if water user groups experience water shortages for a period of one year. Actual socioeconomic impacts would likely become larger as drought of record conditions persist for periods greater than a single year.

2.2.1 IMPLAN Model and Data

Input-Output analysis using the IMPLAN (Impact for Planning Analysis) software package was the primary means of estimating value added, jobs, and taxes. This analysis employed county and regional level models to determine key impacts. IMPLAN is an economic impact model, originally developed by the U.S. Forestry Service in the 1970's to model economic activity at varying geographic levels. The model is currently maintained by the Minnesota IMPLAN Group (MIG Inc.) which collects and sells county and state specific data and software. The year 2011 version of IMPLAN, employing data for all 254 Texas counties, was used to provide estimates of value added, jobs, and taxes on production for the economic sectors associated with the water user groups examined in the study. IMPLAN uses 440 sector-specific Industry Codes, and those that rely on water as a primary input were assigned to their relevant planning water user categories (manufacturing, mining, irrigation, etc.). Estimates of value added for a water use category were obtained by summing value added estimates across the relevant IMPLAN sectors

[1] Foote, Andrew, Grosz, Michel, Stevens, Ann. "Locate Your Nearest Exit: Mass Layoffs and Local Labor Market Response." University of California, Davis. April 2015. http://paa2015.princeton.edu/uploads/150194

associated with that water use category. Similar calculations were performed for the job and tax losses on production and import impact estimates.

Note that the value added estimates, as well as the job and tax estimates from IMPLAN, include three components:

- *Direct effects* representing the initial change in the industry analyzed;
- *Indirect effects* that are changes in inter-industry transactions as supplying industries respond to reduced demands from the directly affected industries; and,
- *Induced effects* that reflect changes in local spending that result from reduced household income among employees in the directly and indirectly affected industry sectors.

2.2.2 Elasticity of Economic Impacts

The economic impact of a water need is based on the relative size of the water need to the water demand for each water user group (Figure 2-1). Smaller water shortages, for example, less than 5 percent, were anticipated to result in no initial negative economic impact because water users are assumed to have a certain amount of flexibility in dealing with small shortages. As a water shortage deepens, however, such flexibility lessens and results in actual and increasing economic losses, eventually reaching a representative maximum impact estimate per unit volume of water. To account for such ability to adjust, an elasticity adjustment function was used in estimating impacts for several of the measures. Figure 2-1 illustrates the general relationship for the adjustment functions. Negative impacts are assumed to begin accruing when the shortage percentage reaches the lower bound b1 (10 percent in Figure 2-1), with impacts then increasing linearly up to the 100 percent impact level (per unit volume) once the upper bound for adjustment reaches the b2 level shortage (50 percent in Figure 2-1 example).

Initially, the combined total value of the three value added components (direct, indirect, and induced) was calculated and then converted into a per acre-foot economic value based on historical TWDB water use estimates within each particular water use category. As an example, if the total, annual value added for livestock in the region was $2 million and the reported annual volume of water used in that industry was 10,000 acre-feet, the estimated economic value per acre-foot of water shortage would be $200 per acre-foot. Negative economic impacts of shortages were then estimated using this value as the maximum impact estimate ($200 per acre-foot in the example) applied to the anticipated shortage volume in acre-feet and adjusted by the economic impact elasticity function. This adjustment varied with the severity as percentage of water demand of the anticipated shortage. If one employed the sample elasticity function shown in Figure 2-1, a 30% shortage in the water use category would imply an economic impact estimate of 50% of the original $200 per acre-foot impact value (i.e., $100 per acre-foot).

Such adjustments were not required in estimating consumer surplus, nor for the estimates of utility revenue losses or utility tax losses. Estimates of lost consumer surplus relied on city-specific demand curves with the specific lost consumer surplus estimate calculated based on the relative percentage of the city's water shortage. Estimated changes in population as well as changes in school enrollment were indirectly related to the elasticity of job losses.

Assumed values for the bounds b1 and b2 varied with water use category under examination and are presented in Table 2-2.

Figure 2-1 Example Economic Impact Elasticity Function (as applied to a single water user's shortage)

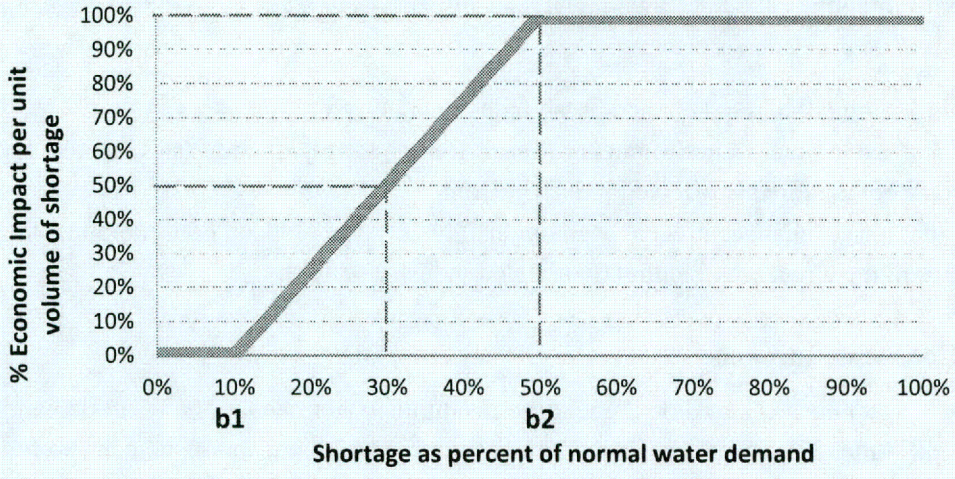

Table 2-2 Economic Impact Elasticity Function Lower and Upper Bounds

Water Use Category	Lower Bound (b1)	Upper Bound (b2)
Irrigation	**5%**	**50%**
Livestock	**5%**	**10%**
Manufacturing	**10%**	**50%**
Mining	**10%**	**50%**
Municipal (non-residential water intensive)	**50%**	**80%**
Steam-electric power	**20%**	**70%**

2.3 Analysis Assumptions and Limitations

Modeling of complex systems requires making assumptions and accepting limitations. This is particularly true when attempting to estimate a wide variety of economic impacts over a large geographic area and into future decades. Some of the key assumptions and limitations of the methodology include:

1. The foundation for estimating socioeconomic impacts of water shortages resulting from a drought are the water needs (potential shortages) that were identified as part of the regional water planning process. These needs have some uncertainty associated with them, but serve as a reasonable basis for evaluating potential economic impacts of a drought of record event.

2. All estimated socioeconomic impacts are snapshot estimates of impacts for years in which water needs were identified (i.e., 2020, 2030, 2040, 2050, 2060, and 2070). The estimates are independent and distinct "what if" scenarios for each particular year, and water shortages are assumed to be temporary events resulting from severe drought conditions. The evaluation assumed that no recommended water management strategies are implemented. In other words, growth occurs, future shocks are imposed on an economy at 10-year intervals, and the resulting impacts are estimated. Note that the estimates presented were not cumulative (i.e., summing up expected impacts from today up to the decade noted), but were simply an estimate of the magnitude of annual socioeconomic impacts should a drought of record occur in each particular decade based on anticipated supplies and demands for that same decade.

3. Input-output models such as IMPLAN rely on a static profile of the structure of the economy as it appears today. This presumes that the relative contributions of all sectors of the economy would remain the same, regardless of changes in technology, supplies of limited resources, and other structural changes to the economy that may occur into the future. This was a significant assumption and simplification considering the 50-year time period examined in this analysis. To presume an alternative future economic makeup, however, would entail positing many other major assumptions that would very likely generate as much or more error.

4. This analysis is not a cost-benefit analysis. That approach to evaluating the economic feasibility of a specific policy or project employs discounting future benefits and costs to their present value dollars using some assumed discount rate. The methodology employed in this effort to estimate the economic impacts of future water shortages did not use any discounting procedures to weigh future costs differently through time.

5. Monetary figures are reported in constant year 2013 dollars.

6. Impacts are annual estimates. The estimated economic model does not reflect the full extent of impacts that might occur as a result of persistent water shortages occurring over an extended duration. The drought of record in most regions of Texas lasted several years.

7. Value added estimates are the primary estimate of the economic impacts within this report. One may be tempted to add consumer surplus impacts to obtain an estimate of total adverse economic impacts to the region, but the consumer surplus measure represents the change to the wellbeing of households (and other water users), not an actual change in the flow of dollars through the economy. The two categories (value added and consumer surplus) are both valid impacts but should not be summed.

8. The value added, jobs, and taxes on production and import impacts include the direct, indirect and induced effects described in Section 2.2.1. Population and school enrollment losses also indirectly include such effects as they are based on the associated losses in employment. The remaining measures (consumer surplus, utility revenue, utility taxes, additional electrical power purchase costs, and potable water trucking costs), however, do not include any induced or indirect effects.

9. The majority of impacts estimated in this analysis may be considered smaller than those that might occur under drought of record conditions. Input-output models such as IMPLAN only capture "backward linkages" on suppliers (including households that supply labor to directly affected industries). While this is a common limitation in these types of economic impact modeling efforts, it is important to note that "forward linkages" on the industries that use the outputs of the directly affected industries can also be very important. A good example is impacts on livestock operators. Livestock producers tend to suffer substantially during droughts, not because there is not enough water for their stock, but because reductions in available pasture and higher prices for purchased hay have significant economic effects on their operations. Food processors could be in a similar situation if they cannot get the grains or other inputs that they need. These effects are not captured in IMPLAN, which is one reason why the impact estimates are likely conservative.

10. The methodology did not capture "spillover" effects between regions – or the secondary impacts that occur outside of the region where the water shortage is projected to occur.

11. The model did not reflect dynamic economic responses to water shortages as they might occur, nor does the model reflect economic impacts associated with a recovery from a drought of record including:
    a. The likely significant economic rebound to the landscaping industry immediately following a drought;
    b. The cost and years to rebuild liquidated livestock herds (a major capital item in that industry);
    c. Direct impacts on recreational sectors (i.e., stranded docks and reduced tourism); or,
    d. Impacts of negative publicity on Texas' ability to attract population and business in the event that it was not able to provide adequate water supplies for the existing economy.

12. Estimates for job losses and the associated population and school enrollment changes may exceed what would actually occur. In practice, firms may be hesitant to lay off employees, even in difficult economic times. Estimates of population and school enrollment changes are based on regional evaluations and therefore do not accurately reflect what might occur on a statewide basis.

13. The results must be interpreted carefully. It is the general and relative magnitudes of impacts as well as the changes of these impacts over time that should be the focus rather than the absolute numbers. Analyses of this type are much better at predicting relative percent differences brought about by a shock to a complex system (i.e., a water shortage) than the precise size of an impact. To illustrate, assuming that the estimated economic impacts of a drought of record on the manufacturing and mining water user categories are $2 and $1 million, respectively, one should be more confident that the economic impacts on manufacturing are twice as large as those on mining and that these impacts will likely be in the millions of dollars. But one should have less confidence that the actual total economic impact experienced would be $3 million.

3 Analysis Results

This section presents a breakdown of the results of the regional analysis for Region I. Projected economic impacts for six water use categories (irrigation, livestock. municipal, manufacturing, mining, and steam-electric power) are also reported by decade.

3.1 Overview of the Regional Economy

Table 3-1 presents the 2011 economic baseline as represented by the IMPLAN model and adjusted to 2013 dollars for Region I. In year 2011, Region I generated about $53 billion in gross state product associated with 552,000 jobs based on the 2011 IMPLAN data. These values represent an approximation of the current regional economy for a reference point.

Table 3-1 Region I Economy

Income ($ millions)*	Jobs	Taxes on production and imports ($ millions)*
$53,483	552,206	$4,030

[1] *Year 2013 dollars based on 2011 IMPLAN model value added estimates for the region.*

The remainder of Section 3 presents estimates of potential economic impacts for each water use category that could reasonably be expected in the event of water shortages associated with a drought of record and if no recommended water management strategies were implemented.

3.2 Impacts for Irrigation Water Shortages

Three of the 20 counties in the region are projected to experience water shortages in the irrigated agriculture water use category for one or more decades within the planning horizon. Estimated impacts to this water use category appear in Table 3-2. Note that tax collection impacts were not estimated for this water use category. IMPLAN data indicates a negative tax impact (i.e., increased tax collections) for the associated production sectors, primarily due to past subsidies from the federal government. Two factors led to excluding any reported tax impacts: 1) Federal support (subsidies) has lessened greatly since the year 2011 IMPLAN data was collected, and 2) It was not considered realistic to report increasing tax revenue collections for a drought of record.

Table 3-2 Impacts of Water Shortages on Irrigation in Region

Impact Measure	2020	2030	2040	2050	2060	2070
Income losses ($ millions)*	$0	$0	$1	$1	$1	$1
Job losses	11	15	19	24	30	38

**** Year 2013 dollars, rounded. Entries denoted by a dash (-) indicate no economic impact. Entries denoted by a zero ($0) indicate income losses less than $500,000.***

3.3 Impacts for Livestock Water Shortages

Two of the 20 counties in the region are projected to experience water shortages in the livestock water use category for one or more decades within the planning horizon. Estimated impacts to this water use category appear in Table 3-3. Note that tax impacts are not reported for this water use category for similar reasons that apply to the irrigation water use category described above.

Table 3-3 Impacts of Water Shortages on Livestock in Region

Impact Measures	2020	2030	2040	2050	2060	2070
Income losses ($ millions)*	$78	$109	$147	$193	$248	$260
Jobs losses	1,790	2,474	3,299	4,296	5,500	5,777

**** Year 2013 dollars, rounded. Entries denoted by a dash (-) indicate no economic impact. Entries denoted by a zero ($0) indicate income losses less than $500,000***

3.4 Impacts for Municipal Water Shortages

Six of the 20 counties in the region are projected to experience water shortages in the municipal water use category for one or more decades within the planning horizon. Impact estimates were made for the two subtypes of use within municipal use: residential, and non-residential. The latter includes commercial and institutional users. Consumer surplus measures were made for both residential and non-residential demands. In addition, available data for the non-residential, water-intensive portion of municipal demand allowed use of IMPLAN and TWDB Water Use Survey data to estimate income loss, jobs, and taxes. Trucking cost estimates, calculated for shortages exceeding 80 percent, assumed a fixed cost of $20,000 per acre-foot to transport water for municipal use. The estimated impacts to this water use category appear in Table 3-4.

Table 3-4 Impacts of Water Shortages on Municipal Water Users in Region

Impact Measures	2020	2030	2040	2050	2060	2070
Income losses[1] ($ millions)*	-	-	$0	$2	$11	$22
Job losses[1]	-	-	4	38	217	443
Tax losses on production and imports[1] ($ millions)*	-	-	$0	$0	$1	$2
Consumer surplus losses ($ millions)*	$0	$0	$1	$2	$5	$9
Trucking costs ($ millions)*	-	-	-	-	$0	$0
Utility revenue losses ($ millions)*	$0	$1	$4	$12	$20	$34
Utility tax revenue losses ($ millions)*	$0	$0	$0	$0	$0	$0

[1] Estimates apply to the water-intensive portion of non-residential municipal water use.
** Year 2013 dollars, rounded. Entries denoted by a dash (-) indicate no economic impact. Entries denoted by a zero ($0) indicate income losses less than $500,000.*

3.5 Impacts of Manufacturing Water Shortages

Manufacturing water shortages in the region are projected to occur in 7 of the 20 counties in the region for at least one decade of the planning horizon. Estimated impacts to this water use category appear in Table 3-5.

Table 3-5 Impacts of Water Shortages on Manufacturing in Region

Impacts Measures	2020	2030	2040	2050	2060	2070
Income losses ($ millions)*	$13,586	$19,631	$20,688	$21,742	$22,837	$24,006
Job losses	58,545	80,644	85,926	91,069	96,554	102,535
Tax losses on production and Imports ($ millions)*	$849	$1,222	$1,289	$1,356	$1,426	$1,501

** Year 2013 dollars, rounded. Entries denoted by a dash (-) indicate no economic impact. Entries denoted by a zero ($0) indicate income losses less than $500,000.*

3.6 Impacts of Mining Water Shortages

Mining water shortages in the region are projected to occur in 7 of the 20 counties in the region for at least one decade of the planning horizon. Estimated impacts to this water use type appear in Table 3-6.

Table 3-6 Impacts of Water Shortages on Mining in Region

Impact Measures	2020	2030	2040	2050	2060	2070
Income losses ($ millions)*	$5,778	$3,428	$765	$615	$486	$410
Job losses	31,856	19,052	4,411	3,562	2,832	2,413
Tax losses on production and Imports ($ millions)*	$930	$551	$121	$98	$77	$65

**** Year 2013 dollars, rounded. Entries denoted by a dash (-) indicate no economic impact. Entries denoted by a zero ($0) indicate income losses less than $500,000.***

3.7 Impacts of Steam-Electric Water Shortages

Steam-electric water shortages in the region are projected to occur in 6 of the 20 counties in the region for at least one decade of the planning horizon. Estimated impacts to this water use category appear in Table 3-7.

Note that estimated economic impacts to steam-electric water users:

- Are reflected as an income loss proxy in the form of the estimated additional purchasing costs for power from the electrical grid that could not be generated due to a shortage;
- Do not include estimates of impacts on jobs. Because of the unique conditions of power generators during drought conditions and lack of relevant data, it was assumed that the industry would retain, perhaps relocating or repurposing, their existing staff in order to manage their ongoing operations through a severe drought.
- Does not presume a decline in tax collections. Associated tax collections, in fact, would likely increase under drought conditions since, historically, the demand for electricity increases during times of drought, thereby increasing taxes collected on the additional sales of power.

Table 3-7 Impacts of Water Shortages on Steam-Electric Power in Region

Impact Measures	2020	2030	2040	2050	2060	2070
Income Losses ($ millions)*	$965	$1,129	$1,414	$1,856	$2,482	$3,409

**** Year 2013 dollars, rounded. Entries denoted by a dash (-) indicate no economic impact. Entries denoted by a zero ($0) indicate income losses less than $500,000.***

3.8 Regional Social Impacts

Projected changes in population, based upon several factors (household size, population, and job loss estimates), as well as the accompanying change in school enrollment, were also estimated and are summarized in Table 3-8.

Table 3-8 Region-wide Social Impacts of Water Shortages in Region

Impact Measures	2020	2030	2040	2050	2060	2070
Consumer surplus losses ($ millions)*	$0	$0	$1	$2	$5	$9
Population losses	16,928	18,761	17,196	18,175	19,303	20,417
School enrollment losses	3,132	3,471	3,181	3,362	3,571	3,777

**** Year 2013 dollars, rounded. Entries denoted by a dash (-) indicate no economic impact. Entries denoted by a zero ($0) indicate income losses less than $500,000.***

Appendix A - County Level Summary of Estimated Economic Impacts for Region I

County level summary of estimated economic impacts of not meeting identified water needs by water use category and decade (in 2013 dollars, rounded). Values presented only for counties with projected economic impacts for at least one decade.

**** Entries denoted by a dash (-) indicate no economic impact. Entries denoted by a zero ($0) indicate income losses less than $500,000***

		Income losses (Million $)*						Job losses						Consumer Surplus losses (Million $)*					
County	Water Use Category	2020	2030	2040	2050	2060	2070	2020	2030	2040	2050	2060	2070	2020	2030	2040	2050	2060	2070
ANDERSON	STEAM ELECTRIC POWER	$441	$516	$607	$718	$853	$1,014	-	-	-	-	-	-	-	-	-	-	-	-
ANDERSON Total		**$441**	**$516**	**$607**	**$718**	**$853**	**$1,014**	-	-	-	-	-	-	-	-	-	-	-	-
ANGELINA	MANUFACTURING	$1,256	$1,406	$1,559	$1,695	$1,839	$1,995	16,159	18,099	20,064	21,808	23,669	25,677	-	-	-	-	-	-
ANGELINA	MINING	$318	$384	$267	$201	$150	$112	1,745	2,110	1,464	1,103	826	616	-	-	-	-	-	-
ANGELINA Total		**$1,573**	**$1,790**	**$1,826**	**$1,895**	**$1,990**	**$2,107**	**17,904**	**20,209**	**21,529**	**22,911**	**24,495**	**26,293**	-	-	-	-	-	-
CHEROKEE	MINING	$160	$166	$141	$99	$56	$21	878	911	775	542	310	115	-	-	-	-	-	-
CHEROKEE	MUNICIPAL	-	-	-	-	$0	$0	-	-	-	-	1	2	$0	$0	$0	$0	$0	$0
CHEROKEE Total		**$160**	**$166**	**$141**	**$99**	**$56**	**$21**	**878**	**911**	**775**	**542**	**311**	**117**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
HENDERSON	MANUFACTURING	-	-	-	$0	$2	$10	-	-	-	1	13	73	-	-	-	-	-	-
HENDERSON	MUNICIPAL	-	-	-	-	-	$0	-	-	-	-	-	1	$0	$0	$0	$0	$0	$0
HENDERSON Total		-	-	-	**$0**	**$2**	**$10**	-	-	-	**1**	**13**	**74**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
HOUSTON	IRRIGATION	$0	$0	$0	$0	$0	$1	4	7	11	16	22	29	-	-	-	-	-	-
HOUSTON Total		**$0**	**$0**	**$0**	**$0**	**$0**	**$1**	**4**	**7**	**11**	**16**	**22**	**29**	-	-	-	-	-	-
JEFFERSON	MANUFACTURING	$12,206	$18,066	$18,909	$19,757	$20,607	$21,489	41,483	61,399	64,262	67,146	70,032	73,032	-	-	-	-	-	-
JEFFERSON	MUNICIPAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	$0	$0	$1	$2
JEFFERSON	STEAM ELECTRIC POWER	$524	$613	$721	$852	$1,013	$1,204	-	-	-	-	-	-	-	-	-	-	-	-
JEFFERSON Total		**$12,730**	**$18,679**	**$19,630**	**$20,610**	**$21,620**	**$22,693**	**41,483**	**61,399**	**64,262**	**67,146**	**70,032**	**73,032**	-	-	**$0**	**$0**	**$1**	**$2**
NACOGDOCHES	LIVESTOCK	$42	$47	$53	$59	$67	$78	1,027	1,148	1,288	1,449	1,635	1,911	-	-	-	-	-	-
NACOGDOCHES	MINING	$3,677	$1,998	-	-	-	-	20,195	10,974	-	-	-	-	-	-	-	-	-	-
NACOGDOCHES	MUNICIPAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	$0	$0
NACOGDOCHES	STEAM ELECTRIC POWER	-	-	$36	$110	$225	$376	-	-	-	-	-	-	-	-	-	-	-	-
NACOGDOCHES Total		**$3,719**	**$2,045**	**$88**	**$170**	**$292**	**$454**	**21,222**	**12,121**	**1,288**	**1,449**	**1,635**	**1,911**	-	-	-	-	**$0**	**$0**
NEWTON	MINING	$15	$3	-	-	-	-	87	15	-	-	-	-	-	-	-	-	-	-
NEWTON	STEAM ELECTRIC POWER	-	-	$51	$160	$334	$573	-	-	-	-	-	-	-	-	-	-	-	-

		Income losses (Million $)*						Job losses						Consumer Surplus losses (Million $)*					
County	Water Use Category	2020	2030	2040	2050	2060	2070	2020	2030	2040	2050	2060	2070	2020	2030	2040	2050	2060	2070
NEWTON Total		**$15**	**$3**	**$51**	**$160**	**$334**	**$573**	**87**	**15**	-	-	-	-	-	-	-	-	-	-
ORANGE	IRRIGATION	$0	$0	$0	$0	$0	$0	7	8	8	9	8	8	-	-	-	-	-	-
ORANGE	MANUFACTURING	-	$11	$51	$103	$175	$267	-	81	374	750	1,279	1,946	-	-	-	-	-	-
ORANGE	STEAM ELECTRIC POWER	-	-	-	$15	$58	$97	-	-	-	-	-	-	-	-	-	-	-	-
ORANGE Total		**$0**	**$11**	**$52**	**$118**	**$234**	**$364**	**7**	**89**	**382**	**759**	**1,287**	**1,954**	-	-	-	-	-	-
PANOLA	MANUFACTURING	-	$0	$1	$1	$2	$5	-	4	9	15	28	74	-	-	-	-	-	-
PANOLA Total		-	**$0**	**$1**	**$1**	**$2**	**$5**	-	**4**	**9**	**15**	**28**	**74**	-	-	-	-	-	-
RUSK	MINING	$190	$376	$351	$313	$279	$276	1,156	2,283	2,133	1,904	1,694	1,679	-	-	-	-	-	-
RUSK	MUNICIPAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	$0	$0	$0	$0
RUSK	STEAM ELECTRIC POWER	-	-	-	-	-	$146	-	-	-	-	-	-	-	-	-	-	-	-
RUSK Total		**$190**	**$376**	**$351**	**$313**	**$279**	**$422**	**1,156**	**2,283**	**2,133**	**1,904**	**1,694**	**1,679**	-	-	**$0**	**$0**	**$0**	**$0**
SAN AUGUSTINE	MINING	$1,412	$495	-	-	-	-	7,753	2,717	-	-	-	-	-	-	-	-	-	-
SAN AUGUSTINE Total		**$1,412**	**$495**	-	-	-	-	**7,753**	**2,717**	-	-	-	-	-	-	-	-	-	-
SHELBY	LIVESTOCK	$36	$62	$94	$133	$181	$181	763	1,326	2,011	2,847	3,866	3,866	-	-	-	-	-	-
SHELBY Total		**$36**	**$62**	**$94**	**$133**	**$181**	**$181**	**763**	**1,326**	**2,011**	**2,847**	**3,866**	**3,866**	-	-	-	-	-	-
SMITH	MANUFACTURING	$125	$147	$168	$186	$212	$240	903	1,062	1,217	1,349	1,533	1,734	-	-	-	-	-	-
SMITH	MINING	$7	$7	$6	$2	$0	$0	42	43	39	13	3	3	-	-	-	-	-	-
SMITH	MUNICIPAL	-	-	$0	$2	$11	$22	-	-	4	38	216	440	$0	$0	$0	$2	$5	$7
SMITH Total		**$131**	**$154**	**$175**	**$190**	**$223**	**$262**	**945**	**1,104**	**1,260**	**1,401**	**1,752**	**2,177**	**$0**	**$0**	**$0**	**$2**	**$5**	**$7**
Regional Total		**$20,408**	**$24,297**	**$23,015**	**$24,409**	**$26,065**	**$28,108**	**92,203**	**102,185**	**93,660**	**98,990**	**105,134**	**111,205**	**$0**	**$0**	**$1**	**$2**	**$5**	**$9**

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Appendix 4-F

Socioeconomic Impact Analysis Letter

This appendix includes the letter from the ETRWPG requesting that the TWDB conduct a socioeconomic impact analysis of not meeting identified water needs for the region. The letter is signed by Mr. Kelley Holcomb, the Chair of the ETRWPG.

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Region I
East Texas Regional
Water Planning Group

Kelley Holcomb, Chair
P.O. Box 387
Lufkin TX 75902
936-633-7543

July 13, 2015

Mr. Kevin Patteson
Executive Administrator
Texas Water Development Board
1700 North Congress
Austin, Texas 78711-3231

Re: Request for the Texas Water Development Board to Conduct a Socioeconomic Impact Analysis for the East Texas Regional Water Planning Area (Region I)

Dear Mr. Patteson:

At the Region I, East Texas Regional Water Planning Group (RWPG) regular meeting held on January 28, 2015, the RWPG discussed and approved a request for the Texas Water Development Board (TWDB) to provide technical assistance in conducting a socioeconomic impact analysis for the 2016 East Texas Regional Water Plan. The RWPG respectfully requests that the analysis be conducted utilizing information specific to Region I East Texas Regional Water Planning Area and that the models correspond to the needs of region.

If you have questions or need additional information, please don't hesitate to call me at 936-633-7543.

Respectfully,

Kelley Holcomb, Chair
East Texas Regional Water Planning Group

cc: Lann Bookout, Texas Water Development Board
Temple McKinnon, Texas Water Development Board
Lila Fuller, City of Nacogdoches
Rex Hunt, Alan Plummer Associates, Inc.

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Appendix 5A-A

Screening Criteria for Potentially Feasible Water Management Strategies

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The screening criteria used to assess the feasibility of potential strategies in the ETRWPA are provided as follows. These criteria were adopted as guidelines, and strategies could be retained or dismissed at the discretion of the ETRWPG.

5A-A.1 General

- Feasible strategy must have an identified sponsor or authority.
- Feasible strategy must consider the end use. This includes water quality, distance to end use, etc. For example, long transmission systems with pumping are not likely to be economically feasible for irrigation use.
- Strategy should provide a reasonable percentage of the projected need (except conservation, which will be evaluated for all needs).
- Strategy must meet existing federal and state regulations.
- Strategies must be based on proven technology.
- Strategy must be able to be implemented.
- Strategy must be appropriate for regional water planning.

5A-A.2 Evaluation by Water Strategy Type

In accordance with 31 TAC Chapter 357.7, the ETRWPG must evaluate all WMSs the regional water planning group determines to be potentially feasible. The types of WMSs to be evaluated are described below.

5A-A.2.1 Water Conservation. The guidelines for water planning require that water conservation be considered as a strategy for every identified need. If water conservation is not adopted, the reason must be documented. Water conservation in the ETRWPA is driven more by economics than lack of readily available supply, and therefore, not every user will have the need to implement conservation. Additional screening criteria for conservation strategies were adopted to comply with this general policy. The criteria are outlined below.

- Municipal conservation strategies will be evaluated for municipal WUGs that have a need identified during the planning period and a current per capita water use greater than 140 gpcd. This is the TWDB recommended goal for municipal users based on the Conservation Task Force recommendations. Municipal conservation will not be evaluated for WUGs with current usage less than 140 gpcd.
- Industrial, commercial and institutional (ICI) conservation strategies will be considered for cities with ICI use that exceeds 20 percent of the city's total water use.
- Industrial conservation will be evaluated for counties with manufacturing demands greater than 1,000 ac-ft per year and/or have identifiable industries with water use greater than 500 ac-ft per year.
- Steam-electric power water demands consider a high level of conservation in the development of the projections. No additional conservation measures will be considered for steam-electric power.
- Irrigation conservation measures will be considered by crop type and water source.
- Conservation will not be considered for livestock or mining water demands. 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.

5A-A.2.2 Drought Management Measures. Drought management WMSs are implemented in response to drought conditions. These strategies provide a safety factor for water users during drought. Drought management measures will not be adopted as strategies to meet long-range needs.

5A-A.2.3 Wastewater Reuse. Reuse projects will be considered on a case-by-case basis. Both direct and indirect reuse will be considered, as appropriate.

5A-A.2.4 Expanded Use of Existing Supplies. Use of existing supplies should be optimized, where possible, to meet new demands. Following is a discussion of how various types of existing supplies might be expanded.

Connection of Existing Supplies. The connection of existing supplies will be considered on a case-by-case basis. In general, supplies should be owned by the water group with a need for additional supply or available to that group for purchase or permitting.

System Operation. New or additional system operations may be considered if they are feasible and the owner wishes to adopt such strategies. Existing operating policies will be considered during evaluation of available supplies.

Conjunctive Use of Groundwater and Surface Water. The conjunctive use of groundwater and surface water supplies may be considered when groundwater supplies are available. Applicable groundwater conservation district rules will be considered for such conjunctive systems.

Reallocation of Reservoir Storage. Reallocation of reservoir storage will be considered if the owner is amenable to reallocation and, where reallocation in federal reservoirs is being considered (such as from flood to conservation storage), an appropriate and willing local sponsor can be found to sponsor a federal study.

Voluntary Redistribution of Water Resources. Voluntary redistribution with the involved parties will be considered and the ETRWPG will come to a consensus on an approach. If the involved parties are not interested, this option will not be pursued.

Voluntary Subordination of Existing Water Rights. Voluntary subordination of existing water rights will be considered if the involved parties are amenable to the strategy. Alternatively, the ETRWPG may recommend that the water right holder consider selling water under their water right to the willing buyer.

Yield Enhancement. ETRWPG will consider yield enhancement projects, as appropriate, for the water source and identified need.

Water Quality Improvement. Water quality improvement projects will be considered for municipal supplies that bring the existing water supply into compliance with state and federal regulations. General water quality projects may be considered if they improve the usability of the water source to help meet demands.

5A-A.2.5 New Supply Development.

The development of new water supplies may be necessary to meet new water demands. A discussion of the development of new water supplies follows.

Surface Water Resources. New surface water resources that can be permitted will be considered, provided a reasonable amount of supply to meet the identified need is located within a reasonable distance of the end users, and recommended new sources would be expected to provide water supplies at a reasonable cost.

Groundwater Resources. The ETRWPG will consider groundwater supplies in areas where additional groundwater is available.

Brush Control. Brush control is not considered a cost effective water supply strategy in the ETRWPA due to the large amount of rainfall and lack of invasive brush species, and will not be considered as a WMS.

Precipitation Enhancement. The ETRWPA has an abundance of precipitation. Precipitation enhancement will not be considered as a WMS.

Desalination. The ETRWPG will consider desalination on a case-by-case basis.

Water Right Cancellation. The ETRWPG will generally not pursue water right cancellation as a means of obtaining additional water supplies. Instead, the ETRWPG will recommend that the water right holder consider selling water under their water right to the willing buyer.

Aquifer Storage and Recovery. Aquifer storage and recovery (ASR) will be considered where the structure of the aquifer is such that this method is applicable. An ASR study must have already been performed to consider an area feasible for an ASR project.

5A-A.2.6 Interbasin Transfers. The ETRWPG will recommend interbasin transfers when necessary to transport water from the source to its destination. Interbasin transfers will be evaluated in accordance with current regulations. The process for selection of the WMSs is described as follows:

1. Define groupings or common areas with supply deficiencies.
2. Develop comprehensive list of potentially feasible strategies, per screening process.
3. Contact potential suppliers/WUGs to determine current strategies under consideration.
4. Prepare qualitative rating based on cost, reliability, environmental impact, impacts on other water resources, impacts on agricultural and natural resources, and political acceptability for the various strategies.
5. Select one or more strategies as appropriate for each need or group.
6. Contact each WUG with a need and confirm the selected strategies are acceptable.
7. Present proposed WMSs to the ETRWPG in a public meeting for discussion, modification, and approval.

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Appendix 5A-B

Potentially Feasible Water Management Strategies

Appendix 5A-B includes a summary of potentially feasible water management strategies considered and a list of Potentially Feasible Strategies identified for all WUGs with needs.

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ETRWPA - Potentially Feasible Water Management Strategies Considered for WUGs and WWPs with Identified Needs

	Every WUG Entity and WWP with an Identified Need			WMSs REQUIRED TO BE CONSIDERED BY STATUTE											ADDITIONAL						
Number	Water User Group Name/WWP Name	County	Maximum Need 2020-2070 (acf/yr)	Conservation	Drought Management	Reuse	Reallocation of Storage	Voluntary Transfers	Conjunctive Use	Expansion of Existing	New Supplies	Regional Water Supply	Improvement of Water Quality	Emergency Transfer of Water	System Optimization, Subordination, & Precip. Enhancement	Brush Control	Weather Modification	Desalination	Aquifer Storage and Recovery	Cancellation of Water Rights	Interbasin Transfers
1	Steam Electric Power	Anderson	25,968	☐	☐	☐	☐	■	☐	■	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2	Manufacturing	Angelina	17,195	☐	☐	☐	☐	■	☐	■	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3	Mining	Angelina	573	☐	☐	☐	☐	■	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4	Alto Rural WSC	Cherokee	215	■	☐	☐	☐	■	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
5	Mining	Cherokee	247	☐	☐	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
6	Steam Electric Power	Cherokee	20,000	☐	☐	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
7	Athens	Henderson	33	■	☐	■	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
8	Chandler	Henderson	312	■	☐	☐	☐	■	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
9	Irrigation	Houston	2,340	☐	☐	☐	☐	☐	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
10	Manufacturing	Jasper	8,420	☐	☐	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
11	Beaumont	Jefferson	6,896	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
12	County Other	Jefferson	3,413	☐	☐	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
13	Manufacturing	Jefferson	309,322	☐	☐	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
14	Steam Electric Power	Jefferson	30,839	☐	☐	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
15	D&M WSC	Nacogdoches	234	■	☐	☐	■	☐	☐	☐	■	■	☐	☐	☐	☐	☐	☐	☐	☐	☐
16	Livestock	Nacogdoches	3,059	☐	☐	☐	☐	☐	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
17	Mining	Nacogdoches	5,475	☐	☐	☐	☐	■	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
18	Steam Electric Power	Nacogdoches	10,472	☐	☐	☐	☐	■	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
19	Mining	Newton	115	☐	☐	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
20	Steam Electric Power	Newton	19,021	☐	☐	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
21	Irrigation	Orange	2,758	☐	☐	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
22	Manufacturing	Orange	31,850	☐	☐	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
23	Steam Electric Power	Orange	4,846	☐	☐	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
24	Manufacturing	Panola	309	☐	☐	☐	☐	■	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
25	Overton	Rusk	215	■	☐	☐	☐	■	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
26	Mining	Rusk	2,092	☐	☐	☐	☐	■	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
27	Steam Electric Power	Rusk	18,868	☐	☐	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
28	Mining	San Augustine	2,102	☐	☐	☐	☐	■	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
29	Livestock	Shelby	6,925	☐	☐	☐	☐	■	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
30	Bullard	Smith	995	■	☐	☐	☐	■	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
31	Crystal Systems Inc	Smith	642	■	☐	☐	☐	■	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
32	Lindale	Smith	826	■	☐	☐	☐	■	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
33	R-P-M WSC	Smith	23	■	☐	☐	☐	■	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
34	Manufacturing	Smith	2,712	☐	☐	☐	☐	■	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
35	Mining	Smith	32	☐	☐	☐	☐	■	☐	☐	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
36	Irrigation	Trinity	331	☐	☐	☐	☐	■	☐	■	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
37	Angelina Neches River Authority	Angelina	102,826	☐	☐	☐	☐	☐	☐	■	■	■	☐	☐	☐	☐	☐	☐	☐	☐	☐
38	Athens MWA	Trinity	5,986	☐	☐	■	☐	☐	☐	■	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
39	Angelina Nacogdoches WCID #1	Henderson	5,305	☐	☐	☐	■	☐	☐	■	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
40	City of Center	Shelby	2,242	☐	☐	■	☐	■	☐	■	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
41	Houston County WCID #1	Houston	2,463	☐	☐	☐	☐	☐	☐	■	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
42	City of Jacksonville	Cherokee	1,700	☐	☐	☐	☐	■	☐	■	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
43	Lower Neches Valley Authority	Cherokee	200,000	☐	☐	☐	☐	■	☐	■	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
44	City of Lufkin	Angelina	28,000	☐	☐	☐	☐	■	☐	■	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
45	City of Nacogdoches	Nacogdoches	8,500	☐	☐	☐	☐	■	☐	■	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
46	Sabine River Authority	Orange	89,680	☐	☐	☐	☐	☐	☐	■	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
47	City of Tyler	Orange	16,815	☐	☐	☐	☐	☐	☐	■	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
48	Upper Neches River Municipal Water Authority	Orange	62,190	☐	☐	☐	☐	☐	☐	■	■	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

ETRWPA - Potentially Feasible Water Management Strategies for WUGs and WWPs with Identified Needs

Sponsor	WMS
Multiple Entities	Municipal conservation
Multiple Entities	Irrigation conservation
Multiple Entities	Reuse (Direct and Indirect, Potable and Non-Potable)
Multiple Entities	Purchase from Provider (Voluntary Transfer)
Anderson County Steam Electric Power	Purchase from Provider (Voluntary Transfer)
Angelina County Manufacturing	Purchase from Provider (Voluntary Transfer)
Angelina County Mining	Purchase from Provider (Voluntary Transfer)
Cherokee County Alto Rural WSC	Municipal conservation
Cherokee County Alto Rural WSC	News Wells in Carrizo Wilcox
Cherokee County Mining	Purchase from Provider (Voluntary Transfer)
Cherokee County Steam Electric Power	Purchase from Provider (Voluntary Transfer)
Henderson County Athens	Municipal conservation
Henderson County Athens	Purchase from Provider (Voluntary Transfer)
Henderson County Chandler	Municipal conservation
Henderson County Chandler	Purchase from Provider (Voluntary Transfer)
Houston County Irrigation	New Wells in Yegua-Jackson
Jasper County Manufacturing	Purchase from Provider (Voluntary Transfer)
Jefferson County Beaumont	Municipal conservation
Jefferson County Other	Purchase from Provider (Voluntary Transfer)
Jefferson County Manufacturing	Purchase from Provider (Voluntary Transfer)
Jefferson County Steam Electric Power	Purchase from Provider (Voluntary Transfer)
Jefferson County Port Arthur	Municipal conservation
Nacogdoches County D&M WSC	New Supply (Regional Water System)
Nacogdoches County Livestock	New Wells in Carrizo Wilcox
Nacogdoches County Mining	Purchase from Provider (Voluntary Transfer)
Nacogdoches County Steam Electric Power	Purchase from Provider (Voluntary Transfer)
Nacogdoches County Steam Electric Power	New Wells in Carrizo Wilcox
Newton County Mining	Purchase from Provider (Voluntary Transfer)
Newton County Steam Electric Power	Purchase from Provider (Voluntary Transfer)
Orange County Irrigation	Purchase from Provider (Voluntary Transfer)
Orange County Manufacturing	Purchase from Provider (Voluntary Transfer)
Orange County Steam Electric Power	Purchase from Provider (Voluntary Transfer)
Panola County Manufacturing	Purchase from Provider (Voluntary Transfer)
Rusk County Overton	Municipal conservation
Rusk County Overton	Purchase from Provider (Voluntary Transfer)
Rusk County Mining	Purchase from Provider (Voluntary Transfer)
Rusk County Steam Electric Power	Purchase from Provider (Voluntary Transfer)
San Augustine County Mining	Purchase from Provider (Voluntary Transfer)
Shelby County Livestock	Purchase from Provider (Voluntary Transfer)
Smith County Bullard	Municipal conservation
Smith County Bullard	New Wells in Carrizo Wilcox
Smith County Bullard	Purchase from Provider (Voluntary Transfer)
Smith County Crystal Systems Inc	Municipal conservation
Smith County Crystal Systems Inc	New Wells in Carrizo Wilcox
Smith County Crystal Systems Inc	Purchase from Provider (Voluntary Transfer)
Smith County Lindale	Municipal conservation
Smith County Lindale	New Wells in Carrizo Wilcox
Smith County Lindale	Purchase from Provider (Voluntary Transfer)
Smith County R-P-M WSC	Municipal conservation
Smith County R-P-M WSC	New Wells in Carrizo Wilcox
Smith County R-P-M WSC	Purchase from Provider (Voluntary Transfer)
Smith County Manufacturing	New Wells in Carrizo Wilcox
Smith County Manufacturing	Purchase from Provider (Voluntary Transfer)

ETRWPA - Potentially Feasible Water Management Strategies for WUGs and WWPs with Identified Needs (cont)

Sponsor	WMS
Smith Count Mining	New Wells in Carrizo Wilcox
Smith Count Mining	Purchase from Provider (Voluntary Transfer)
Trinity County Irrigation	Purchase from Provider (Voluntary Transfer)
Angelina Neches River Authority	New Supplies (Lake Columbia)
Angelina Neches River Authority	Regional Water Treatment Plant and Distribution System
Angelina Neches River Authority	New Supplies (Groundwater Wells)
Angelina Neches River Authority	New Supplies (Run-of-River)
Athens MWA	Reuse (Direct and Indirect, Potable and Non-Potable)
Athens MWA	New Supplies (Groundwater Wells)
Athens MWA	Pump Station Improvements
Angelina Nacogdoches WCID #1	Rreallocation of Storage
Angelina Nacogdoches WCID #1	New Supplies (Dredging)
City of Center	Reuse (Direct and Indirect, Potable and Non-Potable)
City of Center	Purchase from Provider (Voluntary Transfer)
Houston County WCID #1	New Supplies (Permit Amendment)
Houston County WCID #1	New Supplies (Groundwater Wells)
City of Jacksonville	Purchase from Provider (Voluntary Transfer)
Lower Neches Valley Authority	Purchase from Provider (Voluntary Transfer)
Lower Neches Valley Authority	New Supplies (Permit Amendment)
City of Lufkin	Purchase from Provider (Voluntary Transfer)
City of Nacogdoches	Purchase from Provider (Voluntary Transfer)
Sabine River Authority	New Supplies (Permit Amendment)
Sabine River Authority	Pump Station
City of Tyler	Raw Water and Treated Water Transmission
Upper Neches River Municipal Water Authority	New Supplies (Run-of-River)

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Appendix 5B-A

Technical Memorandums of Water Management Analysis

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DESCRIPTION

The 2016 Plan includes a total of 72 recommended water management strategies (WMS) developed to ensure the East Texas Regional Water Planning Area continues to appropriately plan for water demands for the area's citizens, industries, and communities. Appendix 5B-A provides the required evaluation of each proposed WMS, contained in a technical memorandum for each strategy. As required, each technical memorandum addresses the following elements:

- Project Description
- Supply Development
- Environmental Considerations

- Permitting and Development
- Planning-Level Opinion of Cost
- Project Evaluation

The planning-level opinion of cost (PLOC) is a critical element of the regional water planning process. The PLOC is important to project prioritization, which is one of a number of considerations in the TWDB's funding evaluation. For the 2016 Plan, PLOCs have been analyzed using the TWDB's costing tool, except where more detailed costs analysis has been provided by the WUG or WWP. In accordance with TWDB Guidance (Exhibit C, First Amended General Guidelines for Regional Water Planning Development – October 2012), the analysis of costs for recommended and alternative WMSs includes capital costs, debt service, and annual operating and maintenance expenses over the planning horizon.

Costs include expenses associated with infrastructure needed to convey water from sources and treat water for end user requirements. Capital costs consist of construction, engineering, contingencies, financial, legal, administration, environmental, permitting and mitigation, land acquisition and easements, and interest on loans. Water transmission lines were assumed to take the shortest route, following existing highways or roads where possible. Profiles were developed using GIS mapping software and USGS topographic maps. Pipes were sized to deliver peak-day flows within reasonable pressure and velocity ranges. Water losses associated with transmission were assumed to be negligible for regional planning purposes.

The annual costs for operation and maintenance infrastructure are generally based on percentages of estimated construction cost of the infrastructure. In addition, purchased water costs, power costs are included.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR ANDERSON STEAM ELECTRIC POWER

Water User Group Name:	Anderson County – Steam Electric Power
Strategy Name:	Purchase from City of Palestine
Strategy ID:	AND-SEP1
Strategy Type:	New Surface Water Source
Potential Supply Quantity:	11,306 – 21,632 ac-ft per year (Varies) (10.08 – 19.3 MGD)
Implementation Decade:	2020
Development Timeline:	2020
Project Capital Cost:	$44,576,000 (September, 2013)
Annual Cost:	$12,367,000
Unit Water Cost (Rounded):	$522 per ac-ft ($1.6 per 1,000 gallons)

PROJECT DESCRIPTION

Steam Electric Power demand is expected to grow significantly over the planning period and two recommended strategies were identified to meet this need. This strategy is a recommended strategy for steam electric power water users in Anderson County and involves a contract between individual steam electric power users and the City of Palestine from Neches run-of-river and Lake Palestine supplies. The cost for supply from the source of supply includes the cost of raw water and infrastructure related to water conveyance. Ultimately, the cost for raw water will need to be negotiated with the City of Palestine and will reflect the wholesale water rates of this entity at the time a contract is made. The cost estimate included in this technical memorandum utilizes an assumed rate for the East Texas Regional Water Planning Area regional rate for raw surface water.

SUPPLY DEVELOPMENT

The quantity of supply from this strategy represents the steam electric power need projected for Anderson County by the East Texas Regional Water Planning Group. A contract with City of Palestine for their share for supplies in Lake Palestine is the recommended strategy. However, City of Palestine's share of Lake Palestine supplies does not address all the need for steam electric power demand in Anderson County. . The WUG will have an unmet need in 2070 but no strategies were proposed to address this unmet need because the ETRWPG believes that the demands for this decade are over estimated. The strategy discussed in this technical memorandum is developed for the maximum amount available from City of Palestine for water management strategies, after current commitments have been addressed. The reliability of this water supply is considered high due to the availability of water projected in the Neches River using the Texas Water Development Board's Water Availability Models. However, this strategy is dependent on sales with the City of Palestine. The quantity of supply from this strategy represents a contract of 11,306 acre feet per year in 2020 and increasing to a maximum amount of 21,632 ac-ft per year for 2070.

ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. In addition, a contract between Anderson County and the City of Palestine should have a minimum impact to environmental water needs, no impact to the surrounding habitat, and a low impact to cultural resources in the area. There are no bays or estuaries in close proximity Anderson County.

PERMITTING AND DEVELOPMENT

There are no permitting or development issues associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assumed 21 miles of pipeline (the approximate distance from the Neches River to the center of Anderson County), a pump station with an intake, and one terminal storage tank with 4 MG of storage. The annual cost was estimated using the East Texas Regional Water Planning Area regional rate for raw surface water. Overall, this strategy has a medium cost compared to other strategies in the 2016 East Texas Regional Water Plan.

WUG	**Anderson Steam Electric Power**					
WMS	**New Pipeline from Lake Palestine to Anderson County (City of Palestine)**					
VOL	**21,632** ac-ft per year	19.3 MGD				
CAPITAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**		**Cost**
Transmission Facilities						
Pipeline	46 in.	110,880	ft	$	228	$25,265,114
Right of Way Easements		110,880	ft	$	16	$1,906,080
Storage Tanks	4.00 MG	1	LS	$	1,267,691	$1,267,691
Contingencies (30%, engineering done)						$8,595,050
Pipeline Subtotal	21	**Miles**				**$37,033,935**
			1763			
Pump Station		32 MG	HP	$	4,060,515	$4,060,515
Contingencies (35%, engineering done)						$1,421,180
Pump Station Subtotal						**$5,481,695**
Environmental and Permitting						$553,000
Construction Total						**$43,069,000**
Interest During Construction			12	Months		$1,507,000
TOTAL CAPITAL COST						**$44,576,000**
ANNUAL COSTS	**Size**	**Quantity**	**Units**	**Unit Price**		**Cost**
Debt Service (5.5% for 20 years)						$3,730,000
Operational Costs*						$8,636,645
Total Annual Costs						**$12,367,000**
UNIT COSTS (Until Amortized)						
Cost per acre-ft						$522
Cost per 1000 gallons						$1.60
UNIT COSTS (After Amortization)						
Cost per acre-ft						$365
Cost per 1000 gallons						$1.12

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

This strategy benefits steam electric power water users in Anderson County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. A contract to pull water from the Neches River will reduce demands on other water supplies in Anderson County and will have no other apparent impact on other State water resources. From a third party social and economic perspective, this voluntary redistribution of water will be beneficial because it provides water for economic growth.

Based on the analyses provided above, the Anderson County Steam Electric Power recommended strategy to purchase water from the City of Palestine supplies was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	3	21,632 ac-ft per year
Reliability	4	Reliable Supply
Cost	3	Medium Cost
Environmental Factors	4	Low Impacts
Impact on Other State Water Resources	4	No known impacts to other projects.
Threat to Agricultural Resources/Rural Areas	4	Low to No Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low to No Impacts
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	1	Local Sponsorship Unknown
Implementation Issues	4	No known risks

REFERENCES

2011 East Texas Regional Water Plan.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR ANGELINA MANUFACTURING

Water User Group Name:	Angelina Manufacturing
Strategy Name:	Purchase from Lufkin (Lake Kurth/Sam Rayburn)
Strategy ID:	ANGL-MFG
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	6,000 – 17,195 ac-ft per year (Varies) (5.4 – 15.4 MGD)
Implementation Decade:	2020
Development Timeline:	2020-2070
Project Annual Cost:	$1,955,000 (Lake Kurth) (September, 2013) $3,648,000 (Sam Rayburn to Kurth) (September, 2013)
Capital Cost:	$0
Unit Water Cost (Rounded):	$326 per ac-ft ($1.00 per 1,000 gallons)

PROJECT DESCRIPTION

This strategy is a recommended strategy for Manufacturing in Angelina County and involves a contract between individual manufacturers and the City of Lufkin for raw water from Lake Kurth. Beginning in 2030, the City of Lufkin will begin transferring water from Sam Rayburn Lake to Lake Kurth, making more water available to meet manufacturing demands near Lake Kurth. Since 2011, The City of Lufkin installed a transmission system from Lake Kurth to multiple manufacturing water users. Therefore, the only cost for additional supply from the City of Lufkin is the cost of raw water. Ultimately, this cost will need to be negotiated with the City of Lufkin and will reflect the City's wholesale water rates at that time. The cost estimate included in this technical memorandum utilizes an assumed rate for the East Texas Regional Water Planning Area regional rate for raw surface water.

SUPPLY DEVELOPMENT

The City of Lufkin currently supplies approximately 3,000 ac-ft per year to meet manufacturing demands in Angelina County. The quantity of supply from this strategy represents a contract increase of 6,000 ac-ft per year, beginning in 2020, and increases to 17,195 ac-ft per year, beginning in 2070. The supply available in 2020 is limited by the available supply of Lake Kurth to the City of Lufkin. In 2030 through 2070, the supply is limited to the manufacturing need projected by the East Texas Regional Water Planning Group. These supplies are considered highly reliable in 2020; however, the supply beginning in 2030 is dependent on the City of Lufkin implementing their water management strategies.

ENVIRONMENTAL CONSIDERATIONS

There are not any significant environmental considerations associated with this strategy. A contract between manufacturers and the City of Lufkin should have a minimum impact to environmental water needs, no impact to the surrounding habitat, and a low impact to cultural resources in the area. There are no bays or estuaries in close proximity to Lake Kurth.

PERMITTING AND DEVELOPMENT

There are no permitting or development issues associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. No capital costs were assumed, but an annual cost was estimated using the East Texas Regional Water Planning Area regional rate for raw surface water. Overall, this strategy has a low cost compared to other strategies in the 2016 East Texas Regional Water Plan.

WUGNAME:	**Angelina Manufacturing Purchase from**				
STRATEGY:	**Lufkin**				
Raw Water Quantity:	**6,000**	AF/Y		5.35 MGD	
Treated Water Quantity:	**0**	AF/Y		0.00 MGD	
CONSTRUCTION COSTS					
ANNUAL CONTRACT COSTS		**Size**	**Quantity**	**Unit**	**Cost**
Operational Costs*			1,955,000	1000 gal	$1,955,000
ANNUAL COSTS					
Total Annual Costs					**$1,955,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of water					$326
Per 1,000 Gallons					$1.00
UNIT COSTS (After Amortization)					
Per Acre-Foot				NA	
Per 1,000 Gallons				NA	

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

WUGNAME:	**Angelina Manufacturing**				
STRATEGY:	**Purchase from Lufkin**				
Raw Water Quantity:	**11,195**	AF/Y		9.99 MGD	
Treated Water Quantity:	**0**	AF/Y		0.00 MGD	

CONSTRUCTION COSTS				
ANNUAL CONTRACT COSTS	**Size**	**Quantity**	**Unit**	**Cost**
Operational Costs*		3,648,000	1000 gal	$3,648,000
ANNUAL COSTS				
Total Annual Costs				**$3,648,000**
UNIT COSTS (Until Amortized)				
Per Acre-Foot of water				$326
Per 1,000 Gallons				$1.00
UNIT COSTS (After Amortization)				
Per Acre-Foot				NA
Per 1,000 Gallons				NA

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

This strategy benefits manufacturers in Angelina County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. A contract to pull water from Lake Kurth will reduce demands on other water supplies in Angelina County and will have no other apparent impact on other State water resources. From a third party social and economic perspective, this voluntary redistribution of water will be beneficial because it provides water for economic growth.

Based on the analyses provided above, the Angelina Manufacturing recommended strategy to purchase water from the City of Lufkin was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	17,195 ac-ft per year
Reliability	5	Reliable Supply
Cost	4	Low Cost
Environmental Factors	4	Low Impacts
Impact on Other State Water Resources	4	No known impacts to other projects.
Threat to Agricultural Resources/Rural Areas	4	Low to No Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low to No Impacts
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	1	Local Sponsor unknown
Implementation Issues	4	No known risks

REFERENCES

2011 East Texas Regional Water Plan.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR ANGELINA MINING

Water User Group Name:	Angelina Mining
Strategy Name:	Purchase from Angelina Neches River Authority (Angelina River)
Strategy ID:	ANGL-MIN
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	168 – 573 ac-ft per year (Varies) (0.1 – 0.5 MGD)
Implementation Decade:	2020
Development Timeline:	2020
Project Capital Cost:	$4,005,000 (September, 2013)
Annual Cost:	$942,000
Unit Water Cost (Rounded):	$1,644 per ac-ft ($5.05 per 1,000 gallons)

PROJECT DESCRIPTION

This strategy is a recommended strategy for Mining in Angelina County and involves a contract between individual mining water users and the Angelina Neches River Authority for raw water from the Angelina River as their permit allows. The cost for supply from the Angelina River includes the cost of raw water and infrastructure related to water conveyance. Ultimately, the cost for raw water will need to be negotiated with the Angelina Neches River Authority and will reflect the wholesale water rates of this entity at the time a contract is made. The cost estimate included in this technical memorandum utilizes an assumed rate for the East Texas Regional Water Planning Area regional rate for raw surface water.

SUPPLY DEVELOPMENT

The quantity of supply from this strategy represents the mining need projected in Angelina County by the East Texas Regional Water Planning Group. The reliability of this water supply is considered medium due to the availability of water projected in the Angelina River using the Texas Water Development Board's Water Availability Models. However, this strategy is dependent on sales with the Angelina Neches River Authority and their application for 10,000 ac-ft per year from the Angelina River (Strategy ID: ANRA-ROR). The quantity of supply from this strategy represents a contract of 573 ac-ft per year, beginning in 2020, and decreases to 168 ac-ft per year, beginning in 2070. In 2030 through 2070, the supply is limited to the mining need projected by the East Texas Regional Water Planning Group.

ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. In addition, a contract between mining water users in Angelina County and the Angelina Neches River Authority should have a minimum impact to environmental water needs, no impact to the surrounding habitat, and a low impact to cultural resources in the area. There are no bays or estuaries in close proximity Angelina County.

PERMITTING AND DEVELOPMENT

There are no permitting or development issues associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assumed 8 miles of pipeline (the approximate distance from the Angelina River to the center of Angelina County), a pump station with an intake, a booster pump station, and one terminal storage tank with one day of storage. The annual cost was estimated using the East Texas Regional Water Planning Area regional rate for raw surface water. Overall, this strategy has a medium to high cost compared to other strategies in the 2016 East Texas Regional Water Plan due to the length of pipeline required.

WUG NAME:	**Angelina Mining**				
STRATEGY:	**Purchase from ANRA (Angelina River)**				
Quantity:	**573** AF/Y		0.77 MGD		
CAPITAL COSTS					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	10 in.	42,240	LF	$31	$1,322,167
Right of Way Easements Rural (ROW)		42,240	LF	$16	$726,110
Subtotal of Pipeline	**8**	**miles**			**$2,445,277**
Pump Station(s)					
Pump with intake	34 HP	1	LS	$766,000	$766,000
Booster Pump Station		0	LS		
Engineering and Contingencies (35%)					$268,100
Subtotal of Pump Station(s)					**$1,034,100**
Storage Tanks	0.10 MG	1	LS	$169,549	$169,549
Engineering and Contingencies (35%)					$59,342
Subtotal of Storage Tanks					**$228,891**
Permitting and Mitigation					$228,000
Construction Total					**$3,936,000**
Interest During Construction			6	Months	$69,000
TOTAL COST					**$4,005,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$335,000
Operational Costs*					$607,000
Total Annual Costs					**$942,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$1,644
Per 1,000 Gallons					$5.05
UNIT COSTS (After Amortization)					
Per Acre-Foot					$1,059
Per 1,000 Gallons					$3.25

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

This strategy benefits mining users in Angelina County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. A contract to pull water from the Angelina River will reduce demands on other water supplies in Angelina County and will have no other apparent impact on other State water resources. From a third party social and economic perspective, this voluntary redistribution of water will be beneficial because it provides water for economic growth.

Based on the analyses provided above, the Angelina Mining recommended strategy to purchase water from the Angelina Neches River Authority was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	573 ac-ft per year
Reliability	3	Moderate Reliable Supply
Cost	2	Medium Cost
Environmental Factors	4	Low Impacts
Impact on Other State Water Resources	4	No known impacts to other projects.
Threat to Agricultural Resources/Rural Areas	4	Low to No Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low to No Impacts
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	1	Local Sponsor unknown
Implementation Issues	4	No known risks

REFERENCES

2011 East Texas Regional Water Plan.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR CHEROKEE ALTO RURAL WSC

Water User Group Name:	Cherokee County Alto Rural WSC
Strategy Name:	New wells in Carrizo-Wilcox Aquifer
Strategy ID:	CHER-ALT
Strategy Type:	New Groundwater Source
Potential Supply Quantity:	66 - 215 ac-ft per year (0.05 – 0.19 MGD)
Implementation Decade:	2050
Development Timeline:	2050
Project Capital Cost:	$2,682,000 (September 2013)
Annual Cost:	$303,000
Unit Water Cost (Rounded):	$1,212 per ac-ft ($3.72 per 1,000 gallons)

PROJECT DESCRIPTION

Alto Rural WSC is a municipal water user in Cherokee County. This water user currently relies on groundwater in the Carrizo Wilcox aquifer in Cherokee County. Alto Rural WSC has a small need starting in 2050 and the maximum need is approximately 215 ac-ft per year. To meet this need, it is recommended that Alto Rural WSC continue to use supplies from Carrizo Wilcox by drilling additional wells. This strategy is a recommended strategy for Alto Rural WSC in Cherokee County and involves the development of one well located within the Carrizo-Wilcox Aquifer as this aquifer has been identified as a potential source of water in Cherokee County. This well will provide approximately 400 ac-ft per year and are assumed to have a water depth of 300 feet. A peaking factor of two was assumed for the well, and the cost estimate includes conveyance infrastructure in order to capture the peak annual supply.

SUPPLY DEVELOPMENT

The supply is required only in the later part of the planning cycle, for decades 2050 to 2070. Currently, all of the existing needs are being met by supplies from the Carrizo Wilcox aquifer. There are sufficient supplies available in the Cherokee County Carrizo Wilcox to develop the supply needed for this water management strategy. It is assumed that the well will provide 400 ac-ft per year to meet Alto Rural WSC's needs in Cherokee County providing a total yield required for the strategy. Overall, the reliability of this supply is considered high, based on the proven use of this source and groundwater availability models.

ENVIRONMENTAL CONSIDERATIONS

The environmental impacts from this strategy are expected to be low. However, groundwater development from this source should be evaluated for potential impacts on spring flows and base flows of surface water in close proximity. The impact to the environment due to pipeline construction is expected to be temporary and minimal. New wells have a potential decrease in the groundwater-surface water nexus, which could reduce base flows. Impacts to environmental water needs, habitat, and cultural resources are expected to be low. There are no bays or estuaries

in close proximity of Cherokee County.

PERMITTING AND DEVELOPMENT

There are no permitting or development issues associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assumed 1.2 miles of pipeline, one well, a peaking factor of two, and a maximum well yield of 500 gpm for each well. This equates to $1,212 per acre-foot ($3.72 per 1,000 gallons); after the infrastructure is fully paid (30 years), the cost drops to $318 per acre-foot ($0.98 per 1,000 gallons). Overall, this strategy has a medium cost compared to other strategies in the 2016 East Texas Regional Water Plan.

WUG: Cherokee County Alto Rural WSC
WMS: Cherokee County - GW Wells

			Acre-feet		
	Supply	250	per year	155	gpm
	Depth to Water	300	ft		
	Well Depth	800	ft		
	Well Size	12	in		
	Wells Needed	1			

Construction Costs		Number		Unit Cost	Total Cost
Water Wells		1		$597,327	$597,327
Connection to Transmission System		1		$50,000	$50,000
Engineering and Contingencies (30% for pipes, 35% for others)					$224,000
Subtotal of Well(s)					**$871,327**
Transmission System	Size	Quantity	Unit	Unit Cost	Total Cost
Pipeline - Rural	6 in.	6,336	LF	$18	$115,000
Pump Station	36 HP	1	EA	$913,000	$913,000
Ground Storage Tank	0.06 MG	1	EA	$124,984	$124,984
Easement - Rural		6,336	LF	$16	$108,900
Engineering and Contingencies (30% for pipes, 35% for others)					$398,000
Subtotal for Transmission		1	miles		**$1,659,884**
Permitting and Mitigation					$60,000
Construction Total					$2,591,000
Interest During Construction			12	Months	$91,000
TOTAL CAPITAL COST					**$2,682,000**

Debt Service (5.5% for 20 years)	$224,000
Operational Costs*	$79,400
Total Annual Cost	**$303,000**

UNIT COSTS (Until Amortized)	
Cost per ac-ft	$1,212
Cost per 1000 gallons	$3.72
UNIT COSTS (After Amortization)	
Cost per ac-ft	$318
Cost per 1000 gallons	$0.98

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

This strategy benefits municipal user Alto Rural WSC in Cherokee County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. New wells in the county will reduce demands on other water supplies in Cherokee County and will have no other apparent impact on other State water resources. From a third party social and economic perspective, this voluntary redistribution of water will be beneficial because it provides water for economic growth.

Based on the analyses provided above, the recommended strategy to drill new wells in Cherokee County for Alto Rural WSC's use was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	250 ac-ft per year
Reliability	4	Highly Reliable Supply
Cost	2	Moderate to High Cost
Environmental Factors	4	Low Impacts
Impact on Other State Water Resources	4	No known impacts to other projects.
Threat to Agricultural Resources/Rural Areas	4	Low to No Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low to No Impacts
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	3	Local Sponsorship by Alto Rural WSC
Implementation Issues	4	No known risks

REFERENCES

Discussions with Regional Water Planning Group.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR CHEROKEE MINING

Water User Group Name:	Cherokee Mining
Strategy Name:	Purchase from Angelina Neches River Authority (Angelina River)
Strategy ID:	CHER-MIN
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	238 – 40 ac-ft per year (Varies) (0.2 – 0.03 MGD)
Implementation Decade:	2020
Development Timeline:	2020
Project Capital Cost:	$4,214,000 (September, 2013)
Annual Cost:	$640,000
Unit Water Cost (Rounded):	$2,560 per ac-ft ($7.86 per 1,000 gallons)

PROJECT DESCRIPTION

This strategy is a recommended strategy for Mining in Cherokee County and involves a contract between individual mining water users and the Angelina Neches River Authority for raw water from the Angelina River as their permit allows. The cost for supply from the Angelina River includes the cost of raw water and infrastructure related to water conveyance. Ultimately, the cost for raw water will need to be negotiated with the Angelina Neches River Authority and will reflect the wholesale water rates of this entity at the time a contract is made. The cost estimate included in this technical memorandum utilizes an assumed rate for the East Texas Regional Water Planning Area regional rate for raw surface water.

SUPPLY DEVELOPMENT

The quantity of supply from this strategy represents the mining need projected in Angelina County by the East Texas Regional Water Planning Group. The reliability of this water supply is considered medium due to the availability of water projected in the Angelina River using the Texas Water Development Board's Water Availability Models. However, this strategy is dependent on sales with the Angelina Neches River Authority and their application for 30,000 ac-ft per year from the Angelina River (Strategy ID: ANGL-ROR). The quantity of supply from this strategy represents a contract of 238 ac-ft per year, beginning in 2020, and decreases to 40 ac-ft per year, beginning in 2070. In 2030 through 2070, the supply is limited to the mining need projected by the East Texas Regional Water Planning Group.

ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. In addition, a contract between mining water users in Cherokee County and the Angelina Neches River Authority should have a minimum impact to environmental water needs, no impact to the surrounding habitat, and a low impact to cultural resources in the area. There are no bays or estuaries in close proximity Cherokee County.

PERMITTING AND DEVELOPMENT

There are no permitting or development issues associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assumed 7 miles of pipeline (the approximate distance from the Angelina River to the center of Cherokee County), a pump station with an intake, and one terminal storage tank with 0.2 MG of storage. The annual cost was estimated using the East Texas Regional Water Planning Area regional rate for raw surface water. Overall, this strategy has a medium to high cost compared to other strategies in the 2016 East Texas Regional Water Plan due to the length of pipeline required.

WUG NAME:	**Cherokee Mining**				
STRATEGY:	**Purchase from ANRA (Angelina River)**				
Quantity:	**250** AF/Y		0.22 MGD		
CAPITAL COSTS					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	12 in.	36,960	LF	$35	$1,306,000
Right of Way Easements Rural (ROW)		36,960	LF	$26	$1,043,790
Subtotal of Pipeline	**7**	**miles**			**$2,741,790**
Pump Station(s)					
Pump with intake	8 HP	1	LS	$663,040	$663,000
Booster Pump Station	0 HP	1	LS	$0	$0
Engineering and Contingencies (35%)					$232,050
Subtotal of Pump Station(s)					**$895,050**
Storage Tanks	0.20 MG	1	LS	$224,165	$224,165
Engineering and Contingencies (35%)					$78,458
Subtotal of Storage Tanks					**$302,623**
Permitting and Mitigation					$203,000
Construction Total					**$4,142,000**
Interest During Construction			6	Months	$72,000
TOTAL COST					**$4,214,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$353,000
Operational Costs*					$287,000
Total Annual Costs					**$640,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$2,560
Per 1,000 Gallons					$7.86
UNIT COSTS (After Amortization)					
Per Acre-Foot					$1,148
Per 1,000 Gallons					$3.52

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

This strategy benefits mining users in Cherokee County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. A contract to pull water from the Angelina River will reduce demands on other water supplies in Cherokee County and will have no other apparent impact on other State water resources. From a third party social and economic perspective, this voluntary redistribution of water will be beneficial because it provides water for economic growth.

Based on the analyses provided above, the Cherokee Mining recommended strategy to purchase water from the Angelina Neches River Authority was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	250 ac-ft per year
Reliability	4	Medium Reliable Supply
Cost	2	Moderate to High Cost
Environmental Factors	4	Low Impacts
Impact on Other State Water Resources	4	No known impacts to other projects.
Threat to Agricultural Resources/Rural Areas	4	Low to No Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low to No Impacts
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	3	Sponsor identified
Implementation Issues	4	No known risks

REFERENCES

Discussions with Angelina Neches River Authority.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR CHEROKEE STEAM ELECTRIC POWER

Water User Group Name:	Cherokee SEP
Strategy Name:	Purchase from Angelina Neches River Authority (Angelina River)
Strategy ID:	CHER-SEP
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	8,000 – 20,000 ac-ft per year (Varies) (0.2 – 0.03 MGD)
Implementation Decade:	2020
Development Timeline:	2020
Project Capital Cost:	$16,735,000 (September, 2013)
Annual Cost:	$21,514,000
Unit Water Cost (Rounded):	$1,076 per ac-ft ($3.09 per 1,000 gallons)

PROJECT DESCRIPTION

This strategy is a recommended strategy for Steam Electric Power users in Cherokee County and involves a contract between individual steam electric power water users and the Angelina Neches River Authority for raw water from the Angelina River as their permit allows. The cost for supply from the Angelina River includes the cost of raw water and infrastructure related to water conveyance. Ultimately, the cost for raw water will need to be negotiated with the Angelina Neches River Authority and will reflect the wholesale water rates of this entity at the time a contract is made. The cost estimate included in this technical memorandum utilizes an assumed rate for the East Texas Regional Water Planning Area regional rate for raw surface water. There is no identified need for steam electric power user in the Cherokee Count of ETRWPA. However, few prospective steam electric power users have expressed interest in securing water supply and communicated with Angelina Neches River Authority for a potential connection. The purpose of this strategy is to discuss the water management strategy to meet that prospective need.

SUPPLY DEVELOPMENT

The quantity of supply from this strategy represents the need to meet the potential interest expressed by the steam electric power users in Cherokee County by the East Texas Regional Water Planning Group. The reliability of this water supply is considered medium due to the availability of water projected in the Angelina River using the Texas Water Development Board's Water Availability Models. However, this strategy is dependent on sales with the Angelina Neches River Authority and their application for 30,000 ac-ft per year from the Angelina River (Strategy ID: ANGL-ROR). The quantity of supply from this strategy represents a contract of 8,000 ac-ft per year, beginning in 2020, and increases to 20,000 ac-ft per year, beginning in 2070.

ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. In addition, a contract between steam electric power water users in Cherokee County and the Angelina Neches River Authority should have a minimum impact to environmental water needs, no impact to the surrounding habitat, and a low impact to cultural resources in the area. There are no bays or estuaries in

close proximity Cherokee County.

PERMITTING AND DEVELOPMENT

There are no permitting or development issues associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assumed 7 miles of pipeline (the approximate distance from the Angelina River to the center of Cherokee County), a pump station with an intake, and one terminal storage tank with 3.35 MG of storage. The annual cost was estimated using the East Texas Regional Water Planning Area regional rate for raw surface water. Overall, this strategy has a medium to high cost compared to other strategies in the 2016 East Texas Regional Water Plan due to the length of pipeline required.

WUG NAME:	**Cherokee Steam Electric Power**					
STRATEGY:	**Purchase from ANRA (Angelina River)**					
Quantity:	**20,000** AF/Y			17.84 MGD		
CAPITAL COSTS						
Pipeline	**Size**	**Quantity**	**Unit**		**Unit Price**	**Cost**
Pipeline Rural	40 in.	36,960	LF		$194	$7,153,000
Right of Way Easements Rural (ROW)		36,960	LF		$26	$1,043,790
Subtotal of Pipeline	**7**	**miles**				**$10,342,790**
Pump Station(s)						
Pump with intake	1050 HP	1	LS		$3,251,948	$3,252,000
Booster Pump Station	0 HP	1	LS		$0	$0
Engineering and Contingencies (35%)						$1,138,020
Subtotal of Pump Station(s)						**$4,390,200**
Storage Tanks	3.35 MG	1	LS		$1,119,227	$1,119,227
Engineering and Contingencies (35%)						$391,729
Subtotal of Storage Tanks						**$1,510,956**
Permitting and Mitigation						$203,000
Construction Total						**$16,447,000**
Interest During Construction				6	Months	$288,000
TOTAL COST						**$16,735,000**
ANNUAL COSTS						
Debt Service (5.5% for 20 years)						$1,400,000
Operational Costs*						$20,114,000
Total Annual Costs						**$21,514,000**
UNIT COSTS (Until Amortized)						
Per Acre-Foot of treated water						$1,056
Per 1,000 Gallons						$3.30
UNIT COSTS (After Amortization)						
Per Acre-Foot						$1,006
Per 1,000 Gallons						$3.09

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

This strategy benefits steam electric power users in Cherokee County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. A contract to pull water from the Angelina River will reduce demands on other water supplies in Cherokee County and will have no other apparent impact on other State water resources. From a third party social and economic perspective, this voluntary redistribution of water will be beneficial because it provides water for economic growth.

Based on the analyses provided above, the Cherokee steam electric power recommended strategy to purchase water from the Angelina Neches River Authority was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	20,000 ac-ft per year
Reliability	4	Medium Reliable Supply
Cost	2	Moderate to High Cost
Environmental Factors	4	Low Impacts
Impact on Other State Water Resources	4	No known impacts to other projects.
Threat to Agricultural Resources/Rural Areas	4	Low to No Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low to No Impacts
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	3	Sponsor identified
Implementation Issues	4	No known risks

REFERENCES

Discussions with Angelina Neches River Authority.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR HENDERSON CHANDLER

Water User Group Name:	Henderson County – City of Chandler
Strategy Name:	Purchase from City of Tyler
Strategy ID:	HDSN-CHN
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	77– 312 ac-ft per year (Varies) (0.06– 0.3 MGD)
Implementation Decade:	2050
Development Timeline:	2050
Project Capital Cost:	$1,866,000 (September, 2013)
Annual Cost:	$302,000
Unit Water Cost (Rounded):	$863 per ac-ft ($2.65 per 1,000 gallons)

PROJECT DESCRIPTION

This strategy is a recommended strategy for City of Chandler in Henderson County and involves a contract between City of Chandler and the City of Tyler from Lake Palestine supplies. The cost for supply from the Lake Palestine includes the cost of raw water and infrastructure related to water conveyance. Ultimately, the cost for raw water will need to be negotiated with the the City of Tyler and will reflect the wholesale water rates of this entity at the time a contract is made. The cost estimate included in this technical memorandum utilizes an assumed rate for the East Texas Regional Water Planning Area regional rate for raw surface water.

SUPPLY DEVELOPMENT

The quantity of supply from this strategy represents the municipal need projected for City of Chandler in Henderson County by the East Texas Regional Water Planning Group. The reliability of this water supply is considered high due to the availability of water projected in the City of Tyler contracted portion of Lake Palestine using the Texas Water Development Board's Water Availability Models. However, this strategy is dependent on sales with the City of Tyler. The quantity of supply from this strategy represents a contract of 77 ac-ft per year, beginning in 2050, and increasing to 312 ac-ft per year by 2070.

ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. In addition, a contract between City of Chandler in Henderson County and the City of Tyler should have a minimum impact to environmental water needs, no impact to the surrounding habitat, and a low impact to cultural resources in the area. There are no bays or estuaries in close proximity Angelina County.

PERMITTING AND DEVELOPMENT

There are no permitting or development issues associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assumed 2 miles of pipeline (the approximate distance from the Lake Palestine to the center of Henderson County), a pump station with an intake, and one terminal storage tank with 0.1 MG of storage. The annual cost was estimated using the East Texas Regional Water Planning Area regional rate for raw surface water. Overall, this strategy has a medium to high cost compared to other strategies in the 2016 East Texas Regional Water Plan.

WUG	**Henderson - City of Chandler**					
WMS	**Purchase from City of Tyler**					
VOL	**350**	ac-ft per year	0.3 MGD			
CAPITAL COSTS		**Size**	**Quantity**	**Units**	**Unit Price**	**Cost**
Transmission Facilities						
Pipeline		8 in.	10,560	ft	$28	$298,554
Right of Way Easements			10,560	ft	$16	$181,500
Storage Tanks		0.10 MG	1	LS	$174,179	$174,179
Contingencies (30%, engineering done)						$150,529
Pipeline Subtotal		2	**miles**			**$804,761**
			MGD	HPW		
Pump Station			0.37	14	$695,964	$695,964
Contingencies (35%, engineering done)						$243,587
Pump Station Subtotal						**$939,551**
Environmental and Permitting						$78,000
Construction Total						**$1,822,000**
Interest During Construction				12	Months	$64,000
TOTAL CAPITAL COST						**$1,886,000**
ANNUAL COSTS						
Debt Service (5.5% for 20 years)						$158,000
Operational Costs*						$144,287
TOTAL ANNUAL COST						**$302,000**
UNIT COSTS (Until Amortized)						
Cost per acre-ft						$863
Cost per 1000 gallons						$2.65
UNIT COSTS (After Amortization)						
Cost per acre-ft						$411
Cost per 1000 gallons						$1.26

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

This strategy benefits municipal water users in Henderson County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. From a third party social and economic perspective, this voluntary redistribution of water will be beneficial because it provides water for economic growth.

Based on the analyses provided above, the City of Chandler recommended strategy to purchase water from the City of Tyler was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	350 ac-ft per year
Reliability	4	Reliable Supply
Cost	3	Medium Cost
Environmental Factors	4	Low Impacts
Impact on Other State Water Resources	4	No known impacts to other projects.
Threat to Agricultural Resources/Rural Areas	4	Low to No Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low to No Impacts
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	3	Local Sponsorship by City of Chandler
Implementation Issues	4	No known risks

REFERENCES

Discussions with Regional Water Planning Group and City of Tyler.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR HOUSTON IRRIGATION

Water User Group Name:	Houston Irrigation
Strategy Name:	New wells in Yegua-Jackson Aquifer
Strategy ID:	HOUS-IRR
Strategy Type:	New Groundwater Source
Potential Supply Quantity:	2,340 ac-ft per year (2.16 MGD)
Implementation Decade:	2020
Development Timeline:	2020
Project Capital Cost:	$12,926,000 (September, 2013)
Annual Cost:	$1,647,000
Unit Water Cost (Rounded):	$704 per ac-ft ($2.16 per 1,000 gallons)

PROJECT DESCRIPTION

This strategy is a recommended strategy for Irrigation in Houston County and involves the development of six wells located within the Yegua-Jackson Aquifer as this aquifer has been identified as a potential source of water in Houston County. These wells will provide approximately 2,420 ac-ft per year and are assumed to have a water depth of 300 feet. A peaking factor of two was assumed for the wells, and the cost estimate includes conveyance infrastructure in order to capture the peak annual supply.

SUPPLY DEVELOPMENT

It is assumed that each well will provide 500 ac-ft per year to meet irrigation demands in Houston County providing a total strategy yield of 2,420 ac-ft per year for every decade in the planning period (2020-2070). A target yield for this strategy was set to the highest need projected by the East Texas Regional Water Planning Group; the highest need occurs in 2070. Overall, the reliability of this supply is considered high, based on the proven use of this source and groundwater availability models.

ENVIRONMENTAL CONSIDERATIONS

The environmental impacts from this strategy are expected to be low. However, groundwater development from this source should be evaluated for potential impacts on spring flows and base flows of surface water in close proximity. The impact to the environment due to pipeline construction is expected to be temporary and minimal. New wells have a potential decrease in the groundwater-surface water nexus, which could reduce base flows. Impacts to environmental water needs, habitat, and cultural resources are expected to be low. There are no bays or estuaries in close proximity of Houston County.

PERMITTING AND DEVELOPMENT

There are no permitting or development issues associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assumed 3 miles of pipeline, 20 wells, a peaking factor of two, and a maximum well yield of 150 gpm for each well. This equates to $704 per acre-foot ($2.16 per 1,000 gallons); after the infrastructure is fully paid (30 years), the cost drops to $241 per acre-foot ($0.74 per 1,000 gallons). Overall, this strategy has a low cost compared to other strategies in the 2016 East Texas Regional Water Plan.

WUG: Houston County Irrigation
WMS: Houston County, Yegua-Jackson Aquifer

Supply	2,340	Ac-ft/yr	1,451 gpm
Depth to Water	300		
Well Depth	820		
Well Size	12	in	
Wells Needed	20		

Construction Costs	Number	Unit Cost	Total Cost
Water Wells	20	$191,607	$3,832,146
Connection to Transmission System	20	$50,000	$1,000,000
Engineering and Contingencies (30% for pipelines, 35% for other items)			$1,641,000
Subtotal of Well(s)			**$6,473,146**

Transmission System	Size	Quantity	Unit	Unit Cost	Total Cost
Pipeline - Rural	18 in.	15,840	LF	$69	$1,088,000
Pump Station	327 HP	1	EA	$2,716,000	$2,716,000
Ground Storage Tank	0.52 MG	1	EA	$385,028	$385,028
Easement - Rural		15,840	LF	$16	$ 272,250
Engineering and Contingencies (30% for pipelines, 35% for other items)					$1,412,000
Subtotal for Transmission		**3**	**miles**		**5,873,278**

Permitting and Mitigation			$143,000
Construction Total			**$12,489,000**
Interest During Construction	12	Months	$437,000
TOTAL CAPITAL COST			**$12,926,000**

Debt Service (5.5% for 20 years)	$1,082,000
Operational Costs*	$564,700
Total Annual Cost	**$1,647,000**

UNIT COSTS (Until Amortized)	
Cost per ac-ft	$704
Cost per 1000 gallons	$2.16

UNIT COSTS (After Amortization)	
Cost per ac-ft	$241
Cost per 1000 gallons	$0.74

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

This strategy benefits irrigation users in Houston County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. New wells in the county will reduce demands on other water supplies in Houston County and will have no other apparent impact on other State water resources. From a third party social and economic perspective, this voluntary redistribution of water will be beneficial because it provides water for economic growth.

Based on the analyses provided above, the recommended strategy to drill new wells in Houston County for irrigation use was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	2,340 ac-ft per year
Reliability	4	Reliable Supply
Cost	3	Medium Cost
Environmental Factors	4	Low to Medium Impacts
Impact on Other State Water Resources	4	No Known Impacts.
Threat to Agricultural Resources/Rural Areas	5	No Impacts to Rural Areas. Positively benefits Agricultural Resources.
Interbasin Transfers		No
Other Natural Resources	4	Low to No Impacts
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	1	Local Sponsorship unknown
Implementation Issues	4	No known risks

REFERENCES

2011 East Texas Regional Water Plan.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR JASPER MANUFACTURING

Water User Group Name:	Jasper Manufacturing
Strategy Name:	Purchase from Lower Neches Valley Authority (Sam Rayburn)
Strategy ID:	JASP-MFG
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	3,046 – 8,420 ac-ft per year (2.7 – 7.5 MGD)
Implementation Decade:	2030
Development Timeline:	2030
Project Capital Cost:	$33,497,000 (September 2013)
Annual Cost:	$6,059,000
Unit Water Cost (Rounded):	$720 per ac-ft ($2.21 per 1,000 gallons)

PROJECT DESCRIPTION

This strategy is a recommended strategy for Manufacturing in Jasper County and involves a contract between individual manufacturing water users and the Lower Neches Valley Authority for raw water from Sam Rayburn as their permit allows. The cost for supply from Sam Rayburn includes the cost of raw water and infrastructure related to water conveyance. Ultimately, the cost for raw water will need to be negotiated with the Lower Neches Valley Authority and will reflect the wholesale water rates of this entity at the time a contract is made. The cost estimate included in this technical memorandum utilizes an assumed rate for the East Texas Regional Water Planning Area regional rate for raw surface water.

SUPPLY DEVELOPMENT

The quantity of supply from this strategy represents the highest manufacturing need projected in Jasper County by the East Texas Regional Planning Group during the planning period (2020-2070). The reliability of this water supply is considered high due to the availability of water projected in Sam Rayburn using the Texas Water Development Board's Water Availability Models. In addition, this strategy is not dependent on any other water management strategies in the 2016 East Texas Regional Water Plan. The quantity of supply from this strategy represents a contract of 3,046 ac-ft per year, beginning in 2030, and increases to 8,420 ac-ft per year, beginning in 2070.

ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. In addition, a contract between manufacturing water users in Jasper County and the Lower Neches Valley Authority should have a minimum impact to environmental water needs, no impact to the surrounding habitat, and a low impact to cultural resources in the area. There are no bays or estuaries in close proximity Jasper County.

PERMITTING AND DEVELOPMENT

There are no permitting or development issues associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assumed 22 miles of pipeline (the approximate distance from Sam Rayburn to the center of Jasper County), a pump station with an intake, a booster pump station, and one terminal storage tank with one day of storage. The annual cost was estimated using the East Texas Regional Water Planning Area regional rate for raw surface water. Overall, this strategy has a medium cost compared to other strategies in the 2016 East Texas Regional Water Plan due to the length of pipeline required.

WUG NAME:	**Jasper Manufacturing**					
STRATEGY:	**Purchase from Lower Neches Valley Authority (Sam Rayburn)**					
Raw Water Quantity:	**8,420** AF/Y			7.51 MGD		
CAPITAL COSTS						
Pipeline	**Size**	**Quantity**	**Unit**		**Unit Price**	**Cost**
Pipeline Rural	30 in.	116,160	LF		$137	$15,951,000
Pipeline Urban	30 in.	0	LF		$192	$0
Right of Way Easements Rural (ROW)		116,160	LF		$26	$3,280,530
Right of Way Easements Urban (ROW)		0.0	LF			$0
Engineering and Contingencies (30%)						$4,785,000
Subtotal of Pipeline	**22**	**miles**				**$24,016,530**
Pump Station(s)						
Pump with intake	356 HP	1	LS		$2,105,000	$2,105,000
Booster Pump Station	356 HP	1	LS		$2,863,000	$2,863,000
Engineering and Contingencies (35%)						$1,738,800
Subtotal of Pump Station(s)						**$6,706,800**
Storage Tanks	1.9 MG	1	LS		$772,596	$772,596
Engineering and Contingencies (35%)						$270,409
Subtotal of Storage Tanks						**$1,043,005**
Permitting and Mitigation						$598,000
Construction Total						**$32,364,000**
Interest During Construction				12	Months	$1,133,000
TOTAL CAPITAL COST						**$33,497,000**
Debt Service (5.5% for 20 years)						$2,803,000
Electricity ($0.09 kWh)						$209,000
Operational Costs*						$3,256,000
Total Annual Costs						**$6,059,000**
UNIT COSTS (Until Amortized)						
Per Acre-Foot of treated water						$720
Per 1,000 Gallons						$2.21
UNIT COSTS (After Amortization)						
Per Acre-Foot						$387
Per 1,000 Gallons						$1.19

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

This strategy benefits manufacturing users in Jasper County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. A contract to pull water from Sam Rayburn will reduce demands on other water supplies in Jasper County and will have no other apparent impact on other State water resources. From a third party social and economic perspective, this voluntary redistribution of water will be beneficial because it provides water for economic growth.

Based on the analyses provided above, the Jasper Manufacturing recommended strategy to purchase water from the Lower Neches Valley Authority was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	8,420 ac-ft per year
Reliability	4	Reliable Supply
Cost	3	Medium Cost
Environmental Factors	4	Low to Medium Impacts
Impact on Other State Water Resources	4	No Known Impacts.
Threat to Agricultural Resources/Rural Areas	4	Low to No Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low to No Impacts
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	1	Local Sponsorship unknown
Implementation Issues	4	No known risks

REFERENCES

2011 East Texas Regional Water Plan.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR JEFFERSON COUNTY-OTHER

Water User Group Name:	Jefferson County-Other
Strategy Name:	Purchase from Lower Neches Valley Authority (Sam Rayburn)
Strategy ID:	JEFF-CTR
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	797 – 3,413 ac-ft per year (0.7 – 3.0 MGD)
Implementation Decade:	2050
Development Timeline:	2050
Project Capital Cost:	$14,236,000 (September, 2013)
Annual Cost:	$2,521,000
Unit Water Cost (Rounded):	$739 per ac-ft ($2.27 per 1,000 gallons)

PROJECT DESCRIPTION

This strategy is a recommended strategy for County-Other in Jefferson County and involves a contract between individual municipal water users and the Lower Neches Valley Authority for raw water from Sam Rayburn, as their permit allows. The cost for supply from Sam Rayburn includes the contractual cost of raw water and infrastructure related to water conveyance. Ultimately, the cost for raw water will need to be negotiated with the Lower Neches Valley Authority and will reflect the wholesale water rates of this entity at the time a contract is made. The cost estimate included in this technical memorandum utilizes an assumed rate for the East Texas Regional Water Planning Area regional rate for raw surface water.

SUPPLY DEVELOPMENT

The quantity of supply from this strategy represents the water need projected for County-Other in Jefferson County by the East Texas Regional Planning Group during the planning period (2020-2070). The quantity of supply from this strategy represents a contract of 797 ac-ft per year, beginning in 2050, and increases over time to 3,413 ac-ft per year, beginning in 2070. The reliability of this water supply is considered high due to the availability of water projected in Sam Rayburn using the Texas Water Development Board's Water Availability Models. However, this strategy is dependent on coordination with the Lower Neches Valley Authority. This strategy is not dependent on any other water management strategies in the 2016 East Texas Regional Water Plan.

ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. In addition, a contract between municipal water users in Jefferson County, categorized by the Texas Water Development Board as County-Other, and the Lower Neches Valley Authority should have a minimal impact to environmental water needs, no impact to the surrounding habitat, and a low impact to cultural resources in the area. This analysis was performed assuming that a project site would be chosen that had minimal impact to bays or

estuaries in Jefferson County.

PERMITTING AND DEVELOPMENT

There are no permitting or development issues associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assumed 12 miles of pipeline (25% of the approximate distance across Jefferson County), a pump station with an intake, a booster pump station, and one terminal storage tank with one day of storage. The annual cost was estimated using the East Texas Regional Water Planning Area regional rate for raw surface water. Overall, this strategy has a medium to low cost compared to other strategies in the 2016 East Texas Regional Water Plan due to the length of pipeline required.

WUG NAME:	**Jefferson County-Other**				
STRATEGY:	**Purchase from Lower Neches Valley Authority**				
Raw Water Quantity:	**3,413** AF/Y			4.6 MGD	
CAPITAL COSTS					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	20 in.	63,360	LF	$81	$5,118,000
Pipeline Urban	20 in.	0	LF	$112	$0
Right of Way Easements Rural (ROW)		63,360	LF	$26	$1,789,370
Engineering and Contingencies (30%)					$1,535,000
Pump Station(s)					
Pump with intake	120 HP	1	LS	$1,000,000	$1,000,000
Booster Pump Station	120 HP	1	LS	$1,651,000	$1,651,000
Engineering and Contingencies (35%)					$927,850
Subtotal of Pump Station(s)					**$3,578,850**
Storage Tanks	3.0 MG	1	LS	$1,040,950	$1,040,950
Engineering and Contingencies (35%)					$364,332
Subtotal of Storage Tanks					**$1,405,282**
Permitting and Mitigation					$328,000
CONSTRUCTION TOTAL					**$13,754,502**
Interest During Construction			12	Months	$481,000
TOTAL CAPITAL COST					**$14,236,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$1,191,000
Operational Costs*					$1,330,000
Total Annual Costs					**$2,521,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$739
Per 1,000 Gallons					$2.27
UNIT COSTS (After Amortization)					
Per Acre-Foot					$390
Per 1,000 Gallons					$1.20

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

This strategy benefits municipal users in Jefferson County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. A contract to pull water from Sam Rayburn will reduce demands on other water supplies in Jefferson County and will have no other apparent impact on other State water resources.

Based on the analyses provided above, the Jefferson County-Other recommended strategy to purchase water from the Lower Neches Valley Authority was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	3,413 ac-ft per year
Reliability	4	Reliable Supply
Cost	3	Medium Cost
Environmental Factors	4	Low Impacts
Impact on Other State Water Resources	4	No Known Impacts.
Threat to Agricultural Resources/Rural Areas	4	Low to No Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low to No Impacts
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	1	Local Sponsorship unknown
Implementation Issues	4	No known risks

REFERENCES

2011 East Texas Regional Water Plan.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR JEFFERSON MANUFACTURING

Water User Group Name:	Jefferson Manufacturing
Strategy Name:	Purchase from Lower Neches Valley Authority (Sam Rayburn)
Strategy ID:	JEFF-MFG
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	181,181 – 309,322 ac-ft per year (162 – 276 MGD)
Implementation Decade:	2020
Development Timeline:	2020
Project Capital Cost:	$312,255,000
Annual Cost:	$139,694,000
Unit Water Cost (Rounded):	$452 per ac-ft ($1.39 per 1,000 gallons)

PROJECT DESCRIPTION

This strategy is a recommended strategy for Manufacturing in Jefferson County and involves a contract between individual manufacturers and the Lower Neches Valley Authority for raw water from their Sam Rayburn system, as their permit allows. The Lower Neches Valley Authority currently supplies water to manufacturing water users in Jefferson County. Therefore, the only cost for additional supply from is the contractual cost of raw water. Ultimately, this cost will need to be negotiated with the Lower Neches Valley Authority and will reflect their wholesale water rates at that time. The cost estimate included in this technical memorandum utilizes an assumed rate for the East Texas Regional Water Planning Area regional rate for raw surface water.

SUPPLY DEVELOPMENT

The Lower Neches Valley Authority is projected to supply Jefferson Manufacturing with over 230,000 ac-ft per year beginning in 2020; this supplies increases through 2070. The strategy recommended for Jefferson Manufacturing is equal to the need projected for this entity during the planning period (2020-2070). The contract required for this strategy increases their supply by 181,181 ac-ft per year beginning in 2020 and increases over time to 309,322 ac-ft per year beginning in 2070. These supplies are considered highly reliable; however, the supply is dependent on coordination with the Lower Neches Valley Authority.

ENVIRONMENTAL CONSIDERATIONS

There are not any significant environmental considerations associated with this strategy. A contract between manufacturers in Jefferson County and the Lower Neches Valley Authority should have a minimum impact to environmental water needs, no impact to the surrounding habitat, and a low impact to cultural resources in the area. Since this strategy does not include any new construction, there is no impact expected to bays or estuaries located in Jefferson County.

PERMITTING AND DEVELOPMENT

There are no permitting or development issues associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. A regional rate for raw surface water was used for the purchase costs. Overall, this strategy has a low unit cost compared to other strategies in the 2016 East Texas Regional Water Plan.

WUG NAME:	**Jefferson Manufacturing**				
STRATEGY:	**Purchase from Lower Neches Valley Authority (Sam Rayburn)**				
Raw Water Quantity:	**309,322** AF/Y			414 MGD	
CAPITAL COSTS					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	102 in.	89,760	2	$867	$155,706,000
Pipeline Urban	102 in.	0	LF	$1,215	$0
Right of Way Easements Rural (ROW)		89,760	2	$26	$2,534,950
Right of Way Easements Urban (ROW)		0	0	$0	$0
Subtotal of Pipeline	**17**	**miles**			**$204,952,950**
Pump Station(s)					
Pump with intake	17737 HP	1	LS	$22,175,000	$22,175,000
Booster Pump Station	17737 HP	1	LS	$26,293,000	$26,293,000
Engineering and Contingencies (35%)					$16,963,800
Subtotal of Pump Station(s)					**$65,431,800**
Storage Tanks	8.6 MG	6	LS	$2,588,768	$15,532,607
Engineering and Contingencies (35%)					$5,436,412
Subtotal of Storage Tanks					**$20,969,019**
Permitting and Mitigation					$473,000
CONSTRUCTION TOTAL					**$291,827,000**
Interest During Construction			24	Months	$20,428,000
TOTAL CAPITAL COST					**$312,255,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$26,129,000
Operational Costs*					$113,565,060
Total Annual Costs					**$139,694,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$452
Per 1,000 Gallons					$1.39
UNIT COSTS (After Amortization)					
Per Acre-Foot					$398
Per 1,000 Gallons					$1.22

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

This strategy benefits manufacturers in Jefferson County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. A contract to pull water from the Lower Neches Valley Authority's Sam Rayburn system will reduce demands on other water supplies in Angelina County and will have no other apparent impact on other State water resources. From a third party social and economic perspective, this voluntary redistribution of water will be beneficial because it provides water for economic growth.

Based on the analyses provided above, the Jefferson Manufacturing recommended strategy to purchase water from the Lower Neches Valley Authority was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	309,322 ac-ft per year
Reliability	4	Reliable Supply
Cost	4	Low Cost
Environmental Factors	4	Low Impacts
Impact on Other State Water Resources	4	No Known Impacts.
Threat to Agricultural Resources/Rural Areas	4	Low to No Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low to No Impacts
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	1	Local Sponsorship unknown
Implementation Issues	4	No known risks

REFERENCES

2011 East Texas Regional Water Plan.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR JEFFERSON STEAM ELECTRIC POWER

Water User Group Name:	Jefferson Steam Electric Power
Strategy Name:	Purchase from Lower Neches Valley Authority (Sam Rayburn)
Strategy ID:	JEFF-SEP
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	13,426 – 30,839 ac-ft per year (12.0 – 27.5 MGD)
Implementation Decade:	2020
Development Timeline:	2020
Project Capital Cost:	$54,518,000 (September)
Annual Cost:	$15,645,000
Unit Water Cost (Rounded):	$507 per ac-ft ($1.56 per 1,000 gallons)

PROJECT DESCRIPTION

This strategy is a recommended strategy for Steam Electric Power in Jefferson County and involves a contract between individual steam electric power water users and the Lower Neches Valley Authority for raw water from their Sam Rayburn system, as their permit allows. The cost for supply from Sam Rayburn includes the contractual cost of raw water and infrastructure related to water conveyance. Ultimately, the cost for raw water will need to be negotiated with the Lower Neches Valley Authority and will reflect the wholesale water rates of this entity at the time a contract is made. The cost estimate included in this technical memorandum utilizes an assumed rate for the East Texas Regional Water Planning Area regional rate for raw surface water.

SUPPLY DEVELOPMENT

The quantity of supply from this strategy represents the water need projected for Steam Electric Power in Jefferson County by the East Texas Regional Planning Group during the planning period (2020-2070). The quantity of supply from this strategy represents a contract of 13,426 ac-ft per year, beginning in 2020, and increases over time to 30,839 ac-ft per year, beginning in 2070. The reliability of this water supply is considered high due to the availability of water projected in Sam Rayburn using the Texas Water Development Board's Water Availability Models. However, this strategy is dependent on coordination with the Lower Neches Valley Authority. This strategy is not dependent on any other water management strategies in the 2016 East Texas Regional Water Plan.

ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. In addition, a contract between steam electric power water users in Jefferson County and the Lower Neches Valley Authority should have a minimal impact to environmental water needs, no impact to the surrounding habitat, and a low impact to cultural resources in the area. This analysis was performed assuming that a project site would be chosen that had minimal impact to bays or estuaries in Jefferson County.

PERMITTING AND DEVELOPMENT

There are no permitting or development issues associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assumed 17 miles of pipeline (25% of the approximate distance across Jefferson County), a pump station with an intake, and a booster pump station. The annual cost was estimated using the East Texas Regional Water Planning Area regional rate for raw surface water. Overall, this strategy has a medium to low cost compared to other strategies in the 2016 East Texas Regional Water Plan due to the length of pipeline required.

WUG NAME:	**Jefferson Steam Electric Power**				
STRATEGY:	**Purchase from Lower Neches Valley Authority**				
				41.27	
Raw Water Quantity:	**30,839**	AF/Y		MGD	
CAPITAL COSTS					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	60 in.	89,760	LF	$307	$27,552,000
Right of Way Easements Rural (ROW)		89,760	LF	$26	$2,534,950
Engineering and Contingencies (30%)					$8,266,000
Subtotal of Pipeline	**17**	**miles**			**$38,352,950**
Pump Station(s)					
Pump with intake	733 HP	1	LS	$2,666,000	$2,666,000
Booster Pump Station	733 HP	1	LS	$4,806,000	$4,806,000
Engineering and Contingencies (35%)					$2,615,200
Subtotal of Pump Station(s)					**$10,087,200**
Storage Tanks	5.2 MG	1	LS	$1,509,159	$1,509,159
Engineering and Contingencies (35%)					$528,206
Subtotal of Storage Tanks					**$2,037,365**
Permitting and Mitigation					$473,000
Construction Total					**$50,951,000**
Interest During Construction			24	Months	$3,567,000
TOTAL CAPITAL COST					**$54,518,000**
Debt Service (5.5% for 20 years)					$4,562,000
Operational Costs*					$11,083,000
Total Annual Costs					**$15,645,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$507
Per 1,000 Gallons					$1.56
UNIT COSTS (After Amortization)					
Per Acre-Foot					$377
Per 1,000 Gallons					$1.16

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

This strategy benefits municipal users in Jefferson County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. A contract to pull water from Sam Rayburn will reduce demands on other water supplies in Jefferson County and will have no other apparent impact on other State water resources.

Based on the analyses provided above, the Jefferson County-Other recommended strategy to purchase water from the Lower Neches Valley Authority was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	30,839 ac-ft per year
Reliability	4	Reliable Supply
Cost	4	Low Cost
Environmental Factors	4	Low Impacts
Impact on Other State Water Resources	4	No Known Impacts.
Threat to Agricultural Resources/Rural Areas	4	Low to No Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low to No Impacts
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	1	Local Sponsorship unknown
Implementation Issues	4	No known risks

REFERENCES

2011 East Texas Regional Water Plan.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR NACOGDOCHES LAKE NACONICHE

Water User Group Name:	Nacogdoches County Multiple Water Users
Strategy Name:	Lake Naconiche Regional Water System
Strategy ID:	NACN-LK
Strategy Type:	New Surface Water Source
Potential Supply Quantity:	1,700 ac-ft per year (1.5 MGD)
Implementation Decade:	2030
Development Timeline:	2030
Project Capital Cost:	$34,492,000 (September, 2013)
Annual Cost:	$5,273,000
Unit Water Cost (Rounded):	$3,102 per ac-ft ($9.52 per 1,000 gallons)

PROJECT DESCRIPTION

Lake Naconiche has recently been completed. This lake was built by NRCS for flood storage and recreation, but there are plans to develop water supply from the lake for rural communities. A study was completed in 1992 that evaluated a potential regional water system using water from Lake Naconiche. To provide water to Nacogdoches County-Other users and several rural WSCs, it is recommended to develop this source for water supply. A brief description of the proposed strategy is presented below.

SUPPLY DEVELOPMENT

Lake Naconiche is located in northeast Nacogdoches County on Naconiche Creek. It is permitted to store 9,072 ac-ft of water. To use water from Lake Naconiche for water supply, the County must seek a permit amendment for diversions for municipal use. According to the Neches WAM, the firm yield of the lake would be approximately 3,239 ac-ft per year. It is assumed that the regional water system would serve County-Other entities in Nacogdoches County (including Caro WSC, Lilbert-Looneyville, Libby and others), Appleby WSC, Lily Grove WSC and Swift WSC. At this time the primary sponsor of the system has not been confirmed. It could possibly be one of the entities served or a new water provider dedicated to the operation of this system.

The project is initially sized for 3 MGD peak capacity. This includes a lake intake, new water treatment plant located near Lake Naconiche, pump station and a distribution system of pipelines in the northeast part of the county. Overall unit costs are estimated at $9.52 per 1,000 gallons during amortization. After amortization, costs will decrease to $4.31 per 1,000 gallons. The costs for each participant are based on the unit cost of water for the strategy and capital costs are proportioned by strategy amounts. Actual costs would be negotiated by each user.

ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. The project should have a minimum impact to environmental water needs, no impact to the surrounding habitat, and a low impact to cultural resources in the area. There are no bays or estuaries in Nacogdoches County.

PERMITTING AND DEVELOPMENT

The water right permit for Lake Naconiche has to be changed from recreational use to multi-purpose use.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assumed 28 miles of pipeline (serving all the potential customers for this source of supply), a pump station with an intake, a booster pump station, a 3 MGD treatment plant, and one terminal storage tank with 0.38 MG of storage. The annual cost was estimated using the East Texas Regional Water Planning Area regional rate for raw surface water. Overall, this strategy has moderate to high cost compared to other strategies in the 2016 East Texas Regional Water Plan.

WUG	**Nacogdoches County-Other**				
WMS	**Lake Naconiche Regional Water System - Phase 1**				
AMOUNT (ac-ft per year):	**1,700**	1.5 MGD	3.0 MGD		
CAPITAL COSTS	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline					
Right of Way Easements Rural (ROW)		147,840	LF	$26	$4,175,270
Engineering and Contingencies (30%)					$1,612,000
Subtotal of Pipeline					**$11,159,270**
Pump Station(s)					
Pump Station	188 HP	1	LS	$1,997,000	$1,997,000
Lake Intake	188 HP	1	LS	$1,561,000	$500,000
Engineering and Contingencies (35%)					$874,000
Subtotal of Pump Station(s)					**$3,371,000**
Storage Tanks	0.38 MG	1	LS	$314,000	**$314,000**
Engineering and Contingencies (35%)					$110,000
Subtotal of Storage Tanks					**$424,000**
Water Treatment Plant					
Water Treatment Plant	3.0 MGD	1	LS	$11,896,000	**$11,896,000**
Engineering and Contingencies (35%)					$4,164,000
Subtotal of Pump Station(s)					**$16,060,000**
Permitting and Mitigation - infrastructure					$754,066
Construction Total					**$31,768,000**
Water rights Permitting					$500,000
Interest During Construction			24	Months	$2,224,000
TOTAL COST					**$34,492,000**
ANNUAL COSTS					
Operational Costs*					$2,387,000
Total Annual Costs					**$5,273,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$3,102
Per 1,000 Gallons					$9.52
UNIT COSTS (After Amortization)					
Per Acre-Foot					$1,431
Per 1,000 Gallons					$4.39

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

This strategy benefits multiple municipal users in Nacogdoches County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. Using supplies from this source will reduce demands on other water supplies in Nacogdoches County and will have no other apparent impact on other State water resources. From a third party social and economic perspective, this voluntary redistribution of water will be beneficial because it provides water for economic growth.

Based on the analyses provided above, the Lake Naconiche Regional System is identified as a recommended strategy for Nacogdoches County and it was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	1,700 ac-ft per year
Reliability	4	Reliable Supply
Cost	2	Medium to Moderate High Cost
Environmental Factors	4	Low to Medium Impacts
Impact on Other State Water Resources	4	Low Impacts.
Threat to Agricultural Resources/Rural Areas	4	Low to No Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low to No Impacts
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	4	Sponsor identified and committed.
Implementation Issues	4	No known risks

REFERENCES

2011 East Texas Regional Plan.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR NACOGDOCHES D&M WSC

Water User Group Name:	Nacogdoches County D&M WSC
Strategy Name:	New wells in Carrizo-Wilcox Aquifer
Strategy ID:	NACW-DMW
Strategy Type:	New Groundwater Source
Potential Supply Quantity:	250 ac-ft per year (0.22 MGD)
Implementation Decade:	2060
Development Timeline:	2060
Project Capital Cost:	$3,484,000 (September 2013)
Annual Cost:	$384,000
Unit Water Cost (Rounded):	$1,536 per ac-ft ($4.71 per 1,000 gallons)

PROJECT DESCRIPTION

D&M WSC is a municipal water user in Nacogdoches County. This water user currently relies on groundwater in the Carrizo Wilcox aquifer in Nacogdoches County. D&M WSC has a small need starting in 2060 and the maximum need is approximately 234 ac-ft per year. To meet this need, it is recommended that D&M WSC continue to use supplies from Carrizo Wilcox by drilling additional wells. This strategy is a recommended strategy for D&M WSC in Nacogdoches County and involves the development of two wells located within the Carrizo-Wilcox Aquifer as this aquifer has been identified as a potential source of water in Nacogdoches County. These wells will provide approximately 400 ac-ft per year and are assumed to have a water depth of 600 feet. A peaking factor of two was assumed for the wells, and the cost estimate includes conveyance infrastructure in order to capture the peak annual supply.

SUPPLY DEVELOPMENT

The supply is required only in the later part of the planning cycle, for decades 2060 and 2070. Currently, all of the existing needs are being met by supplies from the Carrizo Wilcox aquifer. There are sufficient supplies available in the Nacogdoches County Carrizo Wilcox to develop the supply needed for this water management strategy. It is assumed that each well will provide 200 ac-ft per year to meet D&M WSC's needs in Nacogdoches County providing a total yield required for the strategy. Overall, the reliability of this supply is considered high, based on the proven use of this source and groundwater availability models.

ENVIRONMENTAL CONSIDERATIONS

The environmental impacts from this strategy are expected to be low. However, groundwater development from this source should be evaluated for potential impacts on spring flows and base flows of surface water in close proximity. The impact to the environment due to pipeline construction is expected to be temporary and minimal. New wells have a potential decrease in the groundwater-surface water nexus, which could reduce base flows. Impacts to environmental water needs, habitat, and cultural resources are expected to be low. There are no bays or estuaries in close proximity of Nacogdoches County.

PERMITTING AND DEVELOPMENT

There are no permitting or development issues associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assumed four miles of pipeline, two wells, a peaking factor of two, and a maximum well yield of 250 gpm for each well. This equates to $1,538 per acre-foot ($4.72 per 1,000 gallons); after the infrastructure is fully paid (30 years), the cost drops to $370 per acre-foot ($1.14 per 1,000 gallons). Overall, this strategy has a moderate to high cost compared to other strategies in the 2016 East Texas Regional Water Plan.

WUG: Nacogdoches County D & M WSC
WMS: Nacogdoches County - Carrizo Aquifer Wells

Supply	250	Ac-ft/yr	(155 gpm)
Depth to Water	300		
Well Depth	600		
Well Size	12	in	
Wells Needed	2		

Construction Costs	Number	Unit Cost	Total Cost
Water Wells	2	$394,954	$789,908
Connection to Transmission System	2	$50,000	$100,000
Engineering and Contingencies (30% for pipelines, 35% for other items)			$306,000
Subtotal of Well(s)			**$1,195,908**

Transmission System	Size	Quantity	Unit	Unit Cost	Total Cost
Pipeline - Rural	6 in.	21,120	LF	$18	$384,000
Pump Station	49 HP	1	EA	$789,000	$789,000
Ground Storage Tank	0.06 MG	1	EA	$124,984	$124,984
Easement - Rural		21,120	LF	$16	$363,110
Engineering and Contingencies (30% for pipelines, 35% for other items)					$435,000
Subtotal for Transmission		**4**	**miles**		**2,096,094**

Permitting and Mitigation			$132,000
Construction Total			**$3,424,000**
Interest During Construction	6	Months	$60,000
TOTAL CAPITAL COST			**$3,484,000**

Debt Service (5.5% for 20 years)	$292,000
Operational Costs*	$92,400
Total Annual Cost	**$384,000**

UNIT COSTS (Until Amortized)	
Cost per ac-ft	$1,536
Cost per 1000 gallons	$4.71

UNIT COSTS (After Amortization)	
Cost per ac-ft	$370
Cost per 1000 gallons	$1.14

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

This strategy benefits municipal user D&M WSC in Nacogdoches County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. New wells in the county will reduce demands on other water supplies in Nacogdoches County and will have no other apparent impact on other State water resources. From a third party social and economic perspective, this voluntary redistribution of water will be beneficial because it provides water for economic growth.

Based on the analyses provided above, the recommended strategy to drill new wells in Nacogdoches County for D&M WSC's use was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	250 ac-ft per year
Reliability	4	Highly Reliable Supply
Cost	3	Moderate to High Cost
Environmental Factors	4	Low to No Impacts
Impact on Other State Water Resources	4	No known impacts to other projects.
Threat to Agricultural Resources/Rural Areas	4	Low to No Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low to No Impacts
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	2	Sponsor identified but uncommitted.
Implementation Issues	4	No known risks

REFERENCES

Discussions with Regional Water Planning Group.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR NACOGDOCHES LIVESTOCK

Water User Group Name:	Nacogdoches County Livestock
Strategy Name:	New wells in Carrizo-Wilcox Aquifer
Strategy ID:	NACW-LTK
Strategy Type:	New Groundwater Source
Potential Supply Quantity:	3,059 ac-ft per year (2.7 MGD)
Implementation Decade:	2020
Development Timeline:	2020
Project Capital Cost:	$23,770,000 (September 2013)
Annual Cost:	$2,766,000
Unit Water Cost (Rounded):	$904 per ac-ft ($2.77 per 1,000 gallons)

PROJECT DESCRIPTION

This strategy is a recommended strategy for livestock users in Nacogdoches County and involves the development of 22 wells located within the Carrizo-Wilcox Aquifer as this aquifer has been identified as a potential source of water in Nacogdoches County. These wells will provide approximately 3,000 ac-ft per year and are assumed to have a water depth of 300 feet. A peaking factor of two was assumed for the wells, and the cost estimate includes conveyance infrastructure in order to capture the peak annual supply.

SUPPLY DEVELOPMENT

The supply is required for all decades of the planning cycle to help meet the needs. Currently, local supply provides half of the supply for the livestock needs and the remainder is taken from the Carrizo Wilcox aquifer. There are sufficient supplies available in the Nacogdoches County Carrizo Wilcox to develop the supply needed for this water management strategy. It is assumed that each well will provide 200 ac-ft per year to meet livestock demands in Nacogdoches County providing a total yield required for the strategy. Overall, the reliability of this supply is considered high, based on the proven use of this source and groundwater availability models.

ENVIRONMENTAL CONSIDERATIONS

The environmental impacts from this strategy are expected to be low. However, groundwater development from this source should be evaluated for potential impacts on spring flows and base flows of surface water in close proximity. The impact to the environment due to pipeline construction is expected to be temporary and minimal. New wells have a potential decrease in the groundwater-surface water nexus, which could reduce base flows. Impacts to environmental water needs, habitat, and cultural resources are expected to be low. There are no bays or estuaries in close proximity of Nacogdoches County.

PERMITTING AND DEVELOPMENT

There are no permitting or development issues associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assumed 10 miles of pipeline, 22 wells, a peaking factor of two, and a maximum well yield of 250 gpm for each well. This equates to $904 per acre-foot ($2.77 per 1,000 gallons); after the infrastructure is fully paid (30 years), the cost drops to $254 per acre-foot ($0.78 per 1,000 gallons). Overall, this strategy has a medium cost compared to other strategies in the 2016 East Texas Regional Water Plan.

WUG: Nacogdoches County Livestock
WMS: Nacogdoches County - Carrizo Aquifer Wells

Supply	3,059	Ac-ft/yr	1,897	gpm
Depth to Water	300			
Well Depth	500			
Well Size	6	in		
Wells Needed	22			

Construction Costs	Number	Unit Cost	Total Cost
Water Wells	22	$365,789	$8,047,359
Connection to Transmission System	22	$50,000	$1,100,000
Engineering and Contingencies (30% for pipelines, 35% for other items)			$3,147,000
Subtotal of Well(s)			**$12,294,359**

Transmission System	Size	Quantity	Unit	Unit Cost	Total Cost
Pipeline - Rural	20 in.	52,800	LF	$81	$4,265,000
Pump Station	553 HP	1	EA	$2,423,000	$2,423,000
Ground Storage Tank	0.68 MG	1	EA	$463,432	$463,432
Easement - Rural		52,800	LF	$16	$907,720
Engineering and Contingencies (30% for pipelines, 35% for other items)					$2,290,000
Subtotal for Transmission		**10**	**miles**		**10,349,152**

Permitting and Mitigation			$322,000
Construction Total			**$22,966,000**
Interest During Construction	12	Months	$804,000
TOTAL CAPITAL COST			**$23,770,000**

Debt Service (5.5% for 20 years)	$1,989,000
Operational Costs*	$777,000
Total Annual Cost	**$2,766,000**

UNIT COSTS (Until Amortized)	
Cost per ac-ft	$904
Cost per 1000 gallons	$2.77

UNIT COSTS (After Amortization)	
Cost per ac-ft	$254
Cost per 1000 gallons	$0.78

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

This strategy benefits livestock users in Nacogdoches County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. New wells in the county will reduce demands on other water supplies in Nacogdoches County and will have no other apparent impact on other State water resources. From a third party social and economic perspective, this voluntary redistribution of water will be beneficial because it provides water for economic growth.

Based on the analyses provided above, the recommended strategy to drill new wells in Nacogdoches County for livestock use was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	3,059 ac-ft per year
Reliability	4	Highly Reliable Supply
Cost	3	Medium Cost
Environmental Factors	4	Low to No Impacts
Impact on Other State Water Resources	4	No known impacts to other projects.
Threat to Agricultural Resources/Rural Areas	4	Low to No Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low to No Impacts
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	1	Local Sponsorship unknown
Implementation Issues	4	No known risks

REFERENCES

2011 East Texas Regional Plan.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR NACOGDOCHES MINING

Water User Group Name:	Nacogdoches County Mining
Strategy Name:	Purchase from Angelina Neches River Authority (Angelina River)
Strategy ID:	NACW-MIN
Strategy Type:	New Surface Water Source
Potential Supply Quantity:	5,475– 118 ac-ft per year (Varies) (4.88 – 0.15 MGD)
Implementation Decade:	2020
Development Timeline:	2020
Project Capital Cost:	$12,465,000 (September, 2013)
Annual Cost:	$6,650,000
Unit Water Cost (Rounded):	$1,209 per ac-ft ($3.71 per 1,000 gallons)

PROJECT DESCRIPTION

Mining users in Nacogdoches County show a projected need in the early decades of the planning cycle. This strategy is a recommended strategy for Mining in Nacogdoches County and involves a contract between individual mining water users and the Angelina Neches River Authority for raw water from the Angelina River, as their permit allows. Potential mining customers in Nacogdoches County have reached out to Angelina Neches River Authority for a contract to sell water. It is assumed that the individual mining customers will develop the infrastructure required to access supplies from Angelina River to the project location. The cost for supply from the Angelina River includes the cost of raw water and infrastructure related to water conveyance. Ultimately, the cost for raw water will need to be negotiated with the Angelina Neches River Authority and will reflect the wholesale water rates of this entity at the time a contract is made. The cost estimate included in this technical memorandum utilizes an assumed rate for the East Texas Regional Water Planning Area regional rate for raw surface water.

SUPPLY DEVELOPMENT

The quantity of supply from this strategy represents the mining need projected in Nacogdoches County by the East Texas Regional Water Planning Group. Currently mining needs are met by local supplies in Nacogdoches County and groundwater supplies from other aquifers in the County. The recommended source of supply for the future mining needs will be the run-of-river supplies from Angelina River that Angelina Neches River Authority is applying for. The reliability of this water supply is considered medium due to the availability of water projected in the Angelina River using the Texas Water Development Board's Water Availability Models. However, this strategy is dependent on sales with the Angelina Neches River Authority and their application for 30,000 ac-ft per year from the Angelina River (Strategy ID: ANRA-ROR). The quantity of supply from this strategy represents a contract of 5,475 ac-ft per year, beginning in 2020 and decreases to 118 ac-ft per year by 2040.

ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. In addition, a contract between mining water users in Nacogdoches County and the Angelina Neches River Authority should have a minimum impact to environmental water needs, no impact to the surrounding habitat, and a low impact to cultural resources in the area. There are no bays or estuaries in Nacogdoches County.

PERMITTING AND DEVELOPMENT

There are no permitting or development issues associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assumed 9.5 miles of pipeline (approximate distance from the potential location for run-of-river diversions on Angelina River to the center of Nacogdoches County), a pump station with an intake and one terminal storage tank with 1.2 MG of storage. The annual cost was estimated using the East Texas Regional Water Planning Area regional rate for raw surface water. Overall, this strategy has a medium cost compared to other strategies in the 2016 East Texas Regional Water Plan due to the length of pipeline required.

WUG NAME:	**Nacogdoches County Mining**				
STRATEGY:	**Purchase from ANRA (Angelina ROR)**				
Raw Water Quantity:	**5,500** Ac-ft/yr			9.81 MGD	
CAPITAL COSTS					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	24 in.	50,160	LF	$103	$5,166,000
Pipeline Urban	24 in.	0	LF	$144	$0
Right of Way Easements Rural (ROW)		50,160	LF	$26	$1,416,580
Engineering and Contingencies (30%)					$1,550,000
Subtotal of Pipeline	**9.5**	**miles**			**$8,132,580**
Pump Station(s)					
Pump with intake	345 HP	1	LS	$2,056,000	$2,056,000
Booster Pump Station	0 HP	0	LS	$0	$0
Engineering and Contingencies (35%)					$719,600
Subtotal of Pump Station(s)					**$2,775,600**
Storage Tanks	1.2 MG	1	LS	$643,607	$643,607
Engineering and Contingencies (35%)					$225,262
Subtotal of Storage Tanks					**$868,869**
Permitting and Mitigation					$265,500
Construction Total					**$12,043,000**
Interest During Construction			12	Months	$422,000
TOTAL CAPITAL COST					**$12,465,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$1,043,000
Operational Costs*					$5,607,000
Total Annual Costs					**$6,650,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$1,209
Per 1,000 Gallons					$3.71
UNIT COSTS (After Amortization)					
Per Acre-Foot					$1,019
Per 1,000 Gallons					$3.13

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

This strategy benefits mining users in Nacogdoches County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. A contract to pull water from the Angelina River will reduce demands on other water supplies in Nacogdoches County and will have no other apparent impact on other State water resources. From a third party social and economic perspective, this voluntary redistribution of water will be beneficial because it provides water for economic growth.

Based on the analyses provided above, the Nacogdoches Mining recommended strategy to purchase water from the Angelina Neches River Authority was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	5,475 ac-ft per year
Reliability	3	Medium Reliable Supply
Cost	3	Medium Cost
Environmental Factors	4	Low to No Impacts
Impact on Other State Water Resources	4	No known impacts to other projects.
Threat to Agricultural Resources/Rural Areas	4	Low to No Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low to No Impacts
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	4	Sponsor identified and committed to the strategy
Implementation Issues	4	No known risks

REFERENCES

2011 East Texas Regional Water Plan.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR NACOGDOCHES STEAM ELECTRIC POWER

Water User Group Name:	Nacogdoches County Steam Electric Power
Strategy Name:	Purchase from Angelina Neches River Authority (Angelina River)
Strategy ID:	NACW-SEP1
Strategy Type:	New Surface Water Source
Potential Supply Quantity:	799– 8,594 ac-ft per year (Varies) (0.7– 7.6 MGD)
Implementation Decade:	2030
Development Timeline:	2030
Project Capital Cost:	$25,805,000 (September, 2013)
Annual Cost:	$5,264,000
Unit Water Cost (Rounded):	$619 per ac-ft ($1.9 per 1,000 gallons)

PROJECT DESCRIPTION

There is significant growth in the steam electric power water use in Nacogdoches County. Currently, the steam electric power needs in this County are being met by supplies from Lake Striker. Since the increase in demand is significant, starting at 799 ac-ft per year in 2030 and increasing to 8,594 ac-ft per year, multiple water management strategies are proposed to address this need. This strategy is a recommended strategy for steam electric power users in Nacogdoches County and involves a contract between individual steam electric power water users and the Angelina Neches River Authority for raw water from Angelina River, as their permit allows. It is assumed that the individual steam electric power customers will develop the infrastructure required to access supplies from Angelina River to the project location. The cost for supply from the Angelina River includes the cost of raw water and infrastructure related to water conveyance. Ultimately, the cost for raw water will need to be negotiated with the Angelina Neches River Authority and will reflect the wholesale water rates of this entity at the time a contract is made. The cost estimate included in this technical memorandum utilizes an assumed rate for the East Texas Regional Water Planning Area regional rate for raw surface water.

SUPPLY DEVELOPMENT

The quantity of supply from this strategy represents the steam electric power need projected in Nacogdoches County by the East Texas Regional Water Planning Group. Currently steam electric power needs are met by surface water supplies from Lake Striker. Lake Striker supplies are contracted out for the planning cycle and there are no additional supplies currently available to help meet the needs for steam electric power users in Nacogdoches County. The recommended source of supply for the future steam electric power needs will be the transmission system connection to Lake Columbia supply that Angelina Neches River Authority is developing. The reliability of this water supply is considered medium to high due to the availability of water projected for Lake Columbia using the Texas Water Development Board's Water Availability Models. However, this strategy is dependent on sales with the Angelina Neches River Authority and their plan for developing Lake Columbia supplies. The quantity of supply from this strategy represents a contract of 799 ac-ft per year, beginning in 2020 and increasing to a maximum amount of 8,500 ac-ft per year by 2070. The additional needs for steam electric power will be addressed by a second strategy discussed in another technical memorandum.

ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. In addition, a contract between steam electric power water users in Nacogdoches County and the Angelina Neches River Authority should have a minimum impact to environmental water needs, no impact to the surrounding habitat, and a low impact to cultural resources in the area. There are no bays or estuaries in Nacogdoches County.

PERMITTING AND DEVELOPMENT

There are no permitting or development issues associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assumed 9.5 miles of pipeline (approximate distance from the potential location for releases from Lake Columbia on Angelina River to the center of Nacogdoches County), a pump station with an intake, and one terminal storage tank with 0.9 MG of storage. The annual cost was estimated using the East Texas Regional Water Planning Area regional rate for raw surface water. Overall, this strategy has low to medium cost compared to other strategies in the 2016 East Texas Regional Water Plan.

WUG NAME:	**Nacogdoches County Steam Electric Power**				
STRATEGY:	**Purchase from ANRA**				
Raw Water Quantity:	**8,500** Ac-ft/yr			15.17 MGD	
CAPITAL COSTS					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	60 in.	50,160	LF	$307	$15,397,000
Pipeline Urban	60 in.	0	LF	$430	$0
Right of Way Easements Rural (ROW)		50,160	LF	$26	$1,416,580
Right of Way Easements Urban (ROW)		0.0	LF	$0	$0
Subtotal of Pipeline	**9.5**	**miles**			**$21,432,580**
Pump Station(s)					
Pump with intake	282 HP	1	LS	$1,802,000	$1,802,000
Booster Pump Station	0 HP	0	LS	$0	$0
Engineering and Contingencies (35%)					$630,700
Subtotal of Pump Station(s)					**$2,432,700**
Storage Tanks	0.9 MG	1	LS	$593,305	$593,305
Engineering and Contingencies (35%)					$207,657
Subtotal of Storage Tanks					**$800,962**
Permitting and Mitigation					$265,500
CONSTRUCTION TOTAL					**$24,931,742**
Interest During Construction			12	Months	$873,000
TOTAL CAPITAL COST					**$25,805,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$2,159,000
Operational Costs*					$3,105,000
Total Annual Costs					**$5,264,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$619
Per 1,000 Gallons					$1.90
UNIT COSTS (After Amortization)					

Per Acre-Foot	$365
Per 1,000 Gallons	$1.12

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

This strategy benefits mining users in Nacogdoches County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. A contract to pull water from the Angelina River will reduce demands on other water supplies in Nacogdoches County and will have no other apparent impact on other State water resources. From a third party social and economic perspective, this voluntary redistribution of water will be beneficial because it provides water for economic growth. Based on the analyses provided above, the Nacogdoches Steam Electric Power recommended strategy to purchase water from the Angelina Neches River Authority was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results are in table below.

Criteria	Rating	Explanation
Quantity	4	8,500 ac-ft per year
Reliability	3	Medium Reliable Supply
Cost	3	Low to Medium Cost
Environmental Factors	4	Low to No Impacts
Impact on Other State Water Resources	4	Low Impacts.
Threat to Agricultural Resources/Rural Areas	4	Low to No Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low to No Impacts
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	1	Local Sponsorship unknown
Implementation Issues	4	No known risks

REFERENCES

2011 East Texas Regional Plan.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR NACOGDOCHES STEAM ELECTRIC POWER

Water User Group Name:	Nacogdoches County Steam Electric Power
Strategy Name:	New wells in Carrizo-Wilcox Aquifer/Transfer from Houston County WCID#1
Strategy ID:	NACW-SEP2
Strategy Type:	New Groundwater Source
Potential Supply Quantity:	3,989 ac-ft per year /1,000 ac-ft per year (1.78 MGD)
Implementation Decade:	2070
Development Timeline:	2070
Project Capital Cost:	$16,021,000 (September 2013)
Annual Cost:	$1,875,000
Unit Water Cost (Rounded):	$938 per ac-ft ($2.88 per 1,000 gallons)

PROJECT DESCRIPTION

This strategy is a recommended strategy for Steam Electric Power users in Nacogdoches County and involves the development of ten wells located within the Carrizo-Wilcox Aquifer as this aquifer has been identified as a potential source of water in Nacogdoches County. These wells will provide approximately 4,000 ac-ft per year and are assumed to have a water depth of 300 feet. A peaking factor of two was assumed for the wells, and the cost estimate includes conveyance infrastructure in order to capture the peak annual supply. Additionally, this strategy also assumes a 1,000 ac-ft transfer of groundwater supplies from Houston County WCID #1 to Nacogdoches Steam Electric Power users.

SUPPLY DEVELOPMENT

The supply is only required in 2070 as other water management strategies help meet the need in the interim years. It is assumed that each well will provide 250 ac-ft per year to meet steam electric power demands in Nacogdoches County providing a total strategy yield of 3,989 ac-ft per year for 2070. An additional 1,000 ac-ft per year was also supplied from Houston County WCID#1 as a surplus in all decades. A target yield for this strategy was set to the highest need projected by the East Texas Regional Water Planning Group in 2070. Overall, the reliability of this supply is considered high, based on the proven use of this source and groundwater availability models.

ENVIRONMENTAL CONSIDERATIONS

The environmental impacts from this strategy are expected to be low. However, groundwater development from this source should be evaluated for potential impacts on spring flows and base flows of surface water in close proximity. The impact to the environment due to pipeline construction is expected to be temporary and minimal. New wells have a potential decrease in the groundwater-surface water nexus, which could reduce base flows. Impacts to environmental water needs, habitat, and cultural resources are expected to be low. There are no bays or estuaries in close proximity of Nacogdoches County.

PERMITTING AND DEVELOPMENT

There are no permitting or development issues associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assumed 9.5 miles of pipeline, ten wells, a peaking factor of two, and a maximum well yield of 250 gpm for each well. This equates to $938 per acre-foot ($2.88 per 1,000 gallons); after the infrastructure is fully paid (30 years), the cost drops to $267 per acre-foot ($0.82 per 1,000 gallons). Overall, this strategy has a medium cost compared to other strategies in the 2016 East Texas Regional Water Plan.

WUG: Nacogdoches County Steam Electric Power
WMS: Nacogdoches County - Carrizo Aquifer Wells

Supply	2,000	Acre-feet per year	1,240	gpm
Depth to Water	300			
Well Depth	600			
Well Size	12	in		
Wells Needed	10			

Construction Costs	Number	Unit Cost	Total Cost
Water Wells	10	$394,954	$3,949,539
Connection to Transmission System	10	$50,000	$500,000
Engineering and Contingencies (30% for pipelines, 35% for other items)			$1,532,000
Subtotal of Well(s)			**$5,981,539**

Transmission System	Size	Quantity	Unit	Unit Cost	Total Cost
Pipeline - Rural	16 in.	50,160	LF	$58	$2,887,000
Pump Station	393 HP	1	EA	$3,057,000	$3,057,000
Ground Storage Tank	0.45 MG	1	EA	$347,345	$347,345
Easement - Rural		50,160	LF	$16	$862,290
Engineering and Contingencies (30% for pipelines, 35% for other items)					$2,058,000
Subtotal for Transmission		**9.5**	**miles**		**9,211,635**

Permitting and Mitigation			$285,500
Construction Total			**$15,479,000**
Interest During Construction	12	Months	$542,000
TOTAL CAPITAL COST			**$16,021,000**

Debt Service (5.5% for 20 years)	$1,341,000
Operational Costs*	$533,500
Total Annual Cost	**$1,875,000**

UNIT COSTS (Until Amortized)	
Cost per ac-ft	$938
Cost per 1000 gallons	$2.88

UNIT COSTS (After Amortization)	
Cost per ac-ft	$267
Cost per 1000 gallons	$0.82

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

This strategy benefits steam electric users in Nacogdoches County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. New wells in the county will reduce demands on other water supplies in Nacogdoches County and will have no other apparent impact on other State water resources. From a third party social and economic perspective, this voluntary redistribution of water will be beneficial because it provides water for economic growth.

Based on the analyses provided above, the recommended strategy to drill new wells in Nacogdoches County for steam electric power use was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	2,000 ac-ft per year
Reliability	4	Highly Reliable Supply
Cost	3	Medium Cost
Environmental Factors	4	Low to No Impacts
Impact on Other State Water Resources	4	No known impacts to other projects.
Threat to Agricultural Resources/Rural Areas	4	Low to No Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low to No Impacts
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	1	Local Sponsorship unknown
Implementation Issues	4	No known risks

REFERENCES

2011 East Texas Regional Water Plan.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR NEWTON MINING

Water User Group Name:	Newton Mining
Strategy Name:	Purchase from Sabine River Authority (Toledo Bend)
Strategy ID:	NEWT-MIN
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	59 – 115 ac-ft per year (0.05 – 0.10 MGD)
Implementation Decade:	2020
Development Timeline:	2020
Project Capital Cost:	$0 (May 2015)
Annual Cost:	$111,000
Unit Water Cost (Rounded):	$965 per ac-ft ($2.96 per 1,000 gallons)

PROJECT DESCRIPTION

This strategy is a recommended strategy for Mining in Newton County and involves a contract between individual mining water users and the Sabine River Authority from their Toledo Bend system, as their permit allows. The Sabine River Authority currently supplies water to mining water users in Newton County. Therefore, the only cost for additional supply from is the contractual cost of raw water. Ultimately, this cost will need to be negotiated with the Sabine River Authority and will reflect their wholesale water rates at that time. The cost estimate included in this technical memorandum utilizes an assumed rate for the East Texas Regional Water Planning Area regional rate for raw surface water.

SUPPLY DEVELOPMENT

Currently, the Sabine River Authority is the only provider of water to mining users in Newton County. Therefore, this recommended strategy calls for a contract amendment equal to the projected need of Newton Mining during the planning period. The contract required for this strategy increases their supply by 115 ac-ft per year beginning in 2020 and decreases to 59 ac-ft per year beginning in 2030. Newton mining is not projected to have a need from 2040 through 2070. These supplies are considered highly reliable because the supply is available in Toledo Bend and the infrastructure is already in place; however, the supply is dependent on coordination with the Sabine River Authority.

ENVIRONMENTAL CONSIDERATIONS

There are not any significant environmental considerations associated with this strategy. A contract between mining water users in Newton County and the Sabine River Authority should have a minimal impact to environmental water needs, no impact to the surrounding habitat, and a low impact to cultural resources in the area. There are no bays or estuaries located in Newton County.

PERMITTING AND DEVELOPMENT

There are no permitting or development issues associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. No capital costs were assumed, but an annual cost was estimated using the East Texas Regional Water Planning Area regional rate for raw surface water equal to $3.00 per 1,000 gallons. Overall, this strategy has a medium cost compared to other strategies in the 2016 East Texas Regional Water Plan.

WUG NAME:	**Newton Mining**			
STRATEGY:	**Purchase from Sabine River Authority (Toledo Bend)**			
			0.15	
Raw Water Quantity:	**115**	AF/Y	MGD	
CONSTRUCTION COSTS				
ANNUAL CONTRACT COSTS				
ANNUAL COSTS				
Operational Costs*				**$111,000**
UNIT COSTS (Until Amortized)				
Per Acre-Foot of treated water				$965
Per 1,000 Gallons				$2.96
UNIT COSTS (After Amortization)				
Per Acre-Foot			NA	
Per 1,000 Gallons			NA	

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

This strategy benefits mining water users in Newton County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. A contract to pull water from the Sabine River Authority's Toledo Bend system will reduce demands on other water supplies in Newton County and will have no other apparent impact on other State water resources. From a third party social and economic perspective, this voluntary redistribution of water will be beneficial because it provides water for economic growth.

Based on the analyses provided above, the Newton Mining recommended strategy to purchase water from the Sabine River Authority was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	115 ac-ft per year
Reliability	4	Highly Reliable Supply
Cost	3	Medium Cost
Environmental Factors	4	Low to No Impacts
Impact on Other State Water Resources	4	No known impacts to other projects.
Threat to Agricultural Resources/Rural Areas	4	Low to No Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low to No Impacts
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	1	Local Sponsorship unknown
Implementation Issues	4	Limited Risk

REFERENCES

2011 East Texas Regional Water Plan.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR NEWTON STEAM ELECTRIC POWER

Water User Group Name:	Newton Steam Electric Power
Strategy Name:	Purchase from Sabine River Authority (Toledo Bend)
Strategy ID:	NEWT-SEP
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	690 – 19,021 ac-ft per year (0.6 – 17.0 MGD)
Implementation Decade:	2020
Development Timeline:	2020
Project Capital Cost:	$38,170,000 (May 2015)
Annual Cost:	$10,091,000
Unit Water Cost (Rounded):	$531 per ac-ft ($1.63 per 1,000 gallons)

PROJECT DESCRIPTION

This strategy is a recommended strategy for Steam Electric Power in Newton County and involves a contract between individual steam electric power water users and the Sabine River Authority for raw water from their Toledo Bend system, as their permit allows. The cost for supply from the Toledo Bend system includes the contractual cost of raw water and infrastructure related to water conveyance. Ultimately, the cost for raw water will need to be negotiated with the Sabine River Authority and will reflect the wholesale water rates of this entity at the time a contract is made. The cost estimate included in this technical memorandum utilizes an assumed rate for the East Texas Regional Water Planning Area regional rate for raw surface water.

SUPPLY DEVELOPMENT

The quantity of supply from this strategy represents the water need projected for Steam Electric Power in Newton County by the East Texas Regional Planning Group during the planning period (2020-2070). The quantity of supply from this strategy represents a contract of 690 ac-ft per year, beginning in 2020, and increases over time to 19,021 ac-ft per year, beginning in 2070. The reliability of this water supply is considered high due to the availability of water projected in the Toledo Bend system using the Texas Water Development Board's Water Availability Models. However, this strategy is dependent on coordination with the Sabine River Authority. This strategy is not dependent on any other water management strategies in the 2016 East Texas Regional Water Plan.

ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. In addition, a contract between steam electric power water users in Newton County and the Sabine River Authority should have a minimal impact to environmental water needs, no impact to the surrounding habitat, and a low impact to cultural resources in the area. There are no bays or estuaries within Newton County.

PERMITTING AND DEVELOPMENT

There are no permitting or development issues associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assumed 15 miles of pipeline (50% of the approximate distance across Newton County), a pump station with an intake, and a booster pump station. The annual cost was estimated using the East Texas Regional Water Planning Area regional rate for raw surface water. Overall, this strategy has a medium to low cost compared to other strategies in the 2016 East Texas Regional Water Plan due to the length of pipeline required.

WUG NAME:	**Newton Steam Electric Power**				
STRATEGY:	**Purchase from Sabine River Authority (Toledo Bend)**				
Raw Water Quantity:	**19,021** Ac-ft/yr			34.0 MGD	
CAPITAL COSTS					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	48 in.	79,200	LF	$239	$18,953,000
Subtotal of Pipeline	**15**	**miles**			**$26,875,740**
Pump Station(s)					
Pump with intake	463 HP	1	LS	$2,364,000	$2,364,000
Booster Pump Station	463 HP	1	LS	$3,417,000	$3,417,000
Engineering and Contingencies (35%)					$2,023,350
Subtotal of Pump Station(s)					**$7,804,350**
Storage Tanks	4.2 MG	1	LS	$1,315,816	**$1,315,816**
Engineering and Contingencies (35%)					$460,536
Subtotal of Storage Tanks					**$1,776,352**
Permitting and Mitigation					$423,000
Construction Total					**$36,879,000**
Interest During Construction			12	Months	$1,291,000
TOTAL CAPITAL COST					**$38,170,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$3,194,000
Operational Costs*					$6,897,000
Total Annual Costs					**$10,091,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$531
Per 1,000 Gallons					$1.63
UNIT COSTS (After Amortization)					
Per Acre-Foot					$380
Per 1,000 Gallons					$1.17

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

This strategy benefits steam electric power water users in Newton County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. A contract to pull water from the Toledo Bend system will reduce demands on other water supplies in Newton County and will have no other apparent impact on other State water resources.

Based on the analyses provided above, the Newton Steam Electric Power recommended strategy to purchase water from the Sabine River Authority was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	19,021 ac-ft per year
Reliability	4	Highly Reliable Supply
Cost	3	Low to Medium Cost
Environmental Factors	4	Low to No Impacts
Impact on Other State Water Resources	4	No known impacts to other projects.
Threat to Agricultural Resources/Rural Areas	4	Low to No Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low to No Impacts
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	1	Local Sponsorship unknown
Implementation Issues	4	No known risks

REFERENCES

2011 East Texas Regional Water Plan.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR ORANGE IRRIGATION

Water User Group Name:	Orange Irrigation
Strategy Name:	Purchase from Sabine River Authority (Sabine River)
Strategy ID:	ORAN-IRR
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	2,432 – 2,758 ac-ft per year (2.17– 2.46 MGD)
Implementation Decade:	2020
Development Timeline:	2020
Project Capital Cost:	$13,281,000 (September 2013)
Annual Cost:	$2,293,000
Unit Water Cost (Rounded):	$764 per ac-ft ($2.35 per 1,000 gallons)

PROJECT DESCRIPTION

This strategy is a recommended strategy for irrigation water users in Orange County and involves a contract between individual irrigators and the Sabine River Authority for raw water from the Sabine River, as their permit allows. The cost for supply from the Sabine River includes the contractual cost of raw water and infrastructure related to water conveyance. Ultimately, the cost for raw water will need to be negotiated with the Sabine River Authority and will reflect the wholesale water rates of this entity at the time a contract is made. The cost estimate included in this technical memorandum utilizes an assumed rate for the East Texas Regional Water Planning Area regional rate for raw surface water.

SUPPLY DEVELOPMENT

The quantity of supply from this strategy represents the water need projected for irrigation users in Orange County projected by the East Texas Regional Planning Group during the planning period (2020-2070). The quantity of supply from this strategy represents a contract of 2,432 ac-ft per year, beginning in 2020, and increases over time to 2,758 ac-ft per year by 2070. The reliability of this water supply is considered high due to the availability of water projected in the Sabine River using the Texas Water Development Board's Water Availability Models. However, this strategy is dependent on coordination with the Sabine River Authority. This strategy is not dependent on any other water management strategies in the 2016 East Texas Regional Water Plan.

ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. In addition, a contract between irrigators in Orange County and the Sabine River Authority should have a minimal impact to environmental water needs, no impact to the surrounding habitat, and a low impact to cultural resources in the area. Sabine River Authority already supplies to some irrigation users in Orange County. The strategy is highly reliable since some of the transmission connections may be already in place.

PERMITTING AND DEVELOPMENT

There are no permitting or development issues associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assumed 13 miles of pipeline (the approximate distance from the Sabine River to the center of Orange County), a pump station with an intake, a booster pump station, and a terminal storage tank (0.7 million gallon). The annual cost was estimated using the East Texas Regional Water Planning Area regional rate for raw surface water. Overall, this strategy has a medium cost compared to other strategies in the 2016 East Texas Regional Water Plan due to the length of pipeline required and the large supply volume.

WUG NAME:	**Orange County Irrigation**					
STRATEGY:	**Purchase from Sabine River Authority (Sabine River)**					
Raw Water Quantity:	**3,000**	Ac-ft/yr			5.4 MGD	
CAPITAL COSTS						
Pipeline	**Size**	**Quantity**		**Unit**	**Unit Price**	**Cost**
Pipeline Rural	18 in.	68,640		LF	$69	$4,713,000
Right of Way Easements Rural (ROW)		68,640		LF	$26	$1,938,530
Engineering and Contingencies (30%)						$1,414,000
Subtotal of Pipeline	**13**	**miles**				**$8,065,530**
Pump Station(s)						
Pump with intake	131 HP	1		LS	$1,091,000	$1,091,000
Booster Pump Station	131 HP	1		LS	$1,707,000	$1,707,000
Engineering and Contingencies (35%)						$979,300
Subtotal of Pump Station(s)						**$3,777,300**
Storage Tanks	0.7 MG		1	LS	$456,706	$456,706
Engineering and Contingencies (35%)						$159,847
Subtotal of Storage Tanks						**$616,553**
Permitting and Mitigation						$373,000
CONSTRUCTION TOTAL						**$12,832,000**
Interest During Construction				12	Months	$449,000
TOTAL CAPITAL COST						**$13,281,000**
ANNUAL COSTS						
Debt Service (5.5% for 20 years)						$1,111,000
Operational Costs*						$1,182,000
Total Annual Costs						**$2,293,000**
UNIT COSTS (Until Amortized)						
Per Acre-Foot of treated water						$764
Per 1,000 Gallons						$2.35
UNIT COSTS (After Amortization)						
Per Acre-Foot						$419
Per 1,000 Gallons						$1.29

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

This strategy benefits irrigation water users in Orange County and is expected to have a positive impact on their water supply security. Sabine River Authority currently supplies water to some irrigators in Orange County. Therefore, this strategy is highly reliable as some of the connections may already be in place and the strategy may be just an extension of current contracts. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. A contract to pull water from the Sabine River will reduce demands on other water supplies in Orange County and will have no other apparent impact on other State water resources.

Based on the analyses provided above, the Orange Irrigation recommended strategy to purchase water from the Sabine River Authority was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	3,000 ac-ft per year
Reliability	4	Highly Reliable Supply
Cost	3	Medium Cost
Environmental Factors	4	Low to No Impacts
Impact on Other State Water Resources	4	No known impacts to other projects.
Threat to Agricultural Resources/Rural Areas	5	Positive Impacts to Agricultural Resources
Interbasin Transfers		No
Other Natural Resources	4	Low to No Impacts
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	1	Local Sponsorship unknown
Implementation Issues	4	No known risks

REFERENCES

2011 East Texas Regional Water Plan.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR ORANGE MANUFACTURING

Water User Group Name:	Orange Manufacturing
Strategy Name:	Purchase from Sabine River Authority (Sabine River)
Strategy ID:	ORAN-MFG
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	2,532– 32,111 ac-ft per year (2.56– 29.8 MGD)
Implementation Decade:	2020
Development Timeline:	2020
Project Capital Cost:	$42,621,000 (September 2013)
Annual Cost:	$14,949,000
Unit Water Cost (Rounded):	$467 per ac-ft ($1.43 per 1,000 gallons)

PROJECT DESCRIPTION

Manufacturing demands in Orange County are projected to increase significantly over the planning period in ETRWPA. This strategy is a recommended strategy for Manufacturing in Orange County and involves a contract between individual manufacturing water users and the Sabine River Authority for raw water from the Sabine River, as their permit allows. The cost for supply from the Sabine River includes the contractual cost of raw water and infrastructure related to water conveyance. Ultimately, the cost for raw water will need to be negotiated with the Sabine River Authority and will reflect the wholesale water rates of this entity at the time a contract is made. The cost estimate included in this technical memorandum utilizes an assumed rate for the East Texas Regional Water Planning Area regional rate for raw surface water.

SUPPLY DEVELOPMENT

The quantity of supply from this strategy represents the water need projected for manufacturing users in Orange County projected by the East Texas Regional Planning Group during the planning period (2020-2070). The quantity of supply from this strategy represents a contract of 2,532 ac-ft per year, beginning in 2020, and increases over time to 32,111 ac-ft per year by 2070. The reliability of this water supply is considered high due to the availability of water projected in the Sabine River using the Texas Water Development Board's Water Availability Models. However, this strategy is dependent on coordination with the Sabine River Authority. This strategy is not dependent on any other water management strategies in the 2016 East Texas Regional Water Plan.

ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. In addition, a contract between manufacturing water users in Orange County and the Sabine River Authority should have a minimal impact to environmental water needs, no impact to the surrounding habitat, and a low impact to cultural resources in the area. Sabine River Authority already supplies to some manufacturing users in Orange County so the strategy is highly reliable since some of the transmission connections may be already in place.

PERMITTING AND DEVELOPMENT

There are no permitting or development issues associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assumed 13 miles of pipeline (the approximate distance from the Sabine River to the center of Orange County), a pump station with an intake, a booster pump station, and a terminal storage tank (3.6 million gallon). The annual cost was estimated using the East Texas Regional Water Planning Area regional rate for raw surface water. Overall, this strategy has a medium cost compared to other strategies in the 2016 East Texas Regional Water Plan due to the length of pipeline required and the large supply volume.

WUG NAME:	**Orange County Manufacturing**				
STRATEGY:	**Purchase from Sabine River Authority (Sabine River)**				
Raw Water Quantity:	**33,477**	AF/Y		42.8 MGD	
CAPITAL COSTS					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	60 in.	68,640	LF	$307	$21,069,000
Right of Way Easements Rural (ROW)		68,640	LF	$26	$1,938,530
Engineering and Contingencies (30%)					$6,321,000
Subtotal of Pipeline	**13**	**miles**			**$29,328,530**
Pump Station(s)					
Pump with intake	718 HP	1	LS	$2,601,000	$2,601,000
Booster Pump Station	718 HP	1	LS	$4,731,000	$4,731,000
Engineering and Contingencies (35%)					$2,566,200
Subtotal of Pump Station(s)					**$9,898,200**
Storage Tanks	3.6 MG	1	LS	$1,170,516	$1,170,516
Engineering and Contingencies (35%)					$409,681
Subtotal of Storage Tanks					**$1,580,197**
Permitting and Mitigation					$373,000
Construction Total					**$41,180,000**
Interest During Construction			12	Months	$1,441,000
TOTAL CAPITAL COST					**$42,621,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$3,566,000
Operational Costs*					$11,383,000
Total Annual Costs					**$14,949,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$467
Per 1,000 Gallons					$1.43
UNIT COSTS (After Amortization)					
Per Acre-Foot					$372
Per 1,000 Gallons					$1.14

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

This strategy benefits manufacturing water users in Orange County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. A contract to pull water from the Sabine River will reduce demands on other water supplies in Orange County and will have no other apparent impact on other State water resources.

Based on the analyses provided above, the Orange Manufacturing recommended strategy to purchase water from the Sabine River Authority was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	33,477 ac-ft per year
Reliability	4	Highly Reliable Supply
Cost	2	Low Cost
Environmental Factors	4	Low Impacts
Impact on Other State Water Resources	4	No known impacts to other projects.
Threat to Agricultural Resources/Rural Areas	4	Low to No Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low to No Impacts
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	1	Local Sponsorship unknown
Implementation Issues	4	No known risks

REFERENCES

2011 East Texas Regional Water Plan.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR ORANGE STEAM ELECTRIC POWER

Water User Group Name:	Orange Steam Electric Power
Strategy Name:	Purchase from Sabine River Authority (Sabine River)
Strategy ID:	ORAN-SEP
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	1,038 – 4,846 ac-ft per year (0.92– 4.3 MGD)
Implementation Decade:	2040
Development Timeline:	2040
Project Capital Cost:	$15,847,000 (September 2013)
Annual Cost:	$3,077,000
Unit Water Cost (Rounded):	$686 per ac-ft ($2.1 per 1,000 gallons)

PROJECT DESCRIPTION

This strategy is a recommended strategy for Steam Electric Power in Orange County and involves a contract between individual steam electric power water users and the Sabine River Authority for raw water from the Sabine River, as their permit allows. The cost for supply from the Sabine River includes the contractual cost of raw water and infrastructure related to water conveyance. Ultimately, the cost for raw water will need to be negotiated with the Sabine River Authority and will reflect the wholesale water rates of this entity at the time a contract is made. The cost estimate included in this technical memorandum utilizes an assumed rate for the East Texas Regional Water Planning Area regional rate for raw surface water.

SUPPLY DEVELOPMENT

The quantity of supply from this strategy represents the water need projected for Steam Electric Power in Orange County projected by the East Texas Regional Planning Group during the planning period (2020-2070). The quantity of supply from this strategy represents a contract of 1,038 ac-ft per year, beginning in 2040, and increases over time to 4,846 ac-ft per year by 2070. The reliability of this water supply is considered high due to the availability of water projected in the Sabine River using the Texas Water Development Board's Water Availability Models. However, this strategy is dependent on coordination with the Sabine River Authority. This strategy is not dependent on any other water management strategies in the 2016 East Texas Regional Water Plan.

ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. In addition, a contract between steam electric power water users in Orange County and the Sabine River Authority should have a minimal impact to environmental water needs, no impact to the surrounding habitat, and a low impact to cultural resources in the area.

PERMITTING AND DEVELOPMENT

There are no permitting or development issues associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assumed 13 miles of pipeline (the approximate distance from the Sabine River to the center of Orange County), a pump station with an intake, a booster pump station, and a terminal storage tank (0.5 million gallon). The annual cost was estimated using the East Texas Regional Water Planning Area regional rate for raw surface water. Overall, this strategy has a medium cost compared to other strategies in the 2016 East Texas Regional Water Plan due to the length of pipeline required and the large supply volume.

WUG NAME:	**Orange Steam Electric Power**				
STRATEGY:	**Purchase from Sabine River Authority (Sabine River)**				
Raw Water Quantity:	**4,486** AF/Y			6.0 MGD	
CAPITAL COSTS					
TRANSMISSION FACILITIES					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	20 in.	68,640	LF	$81	$5,545,000
Right of Way Easements Rural (ROW)		68,640	LF	$26	$1,938,530
Engineering and Contingencies (30%)					$1,664,000
Subtotal of Pipeline	**13**	**miles**			**$9,147,530**
Pump Station(s)					
Pump with intake	228 HP	1	LS	$1,712,000	$1,712,000
Booster Pump Station	228 HP	1	LS	$2,203,000	$2,203,000
Engineering and Contingencies (35%)					$1,370,250
Subtotal of Pump Station(s)					**$5,285,250**
Storage Tanks	0.5 MG	1	LS	$374,451	$374,451
Engineering and Contingencies (35%)					$131,058
Subtotal of Storage Tanks					**$505,509**
Permitting and Mitigation					$373,000
CONSTRUCTION TOTAL					**$15,311,289**
Interest During Construction			12	Months	$536,000
TOTAL CAPITAL COST					**$15,847,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$1,326,000
Operational Costs*					$1,751,000
Total Annual Costs					**$3,077,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$686
Per 1,000 Gallons					$2.10
UNIT COSTS (After Amortization)					
Per Acre-Foot					$419
Per 1,000 Gallons					$1.28

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

This strategy benefits steam electric power water users in Orange County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. A contract to pull water from the Sabine River will reduce demands on other water supplies in Orange County and will have no other apparent impact on other State water resources.

Based on the analyses provided above, the Orange Steam Electric Power recommended strategy to purchase water from the Sabine River Authority was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	4,846 ac-ft per year
Reliability	4	Highly Reliable Supply
Cost	3	Medium Cost
Environmental Factors	4	Low Impacts
Impact on Other State Water Resources	4	No known impacts to other projects.
Threat to Agricultural Resources/Rural Areas	4	Low to No Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low to No Impacts
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	1	Local Sponsorship unknown
Implementation Issues	4	No known risks

REFERENCES

2011 East Texas Regional Water Plan.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR PANOLA MANUFACTURING

Water User Group Name:	Panola County Manufacturing
Strategy Name:	Purchase from City of Carthage
Strategy ID:	PANL-MFG
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	134 – 309 ac-ft per year (0.12 – 0.27 MGD)
Implementation Decade:	2020
Development Timeline:	2020
Project Capital Cost:	$0
Annual Cost:	$101,000
Unit Water Cost (Rounded):	$327 per ac-ft ($1.00 per 1,000 gallons)

PROJECT DESCRIPTION

This strategy is a recommended strategy for manufacturing water users in Panola County and involves a contract between individual manufacturing water users and the City of Carthage from their supplies in Carrizo Wilcox or Lake Murvaul. The City of Carthage currently supplies water to manufacturing water users in Panola County. Therefore, the only cost for additional supply from is the contractual cost of raw water. Ultimately, this cost will need to be negotiated with the City of Carthage and will reflect their wholesale water rates at that time. The cost estimate included in this technical memorandum utilizes an assumed rate for the East Texas Regional Water Planning Area regional rate for raw surface water.

SUPPLY DEVELOPMENT

Currently, the City of Carthage is the only provider of water to manufacturing users in Panola County. There are some self-supplied groundwater used by some manufacturing water users in the County. Therefore, this recommended strategy calls for a contract amendment equal to the projected need of Panola County manufacturing demand during the planning period. The contract required for this strategy increases their supply by 134 ac-ft per year beginning in 2020 to 309 ac-ft per year by 2070. These supplies are considered highly reliable because the supply is available in City of Carthage sources of supply and the infrastructure is already in place; however, the supply is dependent on coordination with the City of Carthage. The supply source may be any of the existing supply sources available for City of Carthage.

ENVIRONMENTAL CONSIDERATIONS

There are not any significant environmental considerations associated with this strategy. A contract between manufacturing water users in Panola County and the City of Carthage should have a minimal impact to environmental water needs, no impact to the surrounding habitat, and a low impact to cultural resources in the area. There are no bays or estuaries located in Newton County.

PERMITTING AND DEVELOPMENT

There are no permitting or development issues associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. No capital costs were assumed, but an annual cost was estimated using the East Texas Regional Water Planning Area regional rate for raw surface water. Overall, this strategy has a low cost compared to other strategies in the 2016 East Texas Regional Water Plan.

WUG NAME:	**Panola Manufacturing**		
	Purchase from		
STRATEGY:	**Carthage**		
Raw Water Quantity:	**309** AF/Y	0.41 MGD	
CONSTRUCTION COSTS			
ANNUAL CONTRACT COSTS			
ANNUAL COSTS			
Operational Costs*			**$101,000**
UNIT COSTS (Until Amortized)			
Per Acre-Foot of treated water			$327
Per 1,000 Gallons			$1.00
UNIT COSTS (After Amortization)			
Per Acre-Foot		NA	
Per 1,000 Gallons		NA	

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

This strategy benefits manufacturing water users in Panola County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. A contract to pull water from the City of Carthage supply sources will reduce demands on other water supplies in Panola County and will have no other apparent impact on other State water resources. From a third party social and economic perspective, this voluntary redistribution of water will be beneficial because it provides water for economic growth.

Based on the analyses provided above, the Panola County Manufacturing recommended strategy to purchase water from the City of Carthage was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	309 ac-ft per year
Reliability	4	Very Reliable Supply
Cost	4	Low Cost
Environmental Factors	4	Low Impacts
Impact on Other State Water Resources	4	No known impacts to other projects.
Threat to Agricultural Resources/Rural Areas	4	Low to No Impacts
Interbasin Transfers		No
Other Natural Resources	4	Low to No Impacts
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	1	No Local Sponsor identified
Implementation Issues	4	No known risks

REFERENCES

Discussions with Regional Water Planning Group and Groundwater Management Areas.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR RUSK MINING

Water User Group Name:	Rusk Mining
Strategy Name:	Purchase from Angelina Neches River Authority (Angelina River)
Strategy ID:	RUSK-MIN
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	1,075 – 2,092 ac-ft per year (Varies) (1.0 – 1.9 MGD)
Implementation Decade:	2020
Development Timeline:	2020
Project Capital Cost:	$14,158,000 (May 2015)
Annual Cost:	$3,420,000
Unit Water Cost (Rounded):	$1,635 per ac-ft ($5.02 per 1,000 gallons)

PROJECT DESCRIPTION

This strategy is a recommended strategy for Mining in Ruck County and involves a contract between individual mining water users and the Angelina Neches River Authority for raw water from the Angelina River, as their permit allows. The cost for supply from the Angelina River includes the cost of raw water and infrastructure related to water conveyance. Ultimately, the cost for raw water will need to be negotiated with the Angelina Neches River Authority and will reflect the wholesale water rates of this entity at the time a contract is made. The cost estimate included in this technical memorandum utilizes an assumed rate for the East Texas Regional Water Planning Area regional rate for raw surface water.

SUPPLY DEVELOPMENT

The quantity of supply from this strategy represents the mining need projected in Rusk County by the East Texas Regional Water Planning Group. The reliability of this water supply is considered medium due to the availability of water projected in the Angelina River using the Texas Water Development Board's Water Availability Models. However, this strategy is dependent on sales with the Angelina Neches River Authority and their application for 10,000 ac-ft per year from the Angelina River (Strategy ID: ANRA-ROR). The quantity of supply from this strategy represents a contract of 1,075 ac-ft per year, beginning in 2020, increases to 2,092 ac-ft per year, beginning in 2030, and decreases over the next four decades to 1,677 ac-ft per year, beginning in 2070.

ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. In addition, a contract between mining water users in Rusk County and the Angelina Neches River Authority should have a minimum impact to environmental water needs, no impact to the surrounding habitat, and a low impact to cultural resources in the area. There are no bays or estuaries in Rusk County.

PERMITTING AND DEVELOPMENT

There are no permitting or development issues associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assumed 16 miles of pipeline (50% of the approximate distance across Rusk County), a pump station with an intake, a booster pump station, and one terminal storage tank with one day of storage. The annual cost was estimated using the East Texas Regional Water Planning Area regional rate for raw surface water. Overall, this strategy has a medium cost compared to other strategies in the 2016 East Texas Regional Water Plan due to the length of pipeline required.

WUG NAME:	**Rusk Mining**				
STRATEGY:	**Purchase from Angelina Neches River Authority**				
Raw Water Quantity:	**2,092** AF/Y			3.7 MGD	
CAPITAL COSTS					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	16 in.	84,480	LF	$58	$4,862,000
Right of Way Easements Rural (ROW)		84,480	LF	$26	$2,385,900
Engineering and Contingencies (30%)					$1,459,000
Subtotal of Pipeline	**16**	**miles**			**$8,706,900**
Pump Station(s)					
Pump with intake	98 HP	1	LS	$828,000	$828,000
Booster Pump Station	98 HP	1	LS	$1,529,000	$1,529,000
Engineering and Contingencies (35%)					$824,950
Subtotal of Pump Station(s)					**$3,181,950**
Storage Tanks	2.8 MG	1	LS	$993,963	$993,963.22
Engineering and Contingencies (35%)					$347,887
Subtotal of Storage Tanks					**$1,341,850**
Permitting and Mitigation					$448,000
CONSTRUCTION TOTAL					**$13,678,700**
Interest During Construction			12	Months	$479,000
TOTAL CAPITAL COST					**$14,158,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$1,185,000
Operational Costs*					$2,235,000
Total Annual Costs					**$3,420,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$1,635
Per 1,000 Gallons					$5.02
UNIT COSTS (After Amortization)					
Per Acre-Foot					$1,095
Per 1,000 Gallons					$3.36

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

This strategy benefits mining users in Rusk County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. A contract to pull water from the Angelina River will reduce demands

on other water supplies in Rusk County and will have no other apparent impact on other State water resources. From a third party social and economic perspective, this voluntary redistribution of water will be beneficial because it provides water for economic growth.

Based on the analyses provided above, the Rusk Mining recommended strategy to purchase water from the Angelina Neches River Authority was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	2,092 ac-ft per year
Reliability	3	Medium Reliable Supply
Cost	2	Medium Cost
Environmental Factors	4	Low to No Impacts
Impact on Other State Water Resources	4	No known impacts to other projects.
Threat to Agricultural Resources/Rural Areas	4	Low Impact
Interbasin Transfers		No
Other Natural Resources	4	No known Impacts
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	4	Sponsor Identified and committed.
Implementation Issues	4	No known risk

REFERENCES

Discussions with Angelina River Water Authority.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR RUSK STEAM ELECTRIC POWER

Water User Group Name:	Rusk Steam Electric Power
Strategy Name:	Purchase from Sabine River Authority (Sabine River)
Strategy ID:	RUSK-SEP
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	462 – 18,868 ac-ft per year (0.4 – 16.8 MGD)
Implementation Decade:	2050
Development Timeline:	2050
Project Capital Cost:	$57,718,000 (September 2013)
Annual Cost:	$11,855,000
Unit Water Cost (Rounded):	$628 per ac-ft ($1.93 per 1,000 gallons)

PROJECT DESCRIPTION

This strategy is a recommended strategy for Steam Electric Power in Rusk County and involves a contract between individual steam electric power water users and the Sabine River Authority for raw water from the Sabine River, as their permit allows. The cost for supply from the Sabine River includes the contractual cost of raw water and infrastructure related to water conveyance. Ultimately, the cost for raw water will need to be negotiated with the Sabine River Authority and will reflect the wholesale water rates of this entity at the time a contract is made. The cost estimate included in this technical memorandum utilizes an assumed rate for the East Texas Regional Water Planning Area regional rate for raw surface water.

SUPPLY DEVELOPMENT

The quantity of supply from this strategy represents the water need projected for Steam Electric Power in Rusk County projected by the East Texas Regional Planning Group during the planning period (2020-2070). The quantity of supply from this strategy represents a contract of 462 ac-ft per year, beginning in 2020, and increases over time to 18,868 ac-ft per year, beginning in 2070. The reliability of this water supply is considered high due to the availability of water projected in the Sabine River using the Texas Water Development Board's Water Availability Models. However, this strategy is dependent on coordination with the Sabine River Authority. This strategy is not dependent on any other water management strategies in the 2016 East Texas Regional Water Plan.

ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. In addition, a contract between steam electric power water users in Rusk County and the Sabine River Authority should have a minimal impact to environmental water needs, no impact to the surrounding habitat, and a low impact to cultural resources in the area. There are no bays or estuaries within Rusk County.

PERMITTING AND DEVELOPMENT

There are no permitting or development issues associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assumed 25 miles of pipeline (the approximate distance from the Sabine River to the center of Rusk County), a pump station with an intake, a booster pump station, and a terminal storage tank (14 million gallon). The annual cost was estimated using the East Texas Regional Water Planning Area regional rate for raw surface water. Overall, this strategy has a medium cost compared to other strategies in the 2016 East Texas Regional Water Plan due to the length of pipeline required and the large capacity of the terminal storage.

WUG NAME:	**Rusk Steam Electric Power**				
STRATEGY:	**Purchase from Sabine River Authority (Sabine River)**				
Raw Water Quantity:	**18,868** AF/Y			33.7 MGD	
CAPITAL COSTS					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	48 in.	132,000	LF	$239	$31,588,000
Right of Way Easements Rural (ROW)		132,000	LF	$26	$3,727,900
Engineering and Contingencies (30%)					$9,476,000
Subtotal of Pipeline	**25**	**miles**			**$44,791,900**
Pump Station(s)					
Pump with intake	556 HP	1	LS	$2,425,000	$2,425,000
Booster Pump Station	556 HP	1	LS	$3,897,000	$3,897,000
Engineering and Contingencies (35%)					$2,212,700
Subtotal of Pump Station(s)					**$8,534,700**
Storage Tanks	4.2 MG	1	LS	$1,308,393	$1,308,393
Engineering and Contingencies (35%)					$457,937
Subtotal of Storage Tanks					**$1,766,330**
Permitting and Mitigation					$673,000
CONSTRUCTION TOTAL					**$55,765,930**
Interest During Construction			12	Months	$1,952,000
TOTAL CAPITAL COST					**$57,718,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$4,830,000
Operational Costs*					$7,025,000
Total Annual Costs					**$11,855,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$628
Per 1,000 Gallons					$1.93
UNIT COSTS (After Amortization)					
Per Acre-Foot					$392
Per 1,000 Gallons					$1.20

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

This strategy benefits steam electric power water users in Rusk County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. A contract to pull water from the Sabine River will reduce demands on other water supplies in Rusk County and will have no other apparent impact on other State water resources.

Based on the analyses provided above, the Rusk Steam Electric Power recommended strategy to purchase water from the Sabine River Authority was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	18,868 ac-ft per year
Reliability	4	Highly Reliable Supply
Cost	3	Medium Cost
Environmental Factors	4	Low to No Impacts
Impact on Other State Water Resources	4	No known impacts to other projects.
Threat to Agricultural Resources/Rural Areas	4	Low Impact
Interbasin Transfers		No
Other Natural Resources	4	
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	1	Local Sponsorship unknown
Implementation Issues	4	No known risk

REFERENCES

Discussions with Sabine River Authority.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR SAN AUGUSTINE MINING

Water User Group Name:	San Augustine County Mining
Strategy Name:	Purchase from Angelina Neches River Authority
Strategy ID:	SAUG-MIN
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	2,102 – 1,102 ac-ft per year (1.87 – 0.98 MGD)
Implementation Decade:	2020
Development Timeline:	2020
Project Capital Cost:	$21,064,000 (September 2013)
Annual Cost:	$4,035,000
Unit Water Cost (Rounded):	$1,920 per ac-ft ($5.89 per 1,000 gallons)

PROJECT DESCRIPTION

San Augustine County shows shortages for mining users for the decades 2020 and 2030. The mining water users have a contract with Angelina Neches River Authority to use Angelina Neches River Authority's supplies to meet the water needs. Current supply is from other aquifer and San Augustine City Lake. This strategy is a recommended strategy for mining users in San Augustine County and involves a contract between mining water users and the Angelina Neches River Authority for raw water from the run-of-river supplies on Angelina River. The cost for supply from the Angelina River includes the contractual cost of raw water and infrastructure related to water conveyance. Ultimately, the cost for raw water will need to be negotiated with the Angelina Neches River Authority and will reflect the wholesale water rates of this entity at the time a contract is made. The cost estimate included in this technical memorandum utilizes an assumed rate for the East Texas Regional Water Planning Area regional rate for raw surface water.

SUPPLY DEVELOPMENT

The quantity of supply from this strategy represents the water need projected for mining in Shelby County projected by the East Texas Regional Planning Group during the planning period (2020-2070). The shortage manifests for decades 2020 and 2030. The quantity of supply from this strategy represents a contract of 2,102 ac-ft per year, beginning in 2020, and drops to 1,102 ac-ft per year in 2030. Angelina Neches River Authority put in an application for 10,000 ac-ft per year of run-of-river supplies and the application is administratively complete. Angelina Neches River Authority has a water management strategy in the 2016 Plan to apply for additional run-of-river supplies to address the mining demands in the region. Because of the nature of the application and the process involved in securing the water rights, this supply is not considered very reliable at this time. Therefore, this strategy is dependent on successful execution of Angelina Neches River Authority's water management strategies in the 2016 East Texas Regional Water Plan to secure additional run-of-river supplies.

ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. In addition, a contract between mining water users in San Augustine County and the Angelina Neches River Authority should have a minimal impact to environmental water needs, no impact to the surrounding habitat, and a low impact to cultural resources in the area.

PERMITTING AND DEVELOPMENT

There are permitting and supply development issues associated with this strategy. Angelina Neches River Authority has to work with Texas Commission on Environmental Quality to furnish all the required documentation required for the successful procurement of the new and currently pending run-of-river water right applications. Also, the availability of this supply is potentially limited to the environmental flow requirements and supply availability in the Angelina River in that region.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assumed 30 miles of pipeline (the approximate distance from Angelina River to the center of San Augustine County), a pump station with an intake, and a terminal storage tank (0.4 million gallon). The annual cost was estimated using the East Texas Regional Water Planning Area regional rate for raw surface water equal to $3.00 per 1,000 gallons. Overall, this strategy has a medium to high cost compared to other strategies in the 2016 East Texas Regional Water Plan due to the length of pipeline required and the quantity of supply delivered for the infrastructure.

WUG NAME:	**San Augustine Mining**					
STRATEGY:	**Angelina River**					
Quantity:	**2,102**	AF/Y		2.81 MGD		
CAPITAL COSTS						
Pipeline		**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural		18 in.	158,400	LF	$69	$10,876,000
Right of Way Easements Rural (ROW)			158,400	LF	$16	$2,723,050
Subtotal of Pipeline						**$16,862,050**
Pump Station(s)						
Pump with intake		207 HP	1	LS	$1,678,000	$1,678,000
Engineering and Contingencies (35%)						$587,300
Subtotal of Pump Station(s)						**$2,265,300**
Storage Tanks		0.4 MG	1	LS	$331,000	**$331,000**
Engineering and Contingencies (35%)						$115,850
Subtotal of Storage Tanks						**$446,850**
Permitting and Mitigation						$778,000
CONSTRUCTION TOTAL						**$20,352,200**
Interest During Construction				12	Months	$712,000
TOTAL COST						**$21,064,000**
ANNUAL COSTS						
Debt Service (5.5% for 20 years)						$1,763,000
Operational Costs*						$2,272,000
Total Annual Costs						**$4,035,000**

UNIT COSTS (Until Amortized)

Per Acre-Foot of treated water	$1,920
Per 1,000 Gallons	$5.89

UNIT COSTS (After Amortization)

Per Acre-Foot	$1,108
Per 1,000 Gallons	$3.40

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

This strategy benefits mining water users in San Augustine County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. A contract to pull water from the Angelina River will reduce demands on other water supplies in San Augustine County and will have no other apparent impact on other State water resources.

Based on the analyses provided above, the recommended strategy for mining users in San Augustine County to purchase water from the Angelina Neches River Authority was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	2,102 ac-ft per year
Reliability	4	Reliable Supply
Cost	2	Medium to Moderate Cost
Environmental Factors	4	Low to No Impacts
Impact on Other State Water Resources	4	No known impacts to other projects.
Threat to Agricultural Resources/Rural Areas	4	Low Impact
Interbasin Transfers		No
Other Natural Resources	4	No known Impacts
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	4	Local Sponsor Identified
Implementation Issues	4	No known risks

REFERENCES

Discussions with Angelina Neches River Authority.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR SHELBY LIVESTOCK

Water User Group Name:	Shelby County Livestock
Strategy Name:	Purchase from Sabine River Authority (Sabine River)
Strategy ID:	SHEL-LTK
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	1,368 – 6,925 ac-ft per year (1.22 – 6.17 MGD)
Implementation Decade:	2020
Development Timeline:	2020
Project Capital Cost:	$25,238,000 (September 2013)
Annual Cost:	$4,893,000
Unit Water Cost (Rounded):	$699 per ac-ft ($2.15 per 1,000 gallons)

PROJECT DESCRIPTION

Livestock water demands are projected to increase significantly in Shelby County, partially due to the growing poultry industry. Current supply is from Carrizo-Wilcox aquifer and local surface water supplies. It is recommended that any large-scale user should obtain surface water from Toledo Bend Reservoir through a contract with Sabine River Authority. This strategy is a recommended strategy for livestock users in Shelby County and involves a contract between livestock water users and the Sabine River Authority for raw water from the Sabine River, as their permit allows. The cost for supply from the Sabine River includes the contractual cost of raw water and infrastructure related to water conveyance. Ultimately, the cost for raw water will need to be negotiated with the Sabine River Authority and will reflect the wholesale water rates of this entity at the time a contract is made. The cost estimate included in this technical memorandum utilizes an assumed rate for the East Texas Regional Water Planning Area regional rate for raw surface water.

SUPPLY DEVELOPMENT

The quantity of supply from this strategy represents the water need projected for Livestock in Shelby County projected by the East Texas Regional Planning Group during the planning period (2020-2070). The quantity of supply from this strategy represents a contract of 1,368 ac-ft per year, beginning in 2020, and increases over time to 6,925 ac-ft per year, beginning in 2070. The reliability of this water supply is considered high due to the availability of water projected in the Sabine River using the Texas Water Development Board's Water Availability Models. However, this strategy is dependent on coordination with the Sabine River Authority. This strategy is not dependent on any other water management strategies in the 2016 East Texas Regional Water Plan.

ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. In addition, a contract between livestock water users in Rusk County and the Sabine River Authority should have a minimal impact to environmental water needs, no impact to the surrounding habitat, and a low impact to cultural resources in the area. There are no bays or estuaries within Rusk County.

PERMITTING AND DEVELOPMENT

There are no permitting or development issues associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assumed 19 miles of pipeline (the approximate distance from the Sabine River to the center of Shelby County), a pump station with an intake, a booster pump station, and a terminal storage tank (1.2 million gallon). The annual cost was estimated using the East Texas Regional Water Planning Area regional rate for raw surface water. Overall, this strategy has a medium cost compared to other strategies in the 2016 East Texas Regional Water Plan due to the length of pipeline required and the large quantity of supply.

WUG NAME:	**Shelby County - Livestock**					
STRATEGY:	**Purchase from Toledo Bend, SRA**					
Quantity:	**7,000**	AF/Y		9.37 MGD		
CAPITAL COSTS						
Pipeline		**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural		24 in.	100,320	LF	$103	$10,332,000
Pipeline Urban		24 in.	0	LF	$144	$0
Right of Way Easements Rural (ROW)			100,320	LF	$16	$1,724,580
Right of Way Easements Urban (ROW)						$0
Engineering and Contingencies (30%)						$3,100,000
Subtotal of Pipeline						**$15,156,580**
Pump Station(s)						
Pump with intake		444 HP	1	LS	$2,352,000	$2,352,000
Booster Pump Station		444 HP	1	LS	$3,320,000	$3,320,000
Engineering and Contingencies (35%)						$1,985,200
Subtotal of Pump Station(s)						**$7,657,200**
Storage Tanks		1.2 MG	1	LS	$791,000	$791,000
Engineering and Contingencies (35%)						$276,850
Subtotal of Storage Tanks						**$1,067,850**
Permitting and Mitigation						$503,000
CONSTRUCTION TOTAL						**$24,384,630**
Interest During Construction				12	Months	$853,000
TOTAL COST						**$25,238,000**
ANNUAL COSTS						
Debt Service (5.5% for 20 years)						$2,112,000
Operational Costs*						$2,781,000
Total Annual Costs						**$4,893,000**
UNIT COSTS (Until Amortized)						
Per Acre-Foot of treated water						$699
Per 1,000 Gallons						$2.15
UNIT COSTS (After Amortization)						
Per Acre-Foot						$431
Per 1,000 Gallons						$1.32

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

This strategy benefits livestock water users in Shelby County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. A contract to pull water from the Sabine River will reduce demands on other water supplies in Shelby County and will have no other apparent impact on other State water resources.

Based on the analyses provided above, the recommended strategy for livestock users in Shelby County to purchase water from the Sabine River Authority was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	7,000 ac-ft per year
Reliability	4	Highly Reliable Supply
Cost	3	Medium Cost
Environmental Factors	4	Low Impacts
Impact on Other State Water Resources	4	No known impacts to other projects.
Threat to Agricultural Resources/Rural Areas	4	Low Impact
Interbasin Transfers		No
Other Natural Resources	4	
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	1	No Local Sponsor identified
Implementation Issues	4	No known Risks

REFERENCES

Discussions with Sabine River Authority.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR SMITH BULLARD

Water User Group Name:	Smith County Bullard
Strategy Name:	Purchase from City of Tyler
Strategy ID:	SMTH-BLD
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	51 – 985 ac-ft per year (0.05 – 0.88 MGD)
Implementation Decade:	2020
Development Timeline:	2020
Project Capital Cost:	$5,260,000 (September 2013)
Annual Cost:	$848,000
Unit Water Cost (Rounded):	$852 per ac-ft ($2.62 per 1,000 gallons)

PROJECT DESCRIPTION

This strategy is a recommended strategy for municipal water user Bullard in Smith County and involves a contract between individual Bullard and the City of Tyler for raw water. Bullard is located in ETRWPA region of Smith County. Bullard currently obtains most of its supply from Carrizo Wilcox and sales from North Cherokee WSC. A feasible strategy would be to continue using groundwater from Carrizo Wilcox. However, this cannot be recommended because of the MAG limitations in Smith County. Therefore, a contract to use City of Tyler's supplies is the recommended strategy for Bullard. In addition to this, municipal conservation is another recommended strategy. Discussion on Conservation strategies is included in a separate technical memorandum. The cost for supply from the City of Tyler includes the contractual cost of raw water and infrastructure related to water conveyance. Ultimately, the cost for raw water will need to be negotiated with the City of Tyler and will reflect the wholesale water rates of this entity at the time a contract is made. City of Tyler may have existing infrastructure near the service area for this water user and that can be used to deliver supplies to Bullard's customers. The cost estimate included in this technical memorandum utilizes an assumed rate for the East Texas Regional Water Planning Area regional rate for raw surface water.

SUPPLY DEVELOPMENT

The quantity of supply from this strategy represents the water need projected for Bullard in Smith County projected by the East Texas Regional Planning Group during the planning period (2020-2070). The quantity of supply from this strategy represents a contract of 57 ac-ft per year in 2020, increasing to 995 ac-ft per year in 2070. The reliability of this water supply is considered high due to the availability of water in City of Tyler's sources of supply. City of Tyler owns Lake Tyler and has contract for water from Lake Palestine. In addition to this, the City also has groundwater supplies in the Smith County Carrizo Wilcox. City of Tyler will decide the appropriate source of supply that is in close proximity to the water user location. However, this strategy is dependent on coordination with the City of Tyler. Depending on the source of supply City of Tyler choses for this water user, this strategy may be dependent on the completion of Tyler's construction of transmission system to access the full amount of Lake Palestine supplies. This is a recommended water management strategy for City of Tyler in 2016 Regional Water Plan.

ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. In addition, a contract between Bullard and the City of Tyler should have a minimal impact to environmental water needs, no impact to the surrounding habitat, and a low impact to cultural resources in the area. There are no bays or estuaries within Smith County.

PERMITTING AND DEVELOPMENT

There are no permitting or development issues associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assumed ten miles of pipeline (the approximate distance from the City of Tyler supplies to Bullard's service area in Smith County), a pump station with an intake, and a terminal storage tank (0.2 million gallon). The annual cost was estimated using the East Texas Regional Water Planning Area regional rate for raw surface water. Overall, this strategy has a moderate cost compared to other strategies in the 2016 East Texas Regional Water Plan due to the yield generated by the infrastructure required.

WUG NAME:	**Smith County - Bullard**				
STRATEGY:	**Purchase from City of Tyler**				
Quantity:	**985** AF/Y			0.88 MGD	
CAPITAL COSTS					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	10 in.	52,800	LF	$31	$1,653,000
Right of Way Easements Rural (ROW)		52,800	LF	$16	$907,720
Engineering and Contingencies (30%)					$496,000
Subtotal of Pipeline					**$3,056,720**
Pump Station(s)					
Pump with intake	128 HP	1	LS	$1,065,000	$1,065,000
Booster Pump Station	0 HP	1	LS	$0	$0
Engineering and Contingencies (35%)					$372,750
Subtotal of Pump Station(s)					**$1,437,750**
Storage Tanks	0.2 MG	1	LS	$229,000	$229,000
Engineering and Contingencies (35%)					$80,150
Subtotal of Storage Tanks					**$309,150**
Permitting and Mitigation					$278,000
CONSTRUCTION TOTAL					**$5,081,620**
Interest During Construction			12	Months	$178,000
TOTAL COST					**$5,260,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$440,000
Operational Costs*					$408,000
Total Annual Costs					**$848,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$852
Per 1,000 Gallons					$2.62
UNIT COSTS (After Amortization)					
Per Acre-Foot					$444

Per 1,000 Gallons $1.36

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

This strategy benefits municipal water users in Smith County and is expected to have a positive impact on their water supply security. The Carrizo Wilcox aquifer is currently over-allocated in Smith County and City of Tyler's supplies provide relief to the Carrizo Wilcox aquifer as more entities switch from groundwater to purchase water from City of Tyler. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. A contract to pull water from the City of Tyler's supplies will reduce demands on other water supplies in Smith and Anderson Counties and will have no other apparent impact on other State water resources.

Based on the analyses provided above, the recommended strategy for Bullard to purchase water from the City of Tyler was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	985 ac-ft per year
Reliability	4	Highly Reliable Supply
Cost	3	Moderate Cost
Environmental Factors	4	Low to No Impacts
Impact on Other State Water Resources	4	No known impacts to other projects.
Threat to Agricultural Resources/Rural Areas	4	Low Impact
Interbasin Transfers		No
Other Natural Resources	4	No Impacts
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	2	Sponsor identified but uncommitted
Implementation Issues	4	Limited Risk

REFERENCES

Discussions with City of Tyler.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR SMITH CRYSTAL SYSTEMS INC.

Water User Group Name:	Smith County Crystal Systems Inc.
Strategy Name:	Purchase from City of Tyler
Strategy ID:	SMTH-CYS
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	12 – 642 ac-ft per year (0.01 – 0.57 MGD)
Implementation Decade:	2020
Development Timeline:	2020
Project Capital Cost:	$2,021,000 (September 2013)
Annual Cost:	$417,000
Unit Water Cost (Rounded):	$650 per ac-ft ($1.99 per 1,000 gallons)

PROJECT DESCRIPTION

This strategy is a recommended strategy for municipal water user Crystal Systems Inc. in Smith County and involves a contract between individual Crystal Systems Inc. and the City of Tyler for raw water. Lindale is located both in Region D and ETRWPA. Crystal Systems Inc. currently obtains most of its supply from Carrizo Wilcox in Region D and ETRWPA. A feasible strategy would be to continue using groundwater from Carrizo Wilcox. However, this cannot be recommended because of the MAG limitations in Smith County. Therefore, a contract to use City of Tyler's supplies is the recommended strategy for Crystal Systems Inc. In addition to this, municipal conservation is another recommended strategy. Discussion on Conservation strategies is included in a separate technical memorandum. The cost for supply from the City of Tyler includes the contractual cost of raw water and infrastructure related to water conveyance. Ultimately, the cost for raw water will need to be negotiated with the City of Tyler and will reflect the wholesale water rates of this entity at the time a contract is made. City of Tyler may have existing infrastructure near the service area for this water user and that can be used to deliver supplies to Crystal System Inc. customers. The cost estimate included in this technical memorandum utilizes an assumed rate for the East Texas Regional Water Planning Area regional rate for raw surface water.

SUPPLY DEVELOPMENT

The quantity of supply from this strategy represents the water need projected for Crystal Systems Inc. in Smith County projected by the East Texas Regional Planning Group during the planning period (2020-2070). The quantity of supply from this strategy represents a contract of 12 ac-ft per year in 2020, increasing to 642 ac-ft per year in 2070. The reliability of this water supply is considered high due to the availability of water in City of Tyler's sources of supply. City of Tyler owns Lake Tyler and has contract for water from Lake Palestine. In addition to this, the City also has groundwater supplies in the Smith County Carrizo Wilcox. City of Tyler will decide the appropriate source of supply that is in close proximity to the water user location. However, this strategy is dependent on coordination with the City of Tyler. Depending on the source of supply City of Tyler choses for this water user, this strategy may be dependent on the completion of Tyler's construction of transmission system to access the full amount of Lake Palestine supplies. This is a recommended water management strategy for City of Tyler in 2016 Regional Water Plan.

ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. In addition, a contract between Crystal System Inc. and the City of Tyler should have a minimal impact to environmental water needs, no impact to the surrounding habitat, and a low impact to cultural resources in the area. There are no bays or estuaries within Smith County.

PERMITTING AND DEVELOPMENT

There are no permitting or development issues associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assumed two miles of pipeline (the approximate distance from the City of Tyler supplies to Crystal Systems Inc. service area in Smith County), a pump station with an intake, and a terminal storage tank (0.1 million gallon). The annual cost was estimated using the East Texas Regional Water Planning Area regional rate for raw surface water. Overall, this strategy has a moderate cost compared to other strategies in the 2016 East Texas Regional Water Plan due to the yield generated by the infrastructure required.

WUG NAME:	**Smith County - Crystal Systems Inc.**				
STRATEGY:	**Purchase from City of Tyler**				
Quantity:	**642** AF/Y		0.86 MGD		
CAPITAL COSTS					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	8 in.	10,560	LF	$28	$299,000
Right of Way Easements Rural (ROW)		10,560	LF	$16	$181,500
Engineering and Contingencies (30%)					$90,000
Subtotal of Pipeline					**$570,500**
Pump Station(s)					
Pump with intake	37 HP	1	LS	$769,000	$769,000
Engineering and Contingencies (35%)					$269,150
Subtotal of Pump Station(s)					**$1,038,150**
Storage Tanks	0.1 MG	1	LS	$197,000	**$197,000**
Engineering and Contingencies (35%)					$68,950
Subtotal of Storage Tanks					**$265,950**
Permitting and Mitigation					$78,000
CONSTRUCTION TOTAL					**$1,952,600**
Interest During Construction			12	Months	$68,000
TOTAL COST					**$2,021,000**
Debt Service (5.5% for 20 years)					$169,000
Operational Costs*					$248,000
Total Annual Costs					**$417,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$650
Per 1,000 Gallons					$1.99
UNIT COSTS (After Amortization)					
Per Acre-Foot					$405
Per 1,000 Gallons					$1.24

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

This strategy benefits municipal water users in Smith County and is expected to have a positive impact on their water supply security. The Carrizo Wilcox aquifer is currently over-allocated in Smith County and City of Tyler's supplies provide relief to the Carrizo Wilcox aquifer as more entities switch from groundwater to purchase water from City of Tyler. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. A contract to pull water from the City of Tyler's supplies will reduce demands on other water supplies in Smith and Anderson Counties and will have no other apparent impact on other State water resources.

Based on the analyses provided above, the recommended strategy for Crystal Systems Inc. to purchase water from the City of Tyler was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results are in the table below.

Criteria	Rating	Explanation
Quantity	3	642 ac-ft per year
Reliability	4	Highly Reliable Supply
Cost	3	Moderate Cost
Environmental Factors	4	Low Impacts
Impact on Other State Water Resources	4	No known impacts to other projects.
Threat to Agricultural Resources/Rural Areas	4	Low Impact
Interbasin Transfers		No
Other Natural Resources	4	No known Impacts
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	1	Sponsor unidentified
Implementation Issues	4	No known Risk

REFERENCES

Discussions with City of Tyler.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR SMITH LINDALE

Water User Group Name:	Smith Lindale
Strategy Name:	Purchase from City of Tyler
Strategy ID:	SMTH-LDL
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	52 – 797 ac-ft per year (0.04 – 0.72MGD)
Implementation Decade:	2020
Development Timeline:	2020
Project Capital Cost:	$5,803,000 (September 2013)
Annual Cost:	$862,000
Unit Water Cost (Rounded):	$1,044 per ac-ft ($3.20 per 1,000 gallons)

PROJECT DESCRIPTION

This strategy is a recommended strategy for municipal water user Lindale in Smith County and involves a contract between individual Lindale and the City of Tyler for raw water. Lindale is located both in Region D and ETRWPA. Lindale currently obtains most of its supply from Carrizo Wilcox. A feasible strategy would be to continue using groundwater from Carrizo Wilcox. However, this cannot be recommended because of the MAG limitations in Smith County. Therefore, a contract to use City of Tyler's supplies is the recommended strategy for Lindale. In addition to this, municipal conservation is another recommended strategy. Discussion on Conservation strategies is included in a separate technical memorandum. The cost for supply from the City of Tyler includes the contractual cost of raw water and infrastructure related to water conveyance. Ultimately, the cost for raw water will need to be negotiated with the City of Tyler and will reflect the wholesale water rates of this entity at the time a contract is made. The cost estimate included in this technical memorandum utilizes an assumed rate for the East Texas Regional Water Planning Area regional rate for raw surface water.

SUPPLY DEVELOPMENT

The quantity of supply from this strategy represents the water need projected for Lindale in Smith County projected by the East Texas Regional Planning Group during the planning period (2020-2070). The quantity of supply from this strategy represents a contract of 46 ac-ft per year in 2020, increasing to 797 ac-ft per year in 2070. The reliability of this water supply is considered high due to the availability of water in City of Tyler's sources of supply. City of Tyler owns Lake Tyler and has contract for water from Lake Palestine. In addition to this, the City also has groundwater supplies in the Smith County Carrizo Wilcox. City of Tyler will decide the appropriate source of supply that is in close proximity to the water user location. However, this strategy is dependent on coordination with the City of Tyler. Depending on the source of supply City of Tyler choses for this water user, this strategy may be dependent on the completion of Tyler's construction of transmission system to access the full amount of Lake Palestine supplies. This is a recommended water management strategy for City of Tyler in 2016 Regional Water Plan.

ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. In addition, a contract between Lindale and the City of Tyler should have a minimal impact to environmental water needs, no impact to the surrounding habitat, and a low impact to cultural resources in the area. There are no bays or estuaries within Smith County.

PERMITTING AND DEVELOPMENT

There are no permitting or development issues associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assumed 10 miles of pipeline (the approximate distance from the City of Tyler supplies to Lindale service area in Smith County), a pump station with an intake, and a terminal storage tank (0.1 million gallon). The annual cost was estimated using the East Texas Regional Water Planning Area regional rate for raw surface water. Overall, this strategy has a moderate cost compared to other strategies in the 2016 East Texas Regional Water Plan due to the yield generated by the infrastructure required.

WUG NAME:	**Smith County - Lindale**				
STRATEGY:	**Purchase from City of Tyler**				
Quantity:	**797** AF/Y		0.72 MGD		
CAPITAL COSTS					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	8 in.	52,800	LF	$28	$1,493,000
Pipeline Urban	8 in.	0	LF	$39	$0
Right of Way Easements Rural (ROW)		52,800	LF	$16	$907,720
Right of Way Easements Urban (ROW)					$0
Engineering and Contingencies (30%)					$448,000
Subtotal of Pipeline					**$2,848,720**
Pump Station(s)					
Pump with intake	195 HP	1	LS	$1,623,00 0	$1,623,000
Booster Pump Station	0 HP	1	LS	$0	$0
Engineering and Contingencies (35%)					$568,050
Subtotal of Pump Station(s)					**$2,191,050**
Storage Tanks	0.1 MG	1	LS	$214,000	$214,000
Engineering and Contingencies (35%)					$74,900
Subtotal of Storage Tanks					**$288,900**
Permitting and Mitigation					$278,000
CONSTRUCTION TOTAL					**$5,606,670**
Interest During Construction			12	Months	$196,000
TOTAL COST					**$5,803,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$486,000
Operational Costs*					$376,000
Total Annual Costs					**$862,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$1,044

Per 1,000 Gallons	$3.20

UNIT COSTS (After Amortization)

Per Acre-Foot	$511
Per 1,000 Gallons	$1.57

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

This strategy benefits Lindale in Smith County and is expected to have a positive impact on their water supply security. The Carrizo Wilcox aquifer is currently overallocated in Smith County and City of Tyler's supplies provide relief to the Carrizo Wilcox aquifer as more entities switch from groundwater to purchase water from City of Tyler. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. A contract to pull water from the City of Tyler's supplies will reduce demands on other water supplies in Smith and Anderson Counties and will have no other apparent impact on other State water resources.

Based on the analyses provided above, the recommended strategy for Lindale to purchase water from the City of Tyler was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	797 ac-ft per year
Reliability	4	Highly Reliable Supply
Cost	2	Moderate Cost
Environmental Factors	4	Low to No Impacts
Impact on Other State Water Resources	4	No known impacts to other projects.
Threat to Agricultural Resources/Rural Areas	4	Low Impact
Interbasin Transfers		No
Other Natural Resources	4	No known Impacts
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	1	No Sponsor identified
Implementation Issues	4	No known risks

REFERENCES

Discussions with City of Tyler.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR SMITH MANUFACTURING

Water User Group Name:	Smith Manufacturing
Strategy Name:	Purchase from City of Tyler
Strategy ID:	SMTH-MFG
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	1,764– 2,879 ac-ft per year (1.55 – 2.4 MGD)
Implementation Decade:	2020
Development Timeline:	2020
Project Capital Cost:	$7,204,000 (September 2013)
Annual Cost:	$1,698,000
Unit Water Cost (Rounded):	$590 per ac-ft ($1.81 per 1,000 gallons)

PROJECT DESCRIPTION

This strategy is a recommended strategy for Manufacturing in Smith County and involves a contract between individual manufacturing water users and the City of Tyler for raw water. City of Tyler already supplies to most of the manufacturing users in the Smith County so in some cases, it might just be an extension of the contract with current customers. This strategy will serve both the East Texas Region and North East Texas Region (Region D) manufacturing demand in Smith County. The cost for supply from the City of Tyler includes the contractual cost of raw water and infrastructure related to water conveyance. Ultimately, the cost for raw water will need to be negotiated with the City of Tyler and will reflect the wholesale water rates of this entity at the time a contract is made. The cost estimate included in this technical memorandum utilizes an assumed rate for the East Texas Regional Water Planning Area regional rate for raw surface water.

SUPPLY DEVELOPMENT

The quantity of supply from this strategy represents the water need projected for manufacturing in Smith County projected by the East Texas Regional Planning Group during the planning period (2020-2070). The quantity of supply from this strategy represents a contract of 1,764 ac-ft per year in 2020, increasing to 2,879 ac-ft per year in 2070. The reliability of this water supply is considered high due to the availability of water in City of Tyler's sources of supply. City of Tyler owns Lake Tyler and has contract for water from Lake Palestine. In addition to this, the City also has groundwater supplies in the Smith County Carrizo Wilcox. City of Tyler will decide the appropriate source of supply that is in close proximity to the water user location. However, this strategy is dependent on coordination with the City of Tyler. Depending on the source of supply City of Tyler choses for this water user, this strategy may be dependent on the completion of Tyler's construction of transmission system to access the full amount of Lake Palestine supplies. This is a recommended water management strategy for City of Tyler in 2016 Regional Water Plan.

ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. In addition, a contract between manufacturing water users in Smith County and the City of Tyler should have a minimal impact to environmental water needs, no impact to the surrounding habitat, and a low impact to cultural resources in the area. There are no bays or estuaries within Smith County.

PERMITTING AND DEVELOPMENT

There are no permitting or development issues associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assumed eight miles of pipeline (the approximate distance from the City of Tyler supplies to center of Smith County), a pump station with an intake, and a terminal storage tank (0.5 million gallon). The annual cost was estimated using the East Texas Regional Water Planning Area regional rate for raw surface water. Overall, this strategy has a high cost compared to other strategies in the 2016 East Texas Regional Water Plan due to the yield generated by the infrastructure required.

WUG NAME:	**Smith County - Manufacturing**					
STRATEGY:	**Purchase from City of Tyler**					
Quantity:	**2,879** AF/Y			3.85 MGD		
CAPITAL COSTS						
Pipeline		**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural		16 in.	42,240	LF	$58	$2,431,000
Pipeline Urban		16 in.	0	LF	$81	$0
Right of Way Easements Rural (ROW)			42,240	LF	$16	$726,110
Right of Way Easements Urban (ROW)						$0
Engineering and Contingencies (30%)						$729,000
Subtotal of Pipeline						**$3,886,110**
Pump Station(s)						
Pump with intake		254 HP	1	LS	$1,755,000	$1,755,000
Booster Pump Station		0 HP	1	LS	$0	$0
Engineering and Contingencies (35%)						$614,250
Subtotal of Storage Tanks						**$2,369,250**
Storage Tanks		0.5 MG	1	LS	$402,000	**$402,000**
Engineering and Contingencies (35%)						$140,700
Subtotal of Pump Station(s)						**$542,700**
Permitting and Mitigation						$228,000
CONSTRUCTION TOTAL						**$7,026,060**
Interest During Construction				12	Months	$246,000
TOTAL COST						**$7,272,000**
ANNUAL COSTS						
Debt Service (5.5% for 20 years)						$609,000
Operational Costs*						$1,089,000
Total Annual Costs						**$1,698,000**

UNIT COSTS (Until Amortized)

Per Acre-Foot of treated water	$590
Per 1,000 Gallons	$1.81

UNIT COSTS (After Amortization)

Per Acre-Foot	$404
Per 1,000 Gallons	$1.24

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

This strategy benefits manufacturing water users in Smith County and is expected to have a positive impact on their water supply security. Since Tyler is already supplying to Smith County's manufacturing demands, it would be easy to set up contracts with City of Tyler. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. A contract to pull water from the City of Tyler's supplies will reduce demands on other water supplies in Smith and Anderson Counties and will have no other apparent impact on other State water resources.

Based on the analyses provided above, the Smith County Manufacturing recommended strategy to purchase water from the City of Tyler was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	2,879 ac-ft per year
Reliability	4	Highly Reliable Supply
Cost	3	Medium Cost
Environmental Factors	4	Low to No Impacts
Impact on Other State Water Resources	4	No known impacts to other projects.
Threat to Agricultural Resources/Rural Areas	4	Low Impact
Interbasin Transfers		No
Other Natural Resources	4	No known Impacts
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	1	No sponsor identified
Implementation Issues	4	No known risks

REFERENCES

Discussions with City of Tyler.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR SMITH MINING

Water User Group Name:	Smith Mining
Strategy Name:	Purchase from City of Tyler
Strategy ID:	SMTH-MIN
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	114 ac-ft per year (0.1 MGD)
Implementation Decade:	2020
Development Timeline:	2020
Project Capital Cost:	$3,103,000 (September)
Annual Cost:	$402,000
Unit Water Cost (Rounded):	$3,526 per ac-ft ($10.82 per 1,000 gallons)

PROJECT DESCRIPTION

This strategy is a recommended strategy for Mining in Smith County and involves a contract between individual mining water users and the City of Tyler for raw water from the Sabine River, as their permit allows. The cost for supply from the City of Tyler includes the contractual cost of raw water and infrastructure related to water conveyance. Ultimately, the cost for raw water will need to be negotiated with the City of Tyler and will reflect the wholesale water rates of this entity at the time a contract is made. The cost estimate included in this technical memorandum utilizes an assumed rate for the East Texas Regional Water Planning Area regional rate for raw surface water.

SUPPLY DEVELOPMENT

The quantity of supply from this strategy represents the water need projected for mining in Smith County projected by the East Texas Regional Planning Group during the planning period (2020-2070). The quantity of supply from this strategy represents a contract of 114 ac-ft per year. It should be noted that mining demands for this county reduce over the course of the planning cycle and drop to 32 ac-ft per year by 2070. The reliability of this water supply is considered high due to the availability of water in City of Tyler's sources of supply. City of Tyler owns Lake Tyler and has contract for water from Lake Palestine. In addition to this, the City also has groundwater supplies in the Smith County Carrizo Wilcox. City of Tyler will decide the appropriate source of supply that is in close proximity to the water user location. However, this strategy is dependent on coordination with the City of Tyler. Depending on the source of supply City of Tyler choses for this water user, this strategy may be dependent on the completion of Tyler's construction of transmission system to access the full amount of Lake Palestine supplies. This is a recommended water management strategy for City of Tyler in 2016 Regional Water Plan.

ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. In addition, a contract between mining water users in Smith County and the City of Tyler should have a minimal impact to environmental water needs, no impact to the surrounding habitat, and a low impact to cultural resources in the area. There are no bays or estuaries within Smith County.

PERMITTING AND DEVELOPMENT

There are no permitting or development issues associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assumed eight miles of pipeline (the approximate distance from the City of Tyler supplies to center of Smith County), a pump station with an intake, and a terminal storage tank (0.1 million gallon). The annual cost was estimated using the East Texas Regional Water Planning Area regional rate for raw surface water equal to $3.00 per 1,000 gallons. Overall, this strategy has a high cost compared to other strategies in the 2016 East Texas Regional Water Plan due to the yield generated by the infrastructure required.

WUG NAME:	**Smith County - Mining**					
STRATEGY:	**Purchase from City of Tyler**					
Quantity:	**114** AF/Y			0.15 MGD		
CAPITAL COSTS						
Pipeline	**Size**	**Quantity**	**Unit**		**Unit Price**	**Cost**
Pipeline Rural	6 in.	42,240	LF		$18	$768,000
Pipeline Urban	6 in.	0	LF		$25	$0
Right of Way Easements Rural (ROW)		42,240	LF		$16	$726,110
Right of Way Easements Urban (ROW)						$0
Engineering and Contingencies (30%)						$230,000
Subtotal of Pipeline						**$1,724,110**
Pump Station(s)						
Pump with intake	5 HP	1	LS		$620,000	$620,000
Booster Pump Station	0 HP	1	LS		$0	$0
Engineering and Contingencies (35%)						$217,000
Subtotal of Pump Station(s)						**$837,000**
Storage Tanks	**0.1 MG**	**1**	**LS**		$193,000	**$193,000**
Engineering and Contingencies (35%)						$67,550
Subtotal of Storage Tanks						**$260,550**
Permitting and Mitigation						$228,000
CONSTRUCTION TOTAL						**$3,049,660**
Interest During Construction				6	Months	$53,000
TOTAL COST						**$3,103,000**
ANNUAL COSTS						
Debt Service (5.5% for 20 years)						$260,000
Operational Costs*						$142,000
Total Annual Costs						**$402,000**
UNIT COSTS (Until Amortized)						
Per Acre-Foot of treated water						$3,526
Per 1,000 Gallons						$10.82
UNIT COSTS (After Amortization)						
Per Acre-Foot						$1,263
Per 1,000 Gallons						$3.88

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

This strategy benefits mining water users in Smith County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. A contract to pull water from the City of Tyler's supplies will reduce demands on other water supplies in Smith and Anderson Counties and will have no other apparent impact on other State water resources.

Based on the analyses provided above, the Smith County Mining recommended strategy to purchase water from the City of Tyler was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	114 ac-ft per year
Reliability	4	Highly Reliable Supply
Cost	2	Moderate to High Cost
Environmental Factors	4	Low to No Impacts
Impact on Other State Water Resources	4	No known impacts to other projects.
Threat to Agricultural Resources/Rural Areas	4	Low Impact
Interbasin Transfers		No
Other Natural Resources	4	No known Impacts
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	1	No Sponsor identified
Implementation Issues	4	No known risks

REFERENCES

Discussions with City of Tyler.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR TRINITY IRRIGATION

Water User Group Name:	Trinity Irrigation
Alternative Strategy Name:	Purchase from County-Other (Yegua-Jackson Aquifer)
Alternative Strategy ID:	TRTY-IRR1
Alternative Strategy Type:	Existing Groundwater Source
Potential Supply Quantity:	331 ac-ft per year (0.3 MGD)
Implementation Decade:	2020
Development Timeline:	2020
Project Capital Cost:	$2,174,000 (September 2013)
Annual Cost:	$327,000
Unit Water Cost (Rounded):	$988 per ac-ft ($3.03 per 1,000 gallons)

PROJECT DESCRIPTION

This Fourth Planning Cycle of regional water planning is the first cycle where the Texas Water Development Board projects an Irrigation demand (500 ac-ft per year) in Trinity County. The East Texas Regional Water Planning Group believes this demand may have been overestimated and has decided to leave 331 ac-ft per year of the projected demand unmet.

In the event that this demand is not overestimated, the group has decided to create an *alternative strategy* for Irrigation in Trinity County. The strategy involves a contract between individual irrigation water users and individual entities aggregated together by the Texas Water Development Board as Trinity County-Other. The cost for supply from Trinity County-Other includes the cost of raw water and infrastructure related to water conveyance. Ultimately, the cost for raw water will need to be negotiated with the individual County-Other entities and will reflect the wholesale water rates of the entity at the time a contract is made. The cost estimate included in this technical memorandum utilizes an assumed rate for the East Texas Regional Water Planning Area regional rate for raw ground water.

SUPPLY DEVELOPMENT

The quantity of supply from this strategy represents the irrigation need projected in Trinity County by the East Texas Regional Water Planning Group. The reliability of this water supply is considered medium because the wells required to pump groundwater are already in place and the water is available from the Yegua-Jackson aquifer according to the Texas Water Development Board's groundwater availability models. However, this strategy is dependent upon coordination with individual County-Other entities and assumes that these entities would be willing to sell their unused groundwater supplies to irrigation water users. This strategy is not dependent on any other water management strategies in the 2016 East Texas Regional Water Plan. The quantity of supply from this strategy represents a contract of 331 ac-ft per year, beginning in 2020, and remains constant through the end of the planning period, 2070.

ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be temporary and minimal. In addition, a contract between irrigation water users in Trinity County and individual County-Other entities

have a minimum impact to environmental water needs, no impact to the surrounding habitat, and a low impact to cultural resources in the area. There are no bays or estuaries in Trinity County.

PERMITTING AND DEVELOPMENT

There are no permitting or development issues associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs include 3 miles of pipeline (assumed water would be purchased within close proximity to where it will be used), a pump station with an intake, and one terminal storage tank with one day of storage. The annual cost was estimated using the East Texas Regional Water Planning Area regional rate for raw ground water. Overall, this strategy has a medium cost compared to other strategies in the 2016 East Texas Regional Water Plan due to the small rate of water associated with the strategy.

WUG NAME:	**Trinity Irrigation**				
Alternative Strategy:	***Purchase from County-Other (Groundwater)***				
Groundwater Quantity:	**331** AF/Y			0.44 MGD	
CAPITAL COSTS					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	6 in.	15,840	LF	$18	$288,000
Right of Way Easements Rural (ROW)		15,840.0	LF	$16	$272,250
Engineering and Contingencies (30%)					$86,000
Subtotal of Pipeline	**3**	**miles**			**$646,250**
Pump Station(s)					
Booster Pump Station	26 HP	1	LS	$754,000	$754,000
Engineering and Contingencies (35%)					$263,900
Subtotal of Pump Station(s)					**$1,017,900**
Storage Tanks	0.3 MG	1	LS	$274,151	**$274,151**
Engineering and Contingencies (35%)					$95,953
Subtotal of Storage Tanks					**$370,104**
Permitting and Mitigation					$103,000
CONSTRUCTION TOTAL					**$2,137,254**
Interest During Construction			6	Months	$37,000
TOTAL CAPITAL COST					**$2,174,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$182,000
Operational Costs*					$145,000
Total Annual Costs					**$327,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$988
Per 1,000 Gallons					$3.03
UNIT COSTS (After Amortization)					
Per Acre-Foot					$462
Per 1,000 Gallons					$1.42

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

This *alternative strategy* benefits irrigation users in Trinity County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. A contract to purchase groundwater from individual County-Other entities will reduce demands on other water supplies in Trinity County and will have no other apparent impact on other State water resources. From a third party social and economic perspective, this voluntary redistribution of water will be beneficial because it provides water for economic growth.

Based on the analyses provided above, the Trinity Irrigation *alternative strategy* to purchase water from the Trinity County-Other was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	3	331 acre feet per year
Reliability	4	Reliable Supply
Cost	3	Low to Medium Cost
Environmental Factors	4	Low to No Impacts
Impact on Other State Water Resources	4	No Impacts
Threat to Agricultural Resources/Rural Areas	4	No Impacts
Interbasin Transfers		No
Other Natural Resources	4	No Impacts
Major Impacts on Key Water Quality Parameters	4	No Impacts
Political Feasibility	1	Sponsor Unknown at this time.
Implementation Issues	4	No known risks

REFERENCES

2011 East Texas Regional Water Plan.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR CONSERVATION

Project Name:	Municipal Conservation – Multiple Water Users
Project ID:	WUG_CONS
Project Type:	Conservation
Potential Supply Quantity (Rounded):	Varies, Specific to WUG
Implementation Decade:	2020 (Project Year)
Development Timeline:	1 years
Project Capital Cost:	$0 (Sept. 2013)
Annual Cost:	Varies, Specific to WUG
Unit Water Cost (Rounded):	Varies, Specific to WUG

PROJECT DESCRIPTION

Water Conservation best management practices were evaluated for municipal water user groups that have a projected per capita water use greater than 140 gpcd and have either demonstrated needs in the planning period or recommended water management strategies that involve interbasin transfer. Evaluated water conservation practices included enhanced public and school education, water conservation pricing, and an enhanced water loss control program. In ETRWPA, water conservation strategies are identified for the following list of municipal water user groups.

1) Alto Rural WSC, Cherokee County
2) City of Bullard, Smith County
3) City of Chandler, Henderson County
4) City of Crystal Systems Inc., Smith County
5) City of Lindale, Smith County
6) City of Overton, Rusk County
7) R-P-M WSC, Smith County
8) Woodville, Tyler County

Discussion of the basic conservation measures, conservation savings, and the corresponding annual costs for these municipal water user groups is discussed in this technical memorandum.

In addition to this basic and advanced conservation strategies are proposed for the following wholesale water providers with municipal customers.

1) City of Beaumont – Advanced Conservation
2) City of Port Arthur – Advanced Conservation
3) Athens Municipal Water Authority – Municipal Conservation for City of Athens in Region C

The conservation strategies for City of Beaumont and City of Port Arthur are also discussed in separate technical memorandums for wholesale water providers. Discussion of City of Athens conservation strategy can be found in the 2016 Region C Water Plan.

SUPPLY DEVELOPMENT

The supply for this strategy represents conservation savings due to enhanced public and school education, water conservation pricing implementation, and an enhanced water loss control program. Below is a table showing the conservation savings for the municipal water user groups.

Total Supply Savings from Conservation Strategy (Acre Feet per Year)						
Water User Group Name	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
ALTO RURAL WSC	0	0	5	7	9	11
ATHENS MWA	See City of Athens Conservation Strategy 2016 Region C Plan					
BEAUMONT	0	3,238	5,341	7,047	8,579	9,966
BULLARD	11	24	30	38	47	56
CHANDLER	0	0	0	16	30	36
CRYSTAL SYSTEMS INC	4	9	12	15	19	22
LINDALE	8	17	22	28	34	41
OVERTON	17	18	106	181	241	289
PORT ARTHUR	4,992	7,450	8,516	9,616	10,340	9,767
WOODVILLE	0	0	10	16	18	19
R-P-M WSC	4	23	36	54	71	86
Grand Total	**5,033**	**10,762**	**14,150**	**17,147**	**19,559**	**20,499**

ENVIRONMENTAL CONSIDERATIONS

No environmental considerations associated with this strategy.

PERMITTING AND DEVELOPMENT

No additional permitting required for this strategy

PLANNING LEVEL OPINION OF COST

No capital costs were identified for the conservation strategies. Below is a summary of annual costs and the unit costs for the water users with conservation strategies.

	Capital Cost ($)	Annual Cost ($)	Unit Cost ($ per acre feet)	Unit Cost ($ per 1,000 gallons)
ALTO RURAL WSC	-	$4,648	$423	$1.30
ATHENS MWA	-	See City of Athens Conservation Strategy 2016 Region C Plan		
BEAUMONT	$52,623,000	$2,271,000	$317	$0.97
BULLARD	-	$11,789	$489	$1.50
CHANDLER	-	$5,812	$489	$1.50
CRYSTAL SYSTEMS INC	-	$3,129	$325	$1.00
LINDALE	-	$7,967	$454	$1.39
OVERTON	$2,105,000	$111,298	$914	$2.81
PORT ARTHUR	$50,075,000	$2,169,000	$367	$1.13
R-P-M WSC	-	$7,967	$454	$1.39
WOODVILLE	-	$3,992	$489	$1.50

PROJECT EVALUATION

Based on the analysis provided above, the municipal conservation project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity		Varies, Specific to Entities
Reliability	4	Reliable Supply
Cost	3-4	Low to Medium Cost
Environmental Factors	5	Low Impacts
Impact on Other State Water Resources	5	No Impacts
Threat to Agricultural Resources/Rural Areas	5	No Impacts
Interbasin Transfers		No
Other Natural Resources	5	No Impacts
Major Impacts on Key Water Quality Parameters	5	No Impacts
Political Feasibility	2	Sponsor identified but not committed
Implementation Issues	4	Limited Risk

REFERENCES

2011 East Texas Regional Water Plan.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR ANRA LAKE COLUMBIA

Project Name:	Lake Columbia
Project ID:	ANRA-COL
Project Type:	New Surface Water Source
Potential Supply Quantity (Rounded):	75,600 ac-ft per year (67.4 MGD)
Implementation Decade:	2030 (Project Year)
Development Timeline:	5-10 years
Project Capital Cost:	$344,498,000 (Sept. 2013)
Unit Water Cost (Rounded):	$333 per ac-ft (during loan period) $13 per ac-ft (after loan period)

PROJECT DESCRIPTION

Project Description for the Lake Columbia Strategy is based on the information provided by Angelina and Neches River Authority (ANRA) and summarized in the October 2014 Draft Dallas Long Range Water Supply Plan. Angelina Neches River Authority is the sponsor for the Lake Columbia project on Mud Creek in Cherokee and Rusk Counties. Lake Columbia is a recommended strategy in the 2011 East Texas Regional Water Plan (ETRWP). Angelina Neches River Authority has been granted a water right permit (Permit No. 4228) by the TCEQ to impound 195,500 acre feet per year and to divert 85,507 acre feet per year (76.3 MGD) for municipal and industrial purposes. Angelina Neches River Authority currently has contracted with customers for 53 percent of the 85,507 ac-ft per year permit of the proposed Lake Columbia reservoir. The City of Dallas is also considering Lake Columbia as a recommended strategy. After considering the local needs in the East Texas Region, Dallas' projected share of the proposed Lake Columbia project is 56,000 ac-ft per year by 2070. This water management strategy for Angelina Neches River Authority was developed to address the total current contracted and potential future customer demand through the construction of Lake Columbia. Angelina Neches River Authority holds the water right for the supply source and will be the project sponsor. It was specified in the 2014 Draft Dallas Long Range Supply Plan that Dallas will be responsible for 70 percent of the dam, reservoir land acquisition, and relocations, and Angelina Neches River Authority will be responsible for the remaining 30 percent of the reservoir construction and land acquisitions costs. This cost split is subject to change during the potential negotiations between Dallas and Angelina Neches River Authority. The Lake Columbia dam site is located two to three miles downstream of Highway 79 on Mud Creek in Cherokee County. The contributing drainage area for the reservoir is approximately 384 square miles. The total conservation pool volume is 195,500 acre feet per year and the top of conservation pool is at the elevation of 315 ft MSL. The conservation pool covers an area of approximately 10,133 acres and the flood pool covers an additional area of 1,367 acres.

CURRENT CONTRACTED AND POTENTIAL CUSTOMERS

Angelina Neches River Authority has contracts with several customers in East Texas Regional Planning Area. The water suppliers currently under contract with Angelina Neches River Authority are listed in Table 1 below along with the current participation percentage. Also included below is Table 2 showing the potential future customers for Angelina Neches River Authority and their corresponding demands. The contract amounts are based on the full permitted diversion. The development of infrastructure to deliver the water to the end users is discussed in separate strategies.

Customers for Lake Columbia				
Recipient	**County**	**Basin**	**Percent Participation in Columbia**	**Contract Amount (ac-ft per year)**
Current Contracted Customers				
Afton Grove WSC, Stryker Lake WSC	Cherokee	Neches	4.5%	3,848
Jacksonville	Cherokee	Neches	5.0%	4,275
New Summerfield	Cherokee	Neches	3.0%	2,565
North Cherokee WSC	Cherokee	Neches	5.0%	4,275
Rusk	Cherokee	Neches	5.0%	4,275
Rusk Rural WSC	Cherokee	Neches	1.0%	855
City of Alto	Cherokee	Neches	0.5%	428
Caro WSC	Nacogdoches	Neches	0.5%	428
Nacogdoches	Nacogdoches	Neches	10.0%	8,551
New London	Rusk	Sabine	1.0%	855
Troup	Smith	Neches	5.0%	4,275
Arp	Smith	Neches	0.5%	428
Blackjack WSC	Smith	Neches	1.0%	855
Jackson WSC	Smith	Neches	1.0%	855
Whitehouse	Smith	Neches	10.0%	8,551
Additional Customers for Lake Columbia				
City of Dallas		Trinity		56,050

Table 2. Potential Future Customer Demand (ac-ft per year) for Lake Columbia

Recipient	2020	2030	2040	2050	2060	2070
Holmwood Utility	65	70	70	70	70	70
Steam Electric Demand – Cherokee	8,000	15,000	20,000	20,000	20,000	20,000
Manufacturing – Rusk County Refinery	5,600	5,600	5,600	5,600	5,600	5,600
Mining - Angelina	474	573	398	300	225	168
Mining - Cherokee	238	247	210	147	84	40
Mining - Nacogdoches	5,475	2,975	118	0	0	0
Mining – San Augustine	2,102	1,102	0	0	0	0
Mining – Rusk	1,075	2,092	1,955	1,809	1,686	1,677
Total Future Customer Demand	**23,028**	**27,658**	**28,350**	**27,926**	**27,665**	**27,555**

SUPPLY DEVELOPMENT

Firm yield for Lake Columbia was determined by means of the water availability analysis using the Neches Basin Water Availability Model (WAM). This model was downloaded from TCEQ website in 2009. The firm yield of the Lake was estimated to be 75,600 acre feet per year in 2020 and reducing to 75,350 acre feet per year in 2070. It should be noted that the water management strategies for the reservoir development and the transmission connections were all based on the firm supplies available

from Lake Columbia. The firm yield reported in the October, 2014 Draft Dallas Long Range Water Supply Plan is very similar to the firm yield generated using the WAM models.

ENVIRONMENTAL CONSIDERATIONS

The summary of environmental considerations was developed based on the known environmental factors that have been discussed in the Draft Environmental Impact Study (DEIS).

Habitat – The footprint of Lake Columbia will impact approximately 5,746.5 acres of waters of the U.S., including 3,689 acres of forested wetlands and the remainder comprised of shrub and emergent wetlands (144 and 1,518 acres, respectively), open water, streams and a hillside bog.

Environmental Flows – The current TCEQ Permit No. 4228 allowing the construction and operation of Lake Columbia does not require any instream flow releases. However, if Dallas wants to move water from Lake Columbia in Neches Basin to Trinity River Basin, an amendment to the Permit is required to allow interbasin transfers. Amendments to the Permit may be subject to recently adopted instream flow standards.

Bays and Estuaries – Lake Columbia project is over 280 river miles upstream from the Neches estuary at Sabine Lake and is therefore expected to have no measureable effect on the fresh water inflows into Sabine Lake and Sabine Lake estuary. Recognizing the diminishing effect of upstream distance on bay and estuary inflows, the Texas Water Code (Section 11.147) requires consideration of such effects only if a proposed project is within 200 river miles of the coast.

Threatened and Endangered Species - The Lake Columbia project area includes six federally listed species, five of which are also listed by the state. The state lists fourteen additional species within Smith and Cherokee Counties where the lake would be developed.

Environmental Factors	Level of Concern
Habitat	High
Environmental Water Needs	Medium Impact
Bay and Estuaries	Low Impact
Threatened and Endangered Species	Low Impact
Wetlands	High (5,351.5 acres of wetlands)

PERMITTING AND DEVELOPMENT

Angelina Neches River Authority has a water right for Lake Columbia and is currently seeking a 404 permit for construction. A draft environmental impact study (DEIS) has been prepared for Lake Columbia by the USACE. The DEIS was published on January 29, 2010 and public and agency comments were provided on March 30, 2010. Currently, the Lake Columbia project is subject to completion of the EIS and issuance of a 404 permit from the U.S Army Corps of Engineers (USACE).

Lake Columbia is in the permitting phase, and has contracts with several local participants. According to Angelina Neches River Authority, the participants have the right of first refusal to contract for water in the next phase of the project. The Texas Water Development Board is a 47% participant and has the right of refusal for 35.9 MGD (40,188 acre feet per year) of supply. Process for water contracts will be initiated after the issuance of the Section 404 permit from the USACE.

If Dallas were to participate in the Lake Columbia project, the current permit no. 4228 has to be amended

for an interbasin transfer from the Neches to the Trinity basin. There is a potential that the authorized diversions from Lake Columbia project may be subject to some reductions due to the environmental flow standards that may be applied during the amendment process.

Permit	Regulatory Entity	Potential Challenges
Water Right Permit Amendment	TCEQ	May require interbasin transfer authorization for Dallas to transfer water from Neches to Trinity basin.
404	USACE	Required to proceed with construction in waters of the US.

PLANNING LEVEL OPINION OF COST

Both Angelina Neches River Authority and participating entities will share in the costs associated with the Lake Columbia water management strategy. Construction costs are divided into three separate categories: reservoir, water treatment plant and transmission system. A planning level opinion of cost (PLOC) for the construction of the reservoir is included below. A planning level opinion of cost (PLOC) for the water treatment plant and distribution system is included in a separate Tech Memo. For reservoir construction, unit costs are based on the WAM Run 3 yield estimate of 75,600 ac-ft per year. The detailed cost estimate below represents the total cost for the construction of the project. It was noted in the Dallas Long Range Supply Plan that Dallas will bear responsibility for 70 percent of reservoir construction and relocation costs and Angelina Neches River Authority will be responsible for the remaining 30 percent. However, the actual percent distribution of the project cost will be determined based on the future negotiations between Angelina Neches River Authority and other participants.

WWP NAME: **ANRA**
STRATEGY: **Lake Columbia**
AMOUNT (ac-ft per year): **75,600**

Dam	**Cost**
Embankment	$27,396,279
Internal Drainage	$657,684
Slope Protection & Crest Roadway	$4,627,905
Service Spillway	$6,393,169
Outlet Works	$1,310,317
Instrumentation	$694,686
Miscellaneous Items	$5,324,652
Engineering	$7,573,517
Contingencies	$9,280,959
Sub Total For Dam	**$63,259,169**
Transportation Conflicts	
Roads	$3,292,439
Highways	$35,969,978
Railroads	$30,452,793
Erosion Protection	$4,432,898
Engineering	$11,632,584
Contingencies	$14,829,581
Subtotal for Transportation Conflicts	**$100,610,273**

Utility Conflicts

Communications	$2,701,029
Electric Utilities	$16,200,606
Oil and Gas	$4,049,069
Water Utilities	$170,992
Engineering	$69,365
Contingencies	$4,624,298
Subtotal for Utility Conflicts	**$27,815,358**
Project Site Acquisition	
Property Purchase	$24,540,441
Conservation Easement	$1,778,251
Survey and Appraisal	$1,391,536
Professional Fees	$807,856
Engineering	$876,500
Contingencies	$5,703,637
Sub Total for Project Site Acquisition	**$35,098,220**
Mitigation	
Mitigation	$91,804,133
Contingencies	$7,780,067
Sub Total for Mitigation	**$99,584,200**
Cultural Resources	
Archeological/Historical Resources	$14,861,326
Engineering	$297,251
Contingencies	$2,972,306
Sub Total for Cultural Resources	**$18,130,884**
TOTAL CONSTRUCTION COST	**$344,498,000**
ANNUAL COSTS	
Debt Service for Reservoirs (5.5% for 40 years)	$13,465,711
Debt Service for Relocations (5.5% for 20 years)	$10,746,571
Operation & Maintenance	$948,900
Total Annual Costs	**$25,161,000**
UNIT COSTS (Until Amortized)	
Per Acre-Foot of treated water	$332.8
Per 1,000 Gallons	$1.02
UNIT COSTS (After Amortization)	
Per Acre-Foot	$12.6
Per 1,000 Gallons	$0.04

PROJECT EVALUATION

Based on the analysis provided above, the Lake Columbia Reservoir Construction project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	75,600 acre feet per year
Reliability	4	Reliable Supply
Cost	4	Medium Cost
Environmental Factors	3	Medium Impacts
Impact on Other State Water Resources	4	No Impacts
Threat to Agricultural Resources/Rural Areas	4	No Impacts
Interbasin Transfers		Yes, if Dallas uses the Supplies
Other Natural Resources	4	No Impacts
Major Impacts on Key Water Quality Parameters	4	No Impacts
Political Feasibility	4	Local Sponsor is ANRA
Implementation Issues	3	Contract with City of Dallas

REFERENCES

October 2014 Draft Dallas Long Range Water Supply Plan.

2011 East Texas Regional Plan.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR ANRA WTP

Project Name:	ANRA Treatment Plant and Distribution System
Project ID:	ANRA-WTP
Project Type:	Existing Surface Water Source
Potential Supply Quantity (Rounded):	22,232 ac-ft per year (10 MGD)
Implementation Decade:	2020
Development Timeline:	5 years
Project Capital Cost:	$117,250,000 (Sept. 2013)
Unit Water Cost (Rounded):	$1,883per ac-ft (during loan period) $5.78 per 1,000 gallons

PROJECT DESCRIPTION

Project Description for the Lake Columbia Strategy is based on the information summarized in the October 2014 Draft Dallas Long Range Water Supply Plan. Angelina Nacogdoches River Authority Angelina Neches River Authority is the sponsor for the Lake Columbia project on Mud Creek in Cherokee and Rusk Counties. Lake Columbia is a recommended strategy in the 2011 East Texas Regional Water Plan (ETRWP). Angelina Neches River Authority has been granted a water right permit (Permit No. 4228) by the TCEQ to impound 195,500 acre feet per year and to divert 85,507 acre feet per year (76.3 MGD) for municipal and industrial purposes. Angelina Neches River Authority currently has contracted customers for 53 percent of the 85,507 ac-ft per year permit of the proposed Lake Columbia reservoir. This water management strategy for Angelina Neches River Authority was developed to address the current contracted demand for the customers receiving treated water from this wholesale provider.

Angelina Neches River Authority has contracts with several customers in East Texas Regional Planning Area. The water suppliers currently under contract with Angelina Neches River Authority are listed in Table below along with the current participation percentage. It is assumed that Afton Grove WSC, Stryker Lake WSC, New Summerfield, and all municipal customers in Smith County will purchase treated water from Angelina Neches River Authority. Therefore, a recommended water management strategy for Angelina Neches River Authority is to construct a Water Treatment Plant and the distribution system to supply treated water to these customers. Transmission system costs are shared among the contracted suppliers that receive treated water.

Customers for Lake Columbia				
Recipient	**County**	**Basin**	**Percent Participation in Columbia**	**Contract Amount (ac-ft per year)**
Current Contracted Customers				
Afton Grove WSC, Stryker Lake WSC	Cherokee	Neches	4.5%	3,848
Jacksonville	Cherokee	Neches	5.0%	4,275
New Summerfield	Cherokee	Neches	3.0%	2,565
North Cherokee WSC	Cherokee	Neches	5.0%	4,275

Rusk	Cherokee	Neches	5.0%	4,275
Rusk Rural WSC	Cherokee	Neches	1.0%	855
City of Alto	Cherokee	Neches	0.5%	428
Caro WSC	Nacogdoches	Neches	0.5%	428
Nacogdoches	Nacogdoches	Neches	10.0%	8,551
New London	Rusk	Sabine	1.0%	855
Troup	Smith	Neches	5.0%	4,275
Arp	Smith	Neches	0.5%	428
Blackjack WSC	Smith	Neches	1.0%	855
Jackson WSC	Smith	Neches	1.0%	855
Whitehouse	Smith	Neches	10.0%	8,551
Additional Customers for Lake Columbia				
City of Dallas		Trinity		56,050

SUPPLY DEVELOPMENT

The supply for this strategy comes from Lake Columbia. The firm yield for Lake Columbia was determined by means of the water availability analysis using the Neches Basin Water Availability Model (WAM). This model was downloaded from TCEQ website in 2009. The firm yield of the Lake was estimated to be 75,600 acre feet per year in 2020 and dropping down to 75,350 acre feet per year in 2070. The water management strategies for the water treatment plant and transmission connections were all based on the firm supplies available from Lake Columbia.

STRATEGY DESCRIPTION

The purpose of this water management strategy is to develop a treatment facility to treat the supplies delivered to potential municipal customers purchasing treated water from Angelina Neches River Authority. The municipal customers are Stryker WSC, Afton Grove WSC, Jackson WSC, Blackjack WSC, City of New Summerfield, City of New London, City of Troup, City of Arp, and City of Whitehouse.

ENVIRONMENTAL CONSIDERATIONS

There are no significant environmental considerations associated with the treatment plant construction and the transmission system strategy.

PERMITTING AND DEVELOPMENT

There are no permitting issues associated with the construction of the water treatment facilities and the transmission facilities.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for the water treatment plant and distribution system is included below. Construction costs include the construction of water treatment plant, pipeline segments, pump station and storage tank to deliver the supplies. The annual costs were estimated assuming 5.5% interest rate over a period of 20 years. The planning level opinion of probable construction cost estimates also include cost of purchase of raw water and treated water from Angelina Neches River Authority.

WWP NAME: **Angelina Neches River Authority**
STRATEGY: **Regional Water Treatment Facilities**
Quantity: **22,232** **AF/Y** 30 MGD Peak

CONSTRUCTION COSTS

Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Subtotal					$14,768,000
Engineering and Contingencies (30%)					$4,430,000
Subtotal of Pipeline					**$24,269,440**
Pump Station(s)					
Pump with intake & building	3157 HP	2	LS	$5,641,000	$11,282,000
Engineering and Contingencies (35%)					$3,948,700
Subtotal of Pump Station(s)					**$15,230,700**
Water Treatment Plant	30 MGD	1	LS	$52,792,000	**$52,792,000**
Storage Tanks	3.7 MG	1	LS	$1,154,320	**$1,154,000**
Engineering and Contingencies (35%)					$18,881,100
Subtotal					**$72,827,100**
Permitting and Mitigation					$957,746
Construction Total					**$113,284,986**
Interest During Construction			12	Months	$3,965,000
TOTAL COST					**$117,250,000**

ANNUAL COSTS

Debt Service (5.5% for 20 years)	$9,811,000
Electricity ($0.09 kWh)	$1,292,000
Operational Costs*	$41,859,000
UNIT COSTS (Until Amortized)	
Per Acre-Foot of treated water	$1,883
Per 1,000 Gallons	$5.78
UNIT COSTS (After Amortization)	
Per Acre-Foot	$1,442
Per 1,000 Gallons	$4.42

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

Based on the analysis provided above, the Angelina Neches River Authority Regional Water Treatment Facilities project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	22,232 ac-ft per year
Reliability	3	Highly Reliable Supply
Cost	2	Medium to High Cost
Environmental Factors	4	Low Impacts
Impact on Other State Water Resources	4	Low Impact
Threat to Agricultural Resources/Rural Areas	4	Low
Interbasin Transfers		No
Other Natural Resources	4	No known Impacts
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	4	Local Sponsorship by ANRA
Implementation Issues	3	Dependent on Lake Columbia Construction

REFERENCES

2011 East Texas Regional Plan

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR ANRA GW WELLS

Project Name:	ANRA Groundwater Wells
Project ID:	ANRA-GW
Project Type:	New Groundwater Source
Potential Supply Quantity (Rounded):	5,600 ac-ft per year (5 MGD)
Implementation Decade:	2020
Development Timeline:	3 years
Project Capital Cost:	$26,023,000 (Sept. 2013)
Unit Water Cost (Rounded):	$578 per ac-ft (during loan period) $1.78 per 1,000 gallons

PROJECT DESCRIPTION

Angelina Neches River Authority will plan to develop groundwater wells in Cherokee and Rusk counties to supply water to manufacturing demand in Rusk County. The list of customers is presented in the table below. Angelina Neches River Authority will develop approximately 5,600 ac-ft per year.

SUPPLY DEVELOPMENT

The supply for this strategy comes from Carrizo Wilcox aquifer in Cherokee and Rusk counties. Based on the supplies reported in the Modeled Available Groundwater (MAG) reports, there are sufficient groundwater supplies available in Cherokee and Rusk counties for this strategy. It was noted that developing this strategy will not result in over allocation of groundwater supplies in those counties.

ENVIRONMENTAL CONSIDERATIONS

There are no significant environmental considerations associated with the treatment plant construction and the transmission system strategy.

PERMITTING AND DEVELOPMENT

There are no permitting issues associated with the construction of the water treatment facilities and the transmission facilities.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for the water treatment plant and distribution system is included below. Construction costs include the construction of water treatment plant, pipeline segments, pump station and storage tank to deliver the supplies. The annual costs were estimated assuming 5.5% interest rate over a period of 20 years.

WWP NAME: ANRA - New Ground Water Wells
WMS: New Wells in Cherokee and Rusk Counties

Supply	5,600	Ac-ft/yr	3,472	gpm
Depth to Water	300	ft		
Well Depth	1,000	ft		
Well Yield	200	gpm		
Well Size	12	in		

Construction Costs	Number	Unit Cost	Total Cost
Water Wells	18	$478,389	$8,611,003
Connection to Transmission System	18	$50,000	$900,000
Engineering and Contingencies (30% for pipelines, 35% for other items)			$3,284,000
Subtotal of Well(s)			**$12,795,003**

Transmission System	Size	Quantity	Unit	Unit Cost	Total Cost
Pipeline - Rural	24 in.	26,400	LF	$103	$2,719,000
Pump Station	890 HP	1	EA	$5,617,000	$5,617,000
Ground Storage Tank	0.63 MG	1	EA	$435,189	$435,189
Easement - Rural		26,400	LF	$16	$453,860
Engineering and Contingencies (30% for pipelines, 35% for other items)					$2,934,000
Subtotal for Transmission		**5**	**miles**		**12,159,049**

Permitting and Mitigation			$189,000
Construction Total			$25,143,052
Interest During Construction	12	Months	$880,000
TOTAL CAPITAL COST			**$26,023,000**

Debt Service (5.5% for 20 years)	$2,178,000
Operational Costs*	$1,061,490
Total Annual Cost	**$3,239,000**

UNIT COSTS (Until Amortized)	
Cost per ac-ft	$578
Cost per 1000 gallons	$1.78

UNIT COSTS (After Amortization)	
Cost per ac-ft	$190
Cost per 1000 gallons	$0.58

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

Based on the analysis provided above, the ANRA Groundwater Wells project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	5,600 ac-ft per year
Reliability	4	Highly Reliable Supply
Cost	3	Low to Medium Costs
Environmental Factors	4	Low Impacts
Impact on Other State Water Resources	4	Low Impact
Threat to Agricultural Resources/Rural Areas	4	Low
Interbasin Transfers		No
Other Natural Resources	4	No known Impacts
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	4	Local Sponsorship by ANRA
Implementation Issues	4	No known Implementation Risks

REFERENCES

Discussions with Angelina Neches River Authority.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR ANRA RUN-OF-RIVER SUPPLIES

Project Name:	ANRA Run-of-River Supplies
Project ID:	ANRA-ROR
Project Type:	New Surface Water Source
Potential Supply Quantity (Rounded):	30,000 ac-ft per year (27 MGD)
Implementation Decade:	2020
Development Timeline:	5 years
Project Capital Cost:	NA
Unit Water Cost (Rounded):	NA

PROJECT DESCRIPTION

In addition, Angelina Neches River Authority has been approached to supply water for mining purposes Angelina, Cherokee, Nacogdoches, Shelby, San Augustine, Rusk, and Sabine counties. The mining demand will be met with run-of-the-river diversions. Additional potential customer are the steam electric power plant owners in Cherokee county. Angelina Neches River Authority has already applied for 10,000 ac-ft per year of run-of-the-river supplies from Mud Creek in Cherokee County. The application process for this permit is administratively complete. Angelina Neches River Authority is planning to apply for additional 20,000 ac-ft per year of run-of-the-river supplies in Cherokee County. With the additional supplies from these two sources, Angelina Neches River Authority can meet the mining and steam electric power customer demand. A table summarizing the potential demands for these customers is provided below.

Recipient	2020	2030	2040	2050	2060	2070
Holmwood Utility	65	70	70	70	70	70
Steam Electric Demand – Cherokee	8,000	15,000	20,000	20,000	20,000	20,000
Manufacturing – Rusk County Refinery	5,600	5,600	5,600	5,600	5,600	5,600
Mining - Angelina	474	573	398	300	225	168
Mining - Cherokee	238	247	210	147	84	40
Mining - Nacogdoches	5,475	2,975	118	0	0	0
Mining – San Augustine	2,102	1,102	0	0	0	0
Mining – Rusk	1,075	2,092	1,955	1,809	1,686	1,677
Total Future Customer Demand	**23,028**	**27,658**	**28,350**	**27,926**	**27,665**	**27,555**

SUPPLY DEVELOPMENT

The supply for this strategy comes from run-of-the-river supplies in Cherokee County. Angelina Neches River Authority will submit a permit application to TCEQ for the new run-of-river supplies of 20,000 ac-ft per year and will monitor the application status for the current permit for run-of-river supplies of 10,000 ac-ft per year.

ENVIRONMENTAL CONSIDERATIONS

The environmental flow rules for Neches basin may impact the supply available to Angelina Neches River Authority for the run-of-river water rights. Other than the process required to complete the application process, there are no significant environmental considerations for this strategy.

PERMITTING AND DEVELOPMENT

Angelina Neches River Authority will apply for a water right permit for the new run-of-river supplies in Cherokee County. The permitting process is dependent on the TCEQ guidelines for granting run-of-river application requests

PLANNING LEVEL OPINION OF COST

Other than the planning levels costs and the lawyer fees for tracking the permit applications, there are not additional costs involved with this strategy. It is assumed that the customers contracted for this supply will develop the infrastructure to access the supplies from the run-of-river supply source in Cherokee County.

PROJECT EVALUATION

Based on the analysis provided above, the Angelina Neches River Authority Run-of-River Supplies project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	30,000 ac-ft per year (Permit Application for 10,000 ac-ft per year already administratively complete, 20,000 ac-ft per year new run-of-river supplies)
Reliability	3	Medium Reliable Supply
Cost	5	No Cost (Other than Administrative and Lawyer Fees)
Environmental Factors	4	Low to No Impacts
Impact on Other State Water Resources	4	Low Impacts
Threat to Agricultural Resources/Rural Areas	4	Low
Interbasin Transfers		No
Other Natural Resources	4	No known Impacts
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	4	Local Sponsorship by ANRA
Implementation Issues	4	No known risks

REFERENCES

2011 East Texas Regional Plan.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR ATHENS MWA FISH HATCHERIES

Water User Group Name:	Athens MWA
Strategy Name:	Indirect Reuse of Flows from Fish Hatcheries
Strategy ID:	AMWA-FH
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	2,872 ac-ft per year (2.6 MGD)
Implementation Decade:	2020
Development Timeline:	2020
Project Capital Cost:	$0 (September 2013)
Annual Cost:	$0 per ac-ft
Unit Water Cost (Rounded):	$0 per ac-ft ($0 per 1,000 gallons)

PROJECT DESCRIPTION

This strategy is a recommended strategy for Athens MWA. The strategy involves an indirect reuse project from the flows returned by the Fish Hatcheries to Lake Athens.

Athens MWA has a contract to supply 3,023 acre feet per year to the Fish Hatcheries. The Fish Hatcheries have a separate intake on Lake Athens to access the lake supplies. Currently, approximately 95 to 100 percent of the diverted water for the Fish Hatchery is returned to Lake Athens; however, the Fish Hatchery is under no contractual obligations to continue this practice. To assure adequate supplies for the fish hatchery and other uses, Athens MWA should work with the fish hatchery to assure that the hatchery continues to return diverted water to Lake Athens for subsequent reuse. For purposes of this plan, it is assumed that 95 percent of the contracted water will be returned. This equates to 2,872 ac-ft per year of additional supply. Athens MWA has to apply for a permit amendment on their permit to provide water to fish hatcheries to be able to utilize the flows returned by the fish hatcheries.

SUPPLY DEVELOPMENT

The fish hatcheries return approximately 95 to 100 percent of the water diverted from Lake Athens. Assuming that 95% of the water is returned, approximately 2,872 acre feet per year of supplies can be developed from this strategy.

ENVIRONMENTAL CONSIDERATIONS

The yield of this strategy will be dependent upon negotiations with the TCEQ regarding environmental flow requirements. Environmental flow requirements will be set so the new permit has a minimum impact to environmental water needs and the surrounding habitat. No impacts to cultural resources in the area are expected.

PERMITTING AND DEVELOPMENT

Athens MWA has to apply for an amendment to their permit to supply water to the fish hatcheries. This amendment will allow them to utilize the water returned by the fish hatcheries to Lake Athens. Previous

attempts of working with TCEQ on the permit amendment have not been successful. Athens MWA is hopeful that the amendment will be approved during the planning period. This permit amendment is dependent upon coordination with the TCEQ.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) was not prepared for this strategy because costs associated with the permit amendment are considered minimal. Any costs incurred by Athens MWA will be related to engineering and lawyer fees.

PROJECT EVALUATION

The recommended strategy for infrastructure improvements was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	2,872 acre feet per year
Reliability	4	Highly Reliable Supply
Cost	5	No Cost (Excluding Administrative and Lawyer Fees)
Environmental Factors	4	Low to No Impacts
Impact on Other State Water Resources	4	Low Impact
Threat to Agricultural Resources/Rural Areas	4	Low
Interbasin Transfers		No
Other Natural Resources	4	No Impacts on other natural resources
Major Impacts on Key Water Quality Parameters	4	No Major Impacts
Political Feasibility	4	Athens MWA is the Local Sponsor. Sponsor is committed.
Implementation Issues	3	Requires agreement with Fish Hatcheries

REFERENCES

2011 East Texas Regional Water Plan.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR ATHENS MWA GROUNDWATER WELLS

Water User Group Name:	Athens MWA
Alternative Strategy Name:	Additional Groundwater Wells in Carrizo Wilcox
Alternative Strategy ID:	AMWA-GW
Alternative Strategy Type:	New Groundwater Source
Potential Supply Quantity:	4,840 ac-ft per year (4.3 MGD)
Implementation Decade:	2020
Development Timeline:	2020
Project Capital Cost:	$9,456,000 (September 2013)
Annual Cost:	$1,340,000 per ac-ft
Unit Water Cost (Rounded):	$277 per ac-ft ($0.85 per 1,000 gallons)

PROJECT DESCRIPTION

This strategy is an alternate strategy for Athens MWA. The strategy involves addition of new groundwater wells in the Carrizo Wilcox aquifer in Henderson County.

Athens MWA is currently pursuing developing groundwater from Carrizo Wilcox aquifer on the property near Lake Athens. It is anticipated that eight new wells (@ 750 gpm each) would be drilled to provide a total of 4.3 MGD of groundwater supply. The water would be transported directly from the well field to the distribution system. The first well will be online in 2016. It should be noted that although Athens MWA has permits to develop the wells, this strategy cannot be included in the 2016 Regional Plan as a recommended strategy for this entity because of the MAG limitations. The Carrizo Wilcox in Henderson County (both in Region C and I) is severely limited by its availability for additional wells. Therefore, the groundwater wells is included as an alternate strategy for Athens MWA in the 2016 Regional Plan. The strategy will be changed to a recommended strategy if the MAG volumes are updated in the near future. Since this is the primary strategy for Athens MWA and the construction is already under-way, the 2016 Regional Plan will show shortages for Athens MWA, which in reality will be addressed by the well field development.

SUPPLY DEVELOPMENT

The project involves drilling eight new wells @ 750 gpm each to produce a total supply of 4.3 MGD or 4,840 acre feet per year. The project will be developed in phases and the first well is expected to be online by 2016. The additional wells will be added over the planning period as and when required.

ENVIRONMENTAL CONSIDERATIONS

No environmental issues identified.

PERMITTING AND DEVELOPMENT

Athens MWA already has permits to drill the wells. The yield from the new wells is above the MAG limits for Henderson County in Regions C and I. If and when the MAG numbers are updated, the yield from the wells will be compared with the MAG availability and the project will be converted to a recommended strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) is provided below.

WWP: Athens MWA - Groundwater Wells
WMS: New Wells in Carrizo-Wilcox Aquifer

Supply	4,840	Acre-feet per year	3,001	gpm
Depth to Water	300	ft		
Well Depth	800	ft		
Well Yield	250	gpm		
Well Size	12	in		
Wells Needed	12			

Construction Costs	Number		Unit Cost	Total Cost
Water Wells	12		$460,014	$5,520,167
Connection to Transmission System	12		$50,000	$600,000
Ground Storage Tank	1.08 MG	1	$627,330	$627,330
Engineering and Contingencies (30% for pipelines, 35% for other)				$2,332,000
Subtotal of Well(s)				**$9,079,498**
Permitting and Mitigation				$57,000
Construction Total				**$9,136,000**
Interest During Construction		12	Months	$320,000
TOTAL CAPITAL COST				**$9,456,000**
Debt Service (5.5% for 20 years)				$791,000
Operational Costs*				$549,200
Total Annual Cost				**$1,340,000**
UNIT COSTS (First 30 Years)				
Cost per ac-ft				$277
Cost per 1000 gallons				$0.85
UNIT COSTS (After 30 Years)				
Cost per ac-ft				$114
Cost per 1000 gallons				$0.35

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

The recommended strategy for infrastructure improvements was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	4,840 acre feet per year
Reliability	2	No reliable because of MAG overallocation
Cost	2	Low Cost
Environmental Factors	4	Low Impacts
Impact on Other State Water Resources	4	Low Impact
Threat to Agricultural Resources/Rural Areas	4	Low
Interbasin Transfers		No
Other Natural Resources	4	No Impacts on other natural resources
Major Impacts on Key Water Quality Parameters	4	No Major Impacts
Political Feasibility	4	Athens MWA is the local sponsor committed to implement the strategy
Implementation Issues	1	Supply from this strategy exceeds MAG limits for Henderson County in Regions C and I.

REFERENCES

Discussions with Athens Municipal Water Authority.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR ATHENS MWA PUMP STATION

Water User Group Name:	Athens MWA
Strategy Name:	Pump Station Improvements
Strategy ID:	AMWA-WTP
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	1,121 ac-ft per year (0 MGD)
Implementation Decade:	2020
Development Timeline:	2020
Project Capital Cost:	$2,900,000 (September 2013)
Annual Cost:	$399,000 per ac-ft
Unit Water Cost (Rounded):	$59 per ac-ft ($0.18 per 1,000 gallons)

PROJECT DESCRIPTION

This strategy is a recommended strategy for Athens MWA. The strategy involves infrastructure improvements at the water treatment plant owned by Athens MWA. The improvements will be applied to the existing booster pump station located at the water treatment plant.

Existing treatment capacity for City of Athens is 8 MGD, with a 7.5 MGD treated water pipeline to the city of Athens. The total yield from Lake Athens and the groundwater well at the WTP property is approximately 6 MGD. The WTP has sufficient capacity to treat the current supplies. Since the future supply from the groundwater wells will be directly added to the distribution system, there is no need for WTP capacity improvements. However, the Booster pump station at the WTP is limited by its capacity (5 MGD) and age. Athens MWA plans to replace the existing pump station with a new 8 MGD pump station. Therefore, the recommended water management strategy for Athens MWA is to address the booster pump station infrastructure improvements at the WTP.

In this strategy, the existing booster pump station will be replaced by a new booster pump station of 6 MGD average capacity and 9 MGD peak capacity.

SUPPLY DEVELOPMENT

No additional supplies associated with this strategy. This strategy will ensure access to the permitted supply from Lake Athens and the amount that is treated at the water treatment plant.

ENVIRONMENTAL CONSIDERATIONS

No known environmental impacts associated with this strategy.

PERMITTING AND DEVELOPMENT

No permitting issues associated with this strategy

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for the infrastructure improvements is provided below.

WWP: Athens MWA

WMS: Booster PS Improvements at Athens WTP

			1.5			
Amount:	6,726	Acre-Feet/Year	6	MGD		Average
			9	MGD		Peak
CONSTRUCTION COSTS						
Pump Station(s)						
Booster PS @ WTP	HP	217	1	LS	$2,061,286	$2,061,286
Engineering and Contingencies (35%)						$721,000
Subtotal of Pump Station(s)						**$2,782,286**
Permitting and Mitigation			1	LS		$20,000
CONSTRUCTION TOTAL						**$2,802,286**
Interest During Construction				12	Months	$98,000
TOTAL CAPITAL COST						**$2,900,000**
ANNUAL COSTS TREATED WATER						
Debt Service (5.5% for 20 years)						$243,000
Operational Costs*						$156,317
Total Annual Costs						**$399,000**
UNIT COSTS (During Amortization)						
Per Acre-Foot of treated water						$59
Per 1,000 Gallons of treated water						$0.18
UNIT COSTS (After Amortization)						
Per Acre-Foot of treated water						$37
Per 1,000 Gallons of treated water						$0.11

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

The recommended strategy for infrastructure improvements was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	1,121 acre-feet per year
Reliability	4	Highly Reliable Supply
Cost	5	Low Cost
Environmental Factors	4	Low Impacts
Impact on Other State Water Resources	4	Low Impact
Threat to Agricultural Resources/Rural Areas	4	Low
Interbasin Transfers		No
Other Natural Resources	4	No Impacts on other natural resources
Major Impacts on Key Water Quality Parameters	4	No Major Impacts
Political Feasibility	5	Athens MWA is the identified sponsor committed to the strategy
Implementation Issues	4	No known risk

REFERENCES

Discussions with Athens Municipal Water Authority.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR ANWCID#1 LAKE STRIKER

Project Name:	Volumetric Surveys of Lake Striker
Project ID:	ANCD-VOL
Project Type:	Existing Surface Water Source
Potential Supply Quantity (Rounded):	NA
Implementation Decade:	2020
Development Timeline:	2 years
Project Capital Cost:	NA
Unit Water Cost (Rounded):	NA

PROJECT DESCRIPTION

Internal studies conducted by Angelina Nacogdoches WCID #1 resulted in higher yield estimates for Lake Striker than those obtained from the Water Availability Model. Angelina Nacogdoches WCID #1 believes that the additional yield in Lake Striker is sufficient to meet the shortages manifested for this entity in this planning cycle. To address this inconsistency, Angelina Nacogdoches WCID #1 is considering a recommended strategy to conduct volumetric survey of Lake Striker to determine the Lake yield. Angelina Nacogdoches WCID #1 will coordinate with TWDB to get on a schedule for the lake volumetric survey.

SUPPLY DEVELOPMENT

There may be some potential for additional yield at Lake Striker. At this time it is not known how much (if any) additional yield will be realized.

ENVIRONMENTAL CONSIDERATIONS

No known environmental considerations at this time but these would be studied in further details during the volumetric survey process.

PERMITTING AND DEVELOPMENT

Texas Water Development Board conducts the volumetric surveys so Angelina Nacogdoches WCID #1 will coordinate with the Board on the timing of the volumetric surveys. No additional permitting issues known at this time.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) was not developed for this strategy. TWDB will charge a fixed fee for conducting volumetric surveys. A cost estimate is not included for this strategy, as this cost will be determined by Angelina Nacogdoches WCID #1 during their negotiations with TWDB.

PROJECT EVALUATION

The addition of the additional yield from Lake Striker will help address the shortages in Angelina Nacogdoches WCID #1's customer demands.

The recommended strategy for infrastructure improvements was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity		NA
Reliability		NA
Cost	5	No Significant Costs
Environmental Factors	4	No Impacts
Impact on Other State Water Resources	4	No Impacts
Threat to Agricultural Resources/Rural Areas	4	No Impacts
Interbasin Transfers		No
Other Natural Resources	4	No Impacts on other natural resources
Major Impacts on Key Water Quality Parameters	4	No Impacts
Political Feasibility	4	AN WCID#1 is local sponsor committed to the strategy
Implementation Issues	4	No known risks

REFERENCES

Discussions with Angelina Nacogdoches WCID #1.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR AN WCID#1 LAKE STRIKER DREDGING

Project Name:	Hydraulic Dredging of Lake Striker
Project ID:	ANCD-DRE
Project Type:	Existing Surface Water Source
Potential Supply Quantity (Rounded):	2,100 ac-ft per year
Implementation Decade:	2040
Development Timeline:	2 years
Project Capital Cost:	$23,716,000
Unit Water Cost (Rounded):	NA

PROJECT DESCRIPTION

Angelina Nacogdoches WCID #1 believes that the volumetric survey will result in an additional yield that will address shortages in the first two decades. To address the shortages in the later decades, a recommended strategy was proposed. The strategy is to conduct hydraulic dredging of Lake Striker to address the Lake sedimentation issues and increase Lake Yield. The timing for the dredging operation is expected to be in 2040.

SUPPLY DEVELOPMENT

At this time it is not known how much (if any) additional yield will be realized from the hydraulic dredging. Angelina Nacogdoches WCID #1 expects to develop approximately 2,100 ac-ft per year of additional supplies from the dredging operations

ENVIRONMENTAL CONSIDERATIONS

No known environmental considerations at this time but these would be studied in further details during the dredging.

PERMITTING AND DEVELOPMENT

The process for conducting hydraulic dredging does not have too many permitting issues.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) was not developed for this strategy. Angelina Nacogdoches WCID #1 provided an estimate of the total cost for the hydraulic dredging strategy. The planning level capital cost estimate for the dredging operations is approximately $23,716,000.

PROJECT EVALUATION

The addition of the additional yield from Lake Striker will help address the shortages in Angelina Nacogdoches WCID #1's customer demands.

The recommended strategy for infrastructure improvements was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	3	2,100 acre-feet per year
Reliability	3	Moderate Reliable Supply
Cost	4	Low Cost
Environmental Factors	4	Low Impact
Impact on Other State Water Resources	4	Low Impact
Threat to Agricultural Resources/Rural Areas	4	Low
Interbasin Transfers		No
Other Natural Resources	4	No Impacts on other natural resources
Major Impacts on Key Water Quality Parameters	4	No Impacts
Political Feasibility	5	AN WCID #1 is the local sponsor committed to the strategy
Implementation Issues	4	No known risks

REFERENCES

Discussions with Angelina Nacogdoches WCID #1.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR AN WCID#1 FOR LAKE STRIKER NORMAL POOL ADJUSTMENT

Project Name:	Normal Pool Elevation Adjustment of Lake Striker
Project ID:	ANCD-NPA
Project Type:	Existing Surface Water Source
Potential Supply Quantity (Rounded):	3,500 acre-feet per year
Implementation Decade:	2070
Development Timeline:	5 years
Project Capital Cost:	NA
Unit Water Cost (Rounded):	NA

PROJECT DESCRIPTION

Angelina Nacogdoches WCID #1 believes that the volumetric survey will result in an additional yield that will address shortages in the first two decades. To address the shortages in the later decades, a recommended strategy was proposed. The strategy is to work with the Texas Water Development Board on the Normal Pool Elevation Adjustment of Lake Striker. It is not clear at this stage the additional yield associated with the normal pool elevation adjustment. The timing for the potential normal pool elevation adjustment is 2070.

SUPPLY DEVELOPMENT

At this time it is not known how much (if any) additional yield will be realized from the normal pool elevation adjustment but for planning purposes it is assumed to be 3,500 acre-feet per year.

ENVIRONMENTAL CONSIDERATIONS

No known environmental considerations at this time but these would be studied in further details during the normal pool elevation adjustment process.

PERMITTING AND DEVELOPMENT

The process for adjusting of the normal pool elevation may require some significant coordination with the Texas Water Development Board and Texas Council on Environmental Quality on permitting and development issues.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) was not developed for this strategy. Angelina Nacogdoches WCID #1 will incur some costs in the form of engineering consulting fees and lawyer fees when they begin working on the normal pool elevation adjustment process. Other than that, no additional costs are anticipated for this strategy.

PROJECT EVALUATION

The addition of the additional yield from Lake Striker will help address the shortages in Angelina Nacogdoches WCID #1's customer demands.

The recommended strategy for infrastructure improvements was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	3,500 acre-feet per year
Reliability	3	Medium Reliable Supply
Cost	5	No Cost (Excluding Administrative and Lawyer Fees)
Environmental Factors	4	Low Impact
Impact on Other State Water Resources	4	Low Impact
Threat to Agricultural Resources/Rural Areas	4	Low
Interbasin Transfers		No
Other Natural Resources	4	No Impacts on other natural resources
Major Impacts on Key Water Quality Parameters	4	No Impacts
Political Feasibility	3	AN WCID #1 is the local sponsor
Implementation Issues	3	Limited Risk

REFERENCES

Discussions with Angelina Nacogdoches WCID #1.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR CITY OF BEAUMONT

Project Name:	City of Beaumont – Municipal Conservation
Project ID:	BEAU-CONS
Project Type:	Conservation
Potential Supply Quantity (Rounded):	9,966 ac-ft per year
Implementation Decade:	2020
Development Timeline:	1 years
Project Capital Cost:	$52,623,000 (Sept. 2013)
Unit Water Cost (Rounded):	$317 per ac-ft (during loan period) $0.97 (per 1,000 gallons)

PROJECT DESCRIPTION

The City of Beaumont is projected to have a water shortage beginning in 2040. In 2011, the City had an average per capita consumption of 219 gpcd, well over the statewide goal of 140 gpcd. After performing a conservation cost estimate, the ETRWPG believes a water conservation strategy for the City is economically achievable. This recommended strategy includes planning level opinion of probable construction cost estimates related to enhanced public and school education, water conservation pricing implementation, and an enhanced water loss control program. The proposed municipal conservation strategy would reduce Beaumont's demand by more than their projected need; therefore, municipal conservation is the only recommended WMS for the City.

SUPPLY DEVELOPMENT

The supply for this strategy represents conservation savings due to enhanced public and school education, water conservation pricing implementation, and an enhanced water loss control program.

ENVIRONMENTAL CONSIDERATIONS

No environmental considerations associated with this strategy.

PERMITTING AND DEVELOPMENT

No additional permitting required for this strategy

PLANNING LEVEL OPINION OF COST

No capital costs were assumed for Beaumont's Conservation strategy. The annual cost for this strategy is $2,271,000. The unit cost is $317 per ac-ft of supply and $0.97 per 1,000 gallons of supply.

PROJECT EVALUATION

Based on the analysis provided above, the City of Beaumont Municipal Conservation project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the

table below.

Criteria	Rating	Explanation
Quantity	4	9,966 ac-ft per year
Reliability	4	Reliable Supply
Cost	4	Low Cost
Environmental Factors	4	Low Impacts
Impact on Other State Water Resources	4	Low Impact
Threat to Agricultural Resources/Rural Areas	4	Low
Interbasin Transfers		No
Other Natural Resources	4	No Impacts
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	3	City of Beaumont is the local sponsor
Implementation Issues	4	No known risks

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR CITY OF CENTER REUSE PIPELINE

Project Name:	City of Center Reuse Pipeline from WWTP to Lake Center
Project ID:	CENT-REU
Project Type:	Existing Surface Water Source
Potential Supply Quantity (Rounded):	1,120 ac-ft/yr (1 MGD)
Implementation Decade:	2020
Development Timeline:	5 years
Project Capital Cost:	$13,579,000 (Sept. 2013)
Project Annual Cost:	$1,672,000 (Sept. 2013)
Unit Water Cost (Rounded):	$1,493 per ac-ft (during loan period) $4.58 per 1,000 gallons.

PROJECT DESCRIPTION

City of Center owns water rights for supplies in Lake Center and Lake Pinkston. Currently the City has sufficient supplies to meet the demand in decades 2020 to 2060 and a small shortage in 2070. The City is planning water management strategies to proactively prepare for satisfying any additional demand in the decades through 2060 and also to address the shortage in 2070. One of the recommended water management strategies is to add the return flows from City's WWTP to Lake Center. The City is permitted to use the return flows from the East Bank WWTP. The discharge point for the treated effluent from the WWTP is on a tributary to Mill Creek upstream of Lake Center. The City is planning an indirect reuse project by means of a reuse pipeline from East Bank WWTP to Lake Center. The total capacity for the indirect reuse project will be approximately 1 MGD (1,121 ac-ft per year) and the project will be online in 2020.

SUPPLY DEVELOPMENT

Supply is readily available at the East Bank WWTP owned and operated by the City. City has a permit to use the return flows origination from the WWTP.

ENVIRONMENTAL CONSIDERATIONS

Impacts of the return flows on the receiving water body's water quality parameters needs to be analyzed in detail. Additional environmental considerations may apply during the permitting process.

PERMITTING AND DEVELOPMENT

The City needs to apply for a bed and banks permit to put the supplies in Lake Center.

PLANNING LEVEL OPINION OF COST

Included below is a planning level opinion of cost (PLOC) for the Phase I of the pipeline from City of Center's East Bank WWTP to Lake Center. The transmission system cost estimate also includes a 90 HP pump station, expansion of the treatment plant to treat the additional supplies.

WWP NAME: **City of Center**
STRATEGY: **Pipeline from East Bank WWTP to Lake Center**
Quantity: **1,120** AF/Y 1.50 MGD

CAPITAL COSTS

Pipeline to Lake Nacogdoches	**Size**	**Qty**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	10 in.	2,000	LF	$31	$63,000
Pipeline Urban	10 in.	19,164	LF	$44	$851,000
Right of Way Easements Rural (ROW)		2,000	LF	$26	$56,430
Right of Way Easements Urban (ROW)		19,164.0	ACRE	$65	$1,241,000
Right of Way Easements Urban (ROW)		19,164	LF	$154	$3,247,420
Engineering and Contingencies (30%)					$274,000
Pump Station(s)					
Pump with intake & building	90 HP	1	LS	$821,000	$821,000
Ground Storage Tank		0.19 MG	1	$63,438	$63,438
Engineering and Contingencies (35%)					$309,553
Subtotal of Pump Station(s)					**$1,193,991**
Water Treatment Facility					
Expand Existing Water Treatment Plant	1 MGD	1	LS	$4,490,000	$4,490,000
Engineering and Contingencies (35%)					$1,571,500
Subtotal of WTP					**$6,061,500**
Permitting and Mitigation					$131,206
Construction Total					**$13,120,000**
Interest During Construction			12	Months	$459,000
TOTAL COST					**$13,579,000**

ANNUAL COSTS

Debt Service (5.5% for 20 years)	$1,136,000
Operational Costs*	$536,000
Total Annual Costs	**$1,672,000**

UNIT COSTS (Until Amortized)

Per Acre-Foot of treated water	$1,493
Per 1,000 Gallons	$4.58

UNIT COSTS (After Amortization)

Per Acre-Foot	$479
Per 1,000 Gallons	$1.47

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

City of Center already has a permit to use the return flows so this project has the benefit of providing a renewable source of supply that is readily available in the close proximity of Lake Center. The addition of the additional 1,120 ac-ft per year will help City of Center supply to the increasing manufacturing demand in Shelby County. City of Center believes that the manufacturing demand reflected in the regional plan is not reflective of the more aggressive growth in the manufacturing use in the region. This strategy will help meet some of the needs in the region.

The recommended strategy for infrastructure improvements was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	1,120 ac-ft per year.
Reliability	5	Highly Reliable Supply
Cost	2	Medium Cost
Environmental Factors	3	Medium Impacts
Impact on Other State Water Resources	4	Low Impact
Threat to Agricultural Resources/Rural Areas	4	Low
Interbasin Transfers		No
Other Natural Resources	4	No Impacts on other natural resources
Major Impacts on Key Water Quality Parameters	3	Impact of the return flows on the quality of the receiving bodies
Political Feasibility	4	City of Center is the local sponsor committed to this strategy
Implementation Issues	4	No known risks

REFERENCES

Discussions with City of Center.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR CITY OF CENTER TOLEDO BEND PIPELINE

Project Name:	Pipeline from Toledo Bend to Lake Center
Project ID:	CENT-TOL
Project Type:	Existing Surface Water Source
Potential Supply Quantity (Rounded):	2,242 ac-ft per year (5 MGD)
Implementation Decade:	2020
Development Timeline:	5 years
Project Capital Cost:	$27,775,000 (Sept. 2013)
Project Annual Cost:	$3,462,000 (Sept. 2013)
Unit Water Cost (Rounded):	$1,544 per ac-ft (during loan period) $4.74 per ac-ft (1,000 gallons of water)

PROJECT DESCRIPTION

To meet the current demands and higher expected future demands, the City has proposed this water management strategy for the planning period. The City is planning to purchase water from Sabine River Authority to transfer water from Toledo Bend Lake to Lake Center. The City will construct the raw water transmission pipeline from Toledo Bend Reservoir to Lake Center. At this time, it is not clear the total amount of water that will be transferred through this pipeline. For planning purposes, it is assumed that the pipeline will be delivering approximately 2 MGD (2,242 ac-ft per year).

SUPPLY DEVELOPMENT

Supply is available from the Toledo Bend Reservoir owned and operated by Sabine River Authority. After honoring the current contracted amounts, SRA has sufficient supplies to provide the amount requested by City of Center.

ENVIRONMENTAL CONSIDERATIONS

There may be some minor impacts of adding water from SRA's Toledo Bend Reservoir to Lake Center. There are not additional environmental considerations known at this time.

PERMITTING AND DEVELOPMENT

No additional permitting issues associated with the project. City of Center will need to sign a contract with Sabine River Authority for the purchase of the water.

PLANNING LEVEL OPINION OF COST

Included below is a planning level opinion of cost for the transmission system from Toledo Bend to Lake Center. Planning level opinion of probable construction cost estimates include a 16-inch pipeline from Toledo Bend to Lake Center, an intake and a booster pump station, and storage tanks. The annual costs are calculated assuming 5.5% interest rate and 20 years of return period. The estimate includes the cost for the purchase of raw water from SRA. For purposes of developing costs for purchasing water, costs were estimated at the regional rate chosen for the ETRWPA. Actual costs will be determined during contract negotiations.

WWP NAME:	**City of Center**					
STRATEGY:	**Pipeline from Toledo Bend to Lake Center**					
				3.00		
Quantity:	**2,242**	AF/Y		MGD		
CAPITAL COSTS						
Pipeline		**Size**	**Qty**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural		16 in.	100,529	LF	$58	$5,786,000
Right of Way Easements Rural (ROW)			100,529	LF	$26	$2,839,100
Engineering and Contingencies (30%)						$1,736,000
Subtotal of Pipeline		**19**	**Miles**			**$10,361,100**
Pump Station(s)						
Pump with intake & building		130 HP	1	LS	$1,076,000	$1,076,000
Booster Pump Station		130 HP	1	LS	$1,698,000	$1,698,000
Storage Tanks		0.38 MG	1	EA	$126,990	$127,000
Engineering and Contingencies (35%)						$1,015,350
Subtotal of Pump Station(s)						**$3,916,350**
Water Treatment Facility						
Expand Existing Water Treatment Plant		3 MGD	1	LS	$8,260,000	$8,260,000
Engineering and Contingencies (35%)						$2,891,000
Subtotal of WTP						**$11,151,000**
Permitting and Mitigation						$529,990
Construction Total						**$25,958,440**
Interest During Construction				24	Months	$1,817,000
TOTAL COST						**$27,775,000**
Debt Service (5.5% for 20 years)						$2,324,000
Operational Costs*						$1,138,000
Total Annual Costs						**$3,462,000**
UNIT COSTS (Until Amortized)						
Per Acre-Foot of treated water						$1,544
Per 1,000 Gallons						$4.74
UNIT COSTS (After Amortization)						
Per Acre-Foot						$865
Per 1,000 Gallons						$2.65

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

The addition of the additional 2,242 ac-ft per year will help City of Center supply to the increasing manufacturing demand in Shelby County. City of Center believes that the manufacturing demand reflected in the regional plan is not reflective of the more aggressive growth in the manufacturing use in the region. This strategy will help meet some of the needs in the region.

The recommended strategy for infrastructure improvements was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	2,242 ac-ft per year.
Reliability	4	Highly Reliable Supply
Cost	2	Medium Cost
Environmental Factors	4	Low Impact
Impact on Other State Water Resources	4	Low Impact
Threat to Agricultural Resources/Rural Areas	4	Low
Interbasin Transfers		No
Other Natural Resources	4	No Impacts on other natural resources
Major Impacts on Key Water Quality Parameters	4	Minor Impact of the addition of raw water on the quality of the receiving bodies
Political Feasibility	4	City of Center is the local sponsor committed to this strategy
Implementation Issues	4	No known risks

REFERENCES

Discussions with City of Center.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR CITY OF CENTER VOLUMETRIC SURVEYS

Project Name:	Volumetric Surveys of Lake Center and Lake Pinkston
Project ID:	CENT-VOL
Project Type:	Existing Surface Water Source
Potential Supply Quantity (Rounded):	NA
Implementation Decade:	2020
Development Timeline:	2 years
Project Capital Cost:	NA
Unit Water Cost (Rounded):	NA

PROJECT DESCRIPTION

To meet the current demands and higher expected future demands, the City has proposed a feasible water management strategy. City of Center is considering a strategy to conduct volumetric survey of Lake Center and Pinkston Reservoir to develop an accurate estimate of the lake yields. City of Center will coordinate with the Texas Water Development Board to get on a schedule for the lake volumetric survey. TWDB will charge a fixed fee for conducting volumetric surveys. This is not a recommended or alternative strategy in the 2016 regional water plan.

SUPPLY DEVELOPMENT

There may be some potential for additional yield at Lake Pinkston but it is not expected to see any additional supplies at Lake Center.

ENVIRONMENTAL CONSIDERATIONS

No known environmental considerations at this time but these would be studied in further details during the volumetric survey process.

PERMITTING AND DEVELOPMENT

Texas Water Development Board conducts the volumetric surveys so City of Center coordinate with the Board on the timing of the volumetric surveys. No additional permitting issues known at this time.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) was not developed for this strategy. TWDB charges a nominal fee for conducting the volumetric surveys but it is not clear what that amount would be in early planning stages.

PROJECT EVALUATION

The addition of the additional yield from Lake Center and Lake Pinkston will help City of Center supply to the increasing demand in Shelby County. City of Center believes that the manufacturing demand reported in the regional plan is not reflective of the more aggressive growth in the manufacturing use in the region. This strategy will help meet some of the needs in the region.

The recommended strategy for infrastructure improvements was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity		NA
Reliability		NA
Cost	4	Low Cost
Environmental Factors	4	Low Impact
Impact on Other State Water Resources	4	Low Impact
Threat to Agricultural Resources/Rural Areas	4	Low
Interbasin Transfers		No
Other Natural Resources	4	No Impacts on other natural resources
Major Impacts on Key Water Quality Parameters	4	No Impacts
Political Feasibility	4	City of Center is the local sponsor committed to this strategy
Implementation Issues	4	No known risks

REFERENCES

Discussions with City of Center.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR HOUSTON COUNTY WCID #1 PERMIT AMENDMENT

Water User Group Name:	Houston County WCID #1
Strategy Name:	Permit Amendment for Houston County Lake
Strategy ID:	HCWC-PA
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	3,500 ac-ft per year (3.1 MGD)
Implementation Decade:	2020
Development Timeline:	2020
Project Capital Cost:	$0
Annual Cost:	$0 per ac-ft
Unit Water Cost (Rounded):	$0 per ac-ft ($0 per 1,000 gallons)

PROJECT DESCRIPTION

This strategy is a recommended strategy for Houston County WCID #1 located in Houston County. The strategy involves a permit amendment to take 3,500 ac-ft per year from Houston County Lake in addition to the 3,500 ac-ft per year included in their existing permit.

SUPPLY DEVELOPMENT

Houston County WCID #1 was originally permitted for 7,000 ac-ft per year from Houston County Lake; in 1987, this supply was reduced by the Texas Commission on Environmental Quality (TCEQ) to 3,500 ac-ft per year. Houston County WCID #1 has applied for a permit amendment to return their permitted diversion to the firm yield of the lake, 7,000 ac-ft per year, and add industrial use to the permit. The reliability of this water supply is considered medium because while the firm yield of the lake allows for this permit amendment, the amendment is dependent upon decisions made by the TCEQ.

ENVIRONMENTAL CONSIDERATIONS

The yield of this strategy will be dependent upon negotiations with the TCEQ regarding environmental flow requirements. Environmental flow requirements will be set so the new permit has a minimum impact to environmental water needs and the surrounding habitat. No impacts to cultural resources in the area are expected. There are no bays or estuaries in close proximity Houston County.

PERMITTING AND DEVELOPMENT

This permit amendment is dependent upon coordination with the TCEQ.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) was not developed for this strategy because costs associated with the permit amendment are considered minimal. Any costs incurred by Houston County WCID #1 will be related to engineering and lawyer fees.

PROJECT EVALUATION

This strategy benefits both municipal and non-municipal users in Houston County and would have a positive impact on their water supply security. Since 2007, Houston County WCID #1 has received multiple requests for additional water supplies from entities and business including the City of Crockett, the Crockett Economic & Industrial Development Corporation, The Consolidated WSC, Nacogdoches Power, LLC, and the Houston County Judge, Erin Ford.

This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. A contract to pull water from Houston County Lake will reduce demands on other water supplies in Houston County and will have no other apparent impact on other State water resources. From a third party social and economic perspective, this permit amendment for existing surface water supplies will be beneficial because it provides water for economic growth.

Based on the analyses provided above, the Houston County WCID #1 recommended strategy for a permit amendment was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	3,500 acre feet per year
Reliability	3	Medium Reliable Supply
Cost	5	No Cost (Excluding Administrative and Lawyer Fees)
Environmental Factors	4	Low Impact
Impact on Other State Water Resources	4	Low Impact
Threat to Agricultural Resources/Rural Areas	4	Low
Interbasin Transfers		No
Other Natural Resources	4	No Impacts on other natural resources
Major Impacts on Key Water Quality Parameters	4	No Impacts
Political Feasibility	4	Sponsored by Houston County WCID #1
Implementation Issues	4	No known risks

REFERENCES

2011 East Texas Regional Water Plan.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR HOUSTON COUNTY WCID #1 GROUNDWATER WELLS

Water User Group Name:	Houston County WCID #1
Alternative Strategy Name:	New wells in Carrizo-Wilcox Aquifer
***Alternative Strategy ID*:**	HCWC-GW
Strategy Type:	New Groundwater Source
Potential Supply Quantity:	3,500 ac-ft per year (3.1 MGD)
Implementation Decade:	2020
Development Timeline:	2020
Project Capital Cost:	$22,793,000 (September, 2013)
Annual Cost:	$2,613,000 per ac-ft
Unit Water Cost (Rounded):	$747 per ac-ft ($2.29 per 1,000 gallons)

PROJECT DESCRIPTION

This strategy is an *alternative* strategy for Houston County WCID #1 to develop 22 wells in Houston County within the Carrizo-Wilcox Aquifer. This aquifer has been identified as a potential source of water in Houston County. These wells will have a maximum total yield of 4,500 gpm, and a water depth of 300 feet was assumed. A peaking factor of two was assumed for the wells, and the cost estimate includes conveyance infrastructure in order to capture the peak annual supply. This project will only be implemented if Houston County WCID #1 is unable to attain a permit amendment for 3,500 ac-ft per year from Houston County Lake (Strategy ID: HCWC-PA).

SUPPLY DEVELOPMENT

It is assumed that each well will have a maximum yield of 200 ac-ft per year to meet both municipal and non-municipal demands in Houston County providing a total strategy yield of 3,500 ac-ft per year for every decade in the planning period (2020-2070). A target yield for this strategy was set by Houston County WCID #1; this value corresponds to the amount listed in their recommended strategy for a permit amendment (Strategy ID: HCWC-PA). Overall, the reliability of this supply is considered high, based on the proven use of this source and groundwater availability models.

ENVIRONMENTAL CONSIDERATIONS

The environmental impacts from this strategy are expected to be low. However, groundwater development from this source should be evaluated for potential impacts on spring flows and base flows of surface water in close proximity. The impact to the environment due to pipeline construction is expected to be temporary and minimal. New wells have a potential decrease in the groundwater-surface water nexus, which could reduce base flows. Impacts to environmental water needs, habitat, and cultural resources are expected to be low. In addition, there are no bays or estuaries in close proximity of Houston County.

PERMITTING AND DEVELOPMENT

There are no permitting or development issues associated with this strategy.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assumed 3 miles of pipeline, nine wells, a peaking factor of two, and a maximum well yield of 200 gpm for each well. This equates to $747 per acre-foot ($2.29 per 1,000 gallons); after the infrastructure if fully paid for (30 years), the cost drops to $202per acre-foot ($0.62 per 1,000 gallons). Overall, this strategy has a low cost compared to other strategies in the 2016 East Texas Regional Water Plan.

WWP: Houston County WCID #1 - New Wells in Carrizo-Wilcox Aquifer
WMS: Houston County, Carrizo-Wilcox Aquifer

Supply	3,500	Ac-ft/yr.	2,170	gpm
Depth to Water	300	ft		
Well Depth	820	ft		
Well Yield	200	gpm		
Well Size	10	in		
Wells Needed	22			

Construction Costs	Number	Unit Cost	Total Cost
Water Wells	22	$410,587	$9,032,913
Connection to Transmission System	22	$50,000	$1,100,000
Engineering and Contingencies (30% for pipelines, 35% for other items)			$3,492,000
Subtotal of Well(s)			**$13,624,913**

Transmission System	Size	Quantity	Unit	Unit Cost	Total Cost
Pipeline - Rural	20 in.	15,840	LF	$81	$1,280,000
Pump Station	505 HP	1	EA	$3,632,000	$3,632,000
Ground Storage Tank	0.78 MG	1	EA	$511,521	$511,521
Easement - Rural		15,840	LF	$16	$272,250
Engineering and Contingencies (30% for pipelines, 35% for other items)					$1,834,000
Subtotal for Transmission		**3**	**miles**		**7,529,771**

Permitting and Mitigation			$147,000
Construction Total			$21,301,684
Interest During Construction	24	Months	$1,491,000
TOTAL CAPITAL COST			**$22,793,000**

Debt Service (5.5% for 20 years)	$1,907,000
Operational Costs*	$705,863
Total Annual Cost	**$2,613,000**

UNIT COSTS (First 30 Years)	
Cost per ac-ft	$747
Cost per 1000 gallons	$2.29
UNIT COSTS (After 30 Years)	
Cost per ac-ft	$202
Cost per 1000 gallons	$0.62

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

This strategy benefits both municipal and non-municipal users in Houston County and would have a positive impact on their water supply security. Since 2007, Houston County WCID #1 has received multiple requests for additional water supplies from entities and business including the City of Crockett, the Crockett Economic & Industrial Development Corporation, The Consolidated WSC, Nacogdoches Power, LLC, and the Houston County Judge, Erin Ford.

This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. New wells in the county will reduce demands on other water supplies in Houston County and will have no other apparent impact on other State water resources. From a third party social and economic perspective, this strategy will provide water for economic growth.

Based on the analyses provided above, the *alternative* strategy to drill new wells in Houston County for the customers of Houston County WCID #1 was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	3,500 acre feet per year
Reliability	3	Medium Reliable Supply
Cost	3	Medium Cost
Environmental Factors	4	Low Impact
Impact on Other State Water Resources	4	Low Impact
Threat to Agricultural Resources/Rural Areas	4	Low
Interbasin Transfers		No
Other Natural Resources	4	No Impacts on other natural resources
Major Impacts on Key Water Quality Parameters	4	No known impacts to water quality
Political Feasibility	4	Sponsored by Houston County WCID #1
Implementation Issues	3	Dependent on HC WCID #1 permit amendment application and the TCEQ

REFERENCES

2011 East Texas Regional Water Plan.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR CITY OF JACKSONVILLE RAW WATER TRANSMISSION

Project Name:	Lake Columbia to Jacksonville Raw Water Transmission System
Project ID:	JACK-COL
Project Type:	Existing Surface Water Source
Potential Supply Quantity (Rounded):	1,700 ac-ft per year (3 MGD)
Implementation Decade:	2040
Development Timeline:	5 years
Project Capital Cost:	$20,645,000 (Sept. 2013)
Project Annual Cost:	$2,645,000 (Sept. 2013)
Unit Water Cost (Rounded):	$1,556 per ac-ft (during loan period) $4.77 (per 1,000 gallons)

PROJECT DESCRIPTION

Lake Columbia is a water management strategy for Angelina Nacogdoches River Authority. Angelina Neches River Authority has contracts with several customers that are participants in the project development. City of Jacksonville is included in the list, participating at five percent contribution. It is assumed that Jacksonville will be purchasing raw water from Angelina Neches River Authority. City of Jacksonville will need a transmission project to transfer supplies from Lake Columbia to the City. The water management strategy associated with the transmission project is discussed in this tech memo. The current contract amount for City of Jacksonville is 4,275 acre feet. However, City of Jacksonville currently does not have any supply shortages and is also not expecting tremendous growth in the recent future. For these reasons, it is assumed that the transmission strategy will be developed in phases with the first phase for a potential supply of 1,700 acre feet per year (3 MGD). The tech memo discussion is associated with the Phase I of the transmission project. Additional phases will be developed at a later stage. The transmission project will include a 5-mile pipeline from Lake Columbia to the City, an intake pump station, and a 3-MGD water treatment plant to treat the supplies before delivery. Figure included at the end of the tech memo show the location map of the project and a preliminary pipeline corridor for the transmission system.

PERMITTING AND DEVELOPMENT

No additional permitting issues associated with the project. The project will commence after the commencement of the Lake Columbia project by Angelina Neches River Authority.

PLANNING LEVEL OPINION OF COST

Included below is a planning level opinion of cost (PLOC) for Phase I of the pipeline from Lake Columbia to City of Jacksonville. Costs are estimated for half-mile of pipeline in urban areas and 4.5 miles of pipeline in rural areas. The transmission system cost estimate also includes the cost of 100 HP intake pump station and a 3 MGD water treatment plant for treating the raw water. The annual costs are calculated assuming 5.5% interest rate and 20 years of return period. The estimate includes the cost for the purchase of raw water from Angelina Neches River Authority.

WWPNAME:	**Jacksonville**	**STRATEGY:**		**Lake Columbia Pipeline**	
Quantity for Phase I	**1,700** AF/Y			2.27 MGD	
CAPITAL COSTS					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	16 in.	23,544	LF	$58	$1,355,000
Pipeline Urban	16 in.	3,000	LF	$81	$242,000
Right of Way Easements Rural (ROW)		23,544	LF	$16	$404,690
Right of Way Easements Urban (ROW)		3,000	LF	$26	$84,700
Engineering and Contingencies (30%)					$479,000
Subtotal of Pipeline					**$2,565,390**
Pump Station(s)					
Pump with intake & building	100 HP	1	LS	$829,000	$829,000
Storage Tanks	0.28 MG	1	EA	$96,290	$96,000
Engineering and Contingencies (35%)					$323,750
Subtotal of Pump Station(s)					**$1,248,750**
Water Treatment Facility					
New Water Treatment Plant	3 MGD	1	LS	$11,833,000	$11,833,000
Engineering and Contingencies (35%)					$4,141,550
Subtotal of WTP					**$15,974,550**
Permitting and Mitigation					$158,231
CONSTRUCTION TOTAL					**$19,947,000**
Interest During Construction			12	Months	$698,000
TOTAL COST					**$20,645,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$1,728,000
Operational Costs*					$917,000
Total Annual Costs					**$2,645,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$1,556
Per 1,000 Gallons					$4.77
UNIT COSTS (After Amortization)					
Per Acre-Foot					$539
Per 1,000 Gallons					$1.66

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

Based on the analysis provided above, the Lake Columbia to Jacksonville Raw Water Transmission System project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	1,700 ac-ft per year
Reliability	4	Highly Reliable Supply
Cost	2	Medium to Moderate High Costs
Environmental Factors	4	Low Impacts
Impact on Other State Water Resources	4	Low Impact
Threat to Agricultural Resources/Rural Areas	4	Low
Interbasin Transfers		No
Other Natural Resources	4	No known Impacts
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	4	City of Jacksonville is the local sponsor committed to this project
Implementation Issues	3	Dependent on the completion of Lake Columbia construction

REFERENCES

2011 East Texas Regional Water Plan.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR LNVA PURCHASE FROM SRA

Water User Group Name:	Lower Neches Valley Authority
Strategy Name:	Purchase from Sabine River Authority (Toledo Bend)
Strategy ID:	LNVA-SRA
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	200,000 ac-ft per year (178.4 MGD)
Implementation Decade:	2040
Development Timeline:	2040
Project Capital Cost:	$399,955,000 (September, 2013) – LNVA estimates $350 million
Annual Cost:	$105,144,000
Unit Water Cost (Rounded):	$526 per ac-ft ($1.61 per 1,000 gallons)

PROJECT DESCRIPTION

This strategy is a recommended strategy for the Lower Neches Valley Authority and involves a contract to take raw surface water from the Sabine River Authority's Toledo Bend system as their permit allows. The cost for supply from the Sabine River Authority includes the cost of raw water and infrastructure related to water conveyance. Ultimately, the cost for raw water will need to be negotiated with the Sabine River Authority and will reflect the wholesale water rates of this entity at the time a contract is made. The cost estimate included in this technical memorandum utilizes an assumed rate for the East Texas Regional Water Planning Area regional rate for raw surface water.

SUPPLY DEVELOPMENT

The quantity of supply from this strategy represents the water requested by the Lower Neches Valley Authority as part of their long term planning. This is equal to 200,000 ac-ft per year beginning in 2040 and continuing through the end of the planning period, 2070. The reliability of this water supply is considered medium to high due to the availability of water from the Toledo Bend system. However, this project is dependent on coordination with the Sabine River Authority.

ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be moderate. In addition, a contract between the Lower Neches Valley Authority and Sabine River Authority should have a minimum impact to environmental water needs, no impact to the surrounding habitat, and a low impact to cultural resources in the area. There are no bays or estuaries in close proximity to the project area located in Jefferson and Orange Counties. Before this project could be pursued, the Lower Neches Valley Authority would need to perform a site selection study to identify environmental impacts associated with the project.

PERMITTING AND DEVELOPMENT

This strategy is dependent on the Sabine River Authority completing a project to move the location of one of their existing pump stations.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assumed 13 miles of pipeline and 17 miles of open canals (distance determined by the Lower Neches Valley Authority), one pump station with an intake, and two booster pump station. The annual cost was estimated assuming a debt service of 6% for 20 years and using the East Texas Regional Water Planning Area regional rate for raw surface water. Overall, this strategy has a low cost compared to other strategies in the 2016 East Texas Regional Water Plan.

WUG NAME:	**Lower Neches Valley Authority**					
STRATEGY:	**Purchase from Sabine River Authority (Toledo Bend)**					
Raw Water Quantity:	**200,000** AF/Y			356.8 MGD		
CONSTRUCTION COSTS						
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline/Canal Rural	144 in.	158,400	LF	$1,527	$241,829,000
Right of Way Easements Rural (ROW)		158,400	LF	$26	$4,473,480
Engineering and Contingencies (30%)					$72,549,000
Subtotal of Pipeline/Canal	**30**	**miles**			**$318,851,480**
Pump Station(s)					
Pump with intake	2953 HP	1	LS	$5,410,000	$5,410,000
Booster Pump Station	2953 HP	2	LS	$9,934,000	$19,868,000
Engineering and Contingencies (35%)					$8,847,300
Subtotal of Pump Station(s)					**$34,125,300**
Storage Tanks	7.0 MG	3	LS	$2,009,754	$6,029,262
Engineering and Contingencies (35%)					$2,110,242
Subtotal of Storage Tanks					**$8,139,504**
Permitting and Mitigation					$834,000
Construction Total					**$361,950,284**
Interest During Construction			36	Months	$38,005,000
TOTAL CAPITAL COST					**$399,955,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$33,468,000
Operational Costs*					$71,676,000
Total Annual Costs					**$105,144,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$526
Per 1,000 Gallons					$1.61
UNIT COSTS (After Amortization)					
Per Acre-Foot					$358
Per 1,000 Gallons					$1.10

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

This strategy benefits customers of the Lower Neches Valley Authority and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. A contract to pull water from the Toledo Bend system will reduce demands on Toledo Bend and the Sabine River and will have no other apparent impact on other State water resources. From a third party social and economic perspective, this voluntary redistribution of water will be beneficial because it provides water for economic growth.

Based on the analyses provided above, the Lower Neches Valley recommended strategy to purchase water from the Sabine River Authority was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	200,000 ac-ft per year
Reliability	4	Highly Reliable Supply
Cost	4	Low Cost
Environmental Factors	4	Low to Medium Impacts to the environment
Impact on Other State Water Resources	4	Low Impact
Threat to Agricultural Resources/Rural Areas	4	Low
Interbasin Transfers		No
Other Natural Resources	4	No known Impacts
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	4	Local sponsorship by Lower Neches Valley Authority
Implementation Issues	3	Contract with SRA

REFERENCES

2011 East Texas Regional Water Plan.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR LNVA PERMIT AMENDMENT

Water User Group Name:	Lower Neches Valley Authority
Strategy Name:	Permit Amendment for Lake Sam Rayburn
Strategy ID:	LNVA-PA
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	28,000 ac-ft per year (25 MGD)
Implementation Decade:	2020
Development Timeline:	2020
Project Capital Cost:	$0 (May 2015)
Annual Cost:	$0
Unit Water Cost (Rounded):	$0 per ac-ft ($0 per 1,000 gallons)

PROJECT DESCRIPTION

This strategy is a recommended strategy for the Lower Neches Valley Authority to apply to the Texas Commission on Environmental Quality (TCEQ) for additional yield from Lake Sam Rayburn.

SUPPLY DEVELOPMENT

The volume associated with this strategy is 28,000 ac-ft per year, beginning in 2020, and continuing through the planning period, 2070. The volume of water is the supply created by the Corps of Engineers when they raised the conservation pool from 164.0 ft msl to 164.4 ft msl in 1969. The reliability of this water supply is considered high because the firm yield of the lake allows for this permit amendment; however, the amendment is dependent upon decisions made by the TCEQ.

ENVIRONMENTAL CONSIDERATIONS

The implementation of this strategy would not require construction of additional infrastructure; therefore, the environmental impacts associated with this projected are expected to be minimal. In addition, the project should have minimum impacts to environmental water needs and the surrounding habitat, and no impacts to cultural resources in the area are expected. There are no bays or estuaries in close proximity to Lake Sam Rayburn.

PERMITTING AND DEVELOPMENT

The implementation of this strategy would not require additional infrastructure or studies. However, this permit amendment is dependent upon coordination with the TCEQ.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) was not developed for this strategy because costs associated with the permit amendment are considered minimal. Any costs incurred by the Lower Neches Valley Authority will be related to engineering and lawyer fees.

PROJECT EVALUATION

This strategy benefits both municipal and non-municipal customers of the Lower Neches Valley Authority and would have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. An amendment to allow the Lower Neches Valley Authority to pull water from Lake Sam Rayburn will reduce demands on other water supplies in Jefferson County and will have no other apparent impact on other State water resources. From a third party social and economic perspective, this permit amendment for existing surface water supplies will be beneficial because it provides water for economic growth.

Based on the analyses provided above, the Lower Neches Valley Authority recommended strategy for a permit amendment was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	28,000 ac-ft per year
Reliability	5	Highly Reliable Supply
Cost	5	No Cost (Excluding Administrative and Lawyer Fees)
Environmental Factors	4	Low to Medium Impacts to the environment
Impact on Other State Water Resources	4	Low Impact
Threat to Agricultural Resources/Rural Areas	4	Low
Interbasin Transfers		No
Other Natural Resources	4	No known Impacts
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	4	Sponsorship by Lower Neches Valley Authority
Implementation Issues	4	Limited risk; dependent on TCEQ

REFERENCES

2011 East Texas Regional Water Plan.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR LNVA TRANSFER TO REGION H

Water User Group Name:	Lower Neches Valley Authority
Strategy Name:	Transfer to Region H (Sam Rayburn)
Strategy ID:	LNVA-RGH
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	55,000 ac-ft per year (44.6 MGD)
Implementation Decade:	2040
Development Timeline:	2040
Project Capital Cost:	$48,949,000 (September, 2013)
Annual Cost:	$23,905,000
Unit Water Cost (Rounded):	$435 per ac-ft ($1.33 per 1,000 gallons)

PROJECT DESCRIPTION

This strategy is a recommended strategy for the Lower Neches Valley Authority to provide conveyance from their Sam Rayburn system to Irrigation customers located in Liberty County (Region H) and represents replacement water for the Devers Canal System from water sold to SJRA in the 1990s. Delivery will occur during the 6-month irrigation season. The cost for this project includes terminal storage and infrastructure related to water conveyance. Ultimately, individual irrigation water users will make contracts with the Lower Neches Valley Authority to purchase the water supply created by this project. The cost for raw water will need to be negotiated with the Lower Neches Valley Authority and will reflect the wholesale water rates of this entity at the time a contract is made.

SUPPLY DEVELOPMENT

The quantity of supply from this strategy represents the water requested by the Lower Neches Valley Authority as part of their long term planning. This is equal to 55,000 ac-ft per year beginning in 2040 and continuing through the end of the planning period, 2070. The reliability of this water supply is considered high due to the availability of water from the Sam Rayburn system.

ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline and canal construction is expected to be moderate, but the conveyance of water from Sam Rayburn to Liberty County should have a minimum impact to environmental water needs in Jefferson County, no impact to the surrounding habitat, and a low impact to cultural resources in the area. There are no bays or estuaries in close proximity to the project area located in Jefferson and Liberty Counties. Before this project could be pursued, the Lower Neches Valley Authority would need to perform a site selection study to identify environmental impacts associated with the project.

PERMITTING AND DEVELOPMENT

The development of this strategy is dependent on the long term planning goals of the Lower Neches Valley Authority and irrigation customers in Liberty County.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assumed 8 miles of pipeline, 5 miles of canals (distances determined by the Lower Neches Valley Authority), one pump station with an intake, one booster pump station, and one ground storage tank. The annual cost was estimated assuming a debt service of 6% for 20 years. Overall, this strategy has a low cost compared to other strategies in the 2016 East Texas Regional Water Plan.

WUG NAME:	**Lower Neches Valley Authority**					
STRATEGY:	**Transfer to Region H (Sam Rayburn)**					
Raw Water Quantity:	**55,000** AF/Y			49.1 MGD		
CAPITAL COSTS						
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**		**Cost**
Pipeline Rural	54 in.	42,240	LF	$274		$11,558,000
Canals Rural	54 in.	26,400	LF	$383		$10,103,000
Right of Way Easements Rural (ROW)		42,240	LF	$26		$1,192,950
Right of Way Easements Urban (ROW)		26,400	LF	$154		$4,473,480
Engineering and Contingencies (30%)						$6,498,000
Subtotal of Pipeline/Canal	**8**	**miles**				**$33,825,000**
Pump Station(s)						
Pump with intake	4904 HP	1	LS		$7,622,000	$7,622,000
Engineering and Contingencies (35%)						$2,667,700
Subtotal of Pump Station(s)						**$10,290,000**
Storage Tanks	6 MG	1	LS		$2,078,705	$2,078,705
Engineering and Contingencies (35%)						$727,547
Subtotal of Storage Tanks						**$2,806,000**
Permitting and Mitigation						$373,000
Construction Total						**$47,294,000**
Interest During Construction			12	Months		$1,655,000
TOTAL CAPITAL COST						**$48,949,000**
ANNUAL COSTS						
Debt Service (5.5% for 20 years)						$4,096,000
Operational Costs*						$19,809,000
Total Annual Costs						**$23,905,000**
UNIT COSTS (Until Amortized)						
Per Acre-Foot of treated water						$435
Per 1,000 Gallons						$1.33
UNIT COSTS (After Amortization)						
Per Acre-Foot						$360
Per 1,000 Gallons						$1.11

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

This strategy benefits irrigation water users in eastern Liberty County who may become customers of the Lower Neches Valley Authority; this strategy is expected to have a positive impact on the water supply security of these future customers. In the future, this supply could also serve municipal and manufacturing demands in Liberty County. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. This project will reduce demands on water resources located in Liberty County and will have no other apparent impact on other State water resources. From a third party social and economic perspective, this voluntary redistribution of water will be beneficial because it provides water for economic growth.

Based on the analyses provided above, the Lower Neches Valley recommended strategy to transfer water to irrigation water users in Liberty County was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	55,000 ac-ft per year
Reliability	4	Highly Reliable Supply
Cost	4	Low Cost
Environmental Factors	4	Low to Medium Impacts to the environment
Impact on Other State Water Resources	4	Low Impact
Threat to Agricultural Resources/Rural Areas	5	No Negative Impacts (Benefits Agricultural Users)
Interbasin Transfers		Yes
Other Natural Resources	4	No known Impacts
Major Impacts on Key Water Quality Parameters	3	Potential Impacts due to IBT
Political Feasibility	4	Sponsorship by Lower Neches Valley Authority
Implementation Issues	3	Potential implementation issues due to IBT

REFERENCES

Discussions with Lower Neches Valley Authority.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR LNVA CONSTRUCTED LEVY

Water User Group Name:	Lower Neches Valley Authority
Strategy Name:	Constructed Levy
Strategy ID:	LNVA-JEFF
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	1,600 ac-ft per year (0.7 MGD)
Implementation Decade:	2020
Development Timeline:	2020
Project Capital Cost:	$34,989,000 (September, 2013)
Annual Cost:	$3,055,000
Unit Water Cost (Rounded):	$1,909 per ac-ft ($5.86 per 1,000 gallons)

PROJECT DESCRIPTION

This strategy is a recommended strategy for the Lower Neches Valley Authority to provide conveyance from their Sam Rayburn system to Irrigation customers located in Liberty County (Region H). The cost for this project includes terminal storage and infrastructure related to water conveyance. Ultimately, individual irrigation water users will make contracts with the Lower Neches Valley Authority to purchase the water supply created by this project. The cost for raw water will need to be negotiated with the Lower Neches Valley Authority and will reflect the wholesale water rates of this entity at the time a contract is made.

SUPPLY DEVELOPMENT

As requested by the Lower Neches Valley Authority, the quantity of supply from this strategy represents a one day supply of all of their municipal and industrial customers in Jefferson County. This is equal to 1,600 ac-ft per year beginning in 2020 and continuing through the end of the planning period, 2070. The reliability of this water supply is considered high due to the availability of water from the Sam Rayburn system. In addition, the Lower Neches Valley Authority would be not be dependent on the sponsorship of another entity.

ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to the installation of a terminal storage reservoir would be minimal. In addition, the project would have minimal to no impacts on environmental water needs in Jefferson County, the surrounding habitat, and the cultural resources in the area. There are no bays or estuaries in close proximity to the project area located in Jefferson County. However, before this project could be pursued, the Lower Neches Valley Authority would need to perform a site selection study to identify environmental impacts associated with the project.

PERMITTING AND DEVELOPMENT

The development of this strategy is dependent on the long term planning goals of the Lower Neches Valley Authority.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The capital costs assumed a storage capacity of 500 million gallons and one pump station to fill the reservoir. The proposed reservoir capacity is equal to a 3-day supply of municipal and industrial customers in South Jefferson County. The annual cost was estimated assuming a debt service of 6% for 20 years as well as electrical and operation and maintenance costs. Overall, this strategy has a high cost compared to other strategies in the 2016 East Texas Regional Water Plan.

WUGNAME:	**Lower Neches Valley Authority**				
STRATEGY:	**Terminal Storage Reservoir in Jefferson County (Sam Rayburn)**				
Raw Water Quantity:	**1,600** acre-feet			521 MG	
TERMINAL STORAGE RESERVOIR (1 day of storage = 521 MG)					
Construction		**Quantity**	**Unit**	**Unit Price**	**Cost**
Excavation		168,600	CY	$5	$860,000
Compacted Fill		875,700	CY	$8	$7,181,000
Gravel (Drain)		6,400	CY	$103	$658,000
Soil Cement (1 foot)		92,600	CY	$87	$8,093,000
Flex Road Base (8 inches)		3,400	CY	$93	$315,000
HDPE Liner		2,482,000	SF	$1	$2,978,000
Inlet and Outlet Structures		1	LS	$1,540,000	$1,540,000
Electrical Building and Controls		1	LS	$1,540,000	$1,540,000
Engineering and Contingencies (30%)					$6,950,000
Subtotal of Construction					**$30,115,000**
Pump Station(s)					
Pump with intake	932 HP	1	LS	$3,118,000	$3,118,000
Booster Pump Station	0 HP	0	LS	$0	$0
Engineering and Contingencies (35%)					$1,091,300
Subtotal of Pump Station(s)					**$4,209,300**
Permitting and Mitigation					$63,000
Construction Total					**$34,387,300**
Interest During Construction			6 Months		$602,000
TOTAL CAPITAL COST					**$34,989,000**
ANNUAL COSTS					
Debt Service (5.5% for 20 years)					$2,928,000
Operational Costs*					$127,000
Total Annual Costs					**$3,055,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$1,909
Per 1,000 Gallons					$5.86
UNIT COSTS (After Amortization)					
Per Acre-Foot					$86
Per 1,000 Gallons					$0.26

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

This strategy benefits municipal and industrial customers of the Lower Neches Valley Authority in Jefferson County and is expected to have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. This project will have no impact to the demands on water resources in Jefferson County or to any other State water resources.

Based on the analyses provided above, the Lower Neches Valley recommended strategy to store water from their Sam Rayburn system in Jefferson County was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	1,600 ac-ft per year
Reliability	4	Highly Reliable Supply
Cost	2	Medium to High Cost
Environmental Factors	4	Low impacts to the environment from construction
Impact on Other State Water Resources	4	Low Impact
Threat to Agricultural Resources/Rural Areas	4	Low
Interbasin Transfers		No
Other Natural Resources	4	No known Impacts
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	1	Sponsorship by Lower Neches Valley Authority
Implementation Issues	4	No known risks

REFERENCES

Discussions with Lower Neches Valley Authority.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR CITY OF LUFKIN

Water User Group Name:	City of Lufkin
Strategy Name:	Conveyance from Sam Rayburn to Kurth Lake
Strategy ID:	LUFK-RAY
Strategy Type:	Existing Surface Water Source
Potential Supply Quantity:	28,000 ac-ft per year (25 MGD)
Implementation Decade:	2030
Development Timeline:	2030-2050
Project Capital Cost:	Phase 1: $49,368,000 Phase 2: $37,863,000 Phase 3: $2,760,000 (September, 2013)
Annual Cost:	Phase 1: $12,503,000 Phase 2: $23,373,000 Phase 3: $22,797,000
Unit Water Cost (Rounded):	Phase 1: $1,115 per ac-ft ($3.42 per 1,000 gallons) Phase 2: $1,051 per ac-ft ($3.23 per 1,000 gallons) Phase 3: $814 per ac-ft ($2.50 per 1,000 gallons)

PROJECT DESCRIPTION

This strategy is a recommended strategy for the City of Lufkin to provide conveyance from Sam Rayburn to Kurth Lake as their permit allows. The cost of the project will occur in three phases and includes the cost of a water treatment plant and infrastructure related to water conveyance. This is a supply that will provide water to both municipal and non-municipal customers in Angelina County; manufacturing in Angelina County is projected to have a need and has a strategy to contract water from this supply. Ultimately, manufacturing water users in Angelina County will make contracts with the City of Lufkin to purchase the water supply created by this project. The cost for raw water will need to be negotiated with the City of Lufkin and will reflect the wholesale water rates of this entity at the time a contract is made.

SUPPLY DEVELOPMENT

As requested by the City of Lufkin, the supply from this strategy represents their water right from Sam Rayburn for 28,000 ac-ft per year. However, since the strategy will be implemented in phases, the full supply will not be available until 2050, pending the demands of potential future customers. The supply in 2030 will be 11,210 ac-ft per year (10 MGD), 22,420 ac-ft per year (20 MGD) in 2040, and 28,000 ac-ft per year (25 MGD) in 2050. The reliability of this water supply is considered high due to the availability of water from the Sam Rayburn system and because the City of Lufkin already has the water right in place to access this water. In addition, the City of Lufkin would not be dependent on sponsorship from another entity

ENVIRONMENTAL CONSIDERATIONS

A specific location for the new water treatment plant has not been determined. Before this strategy could be pursued, a site selection study would need to be performed, in addition to other studies to identify and quantity potential environmental impacts associated with the projected. For the purposes of this analysis, it is assumed that a site could be selected that would have acceptable impacts. Once the water treatment plant is constructed, expanding the water treatment plant will have minimum environmental impacts.

During the construction of the pipeline, impacts to the environment and other natural resources are expected to be minimal and temporary.

PERMITTING AND DEVELOPMENT

Additional study and mitigation may be required before construction of the transmission pipeline.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below; an estimate was prepared for each phase of this strategy. The total capital cost assumes a pipeline length of 12.4 miles, and the water treatment plant would include a 5 million gallon storage tank. The annual cost was estimated assuming a debt service of 6% for 20 years as well as electrical and operation and maintenance costs. Overall, this strategy has a low cost compared to other strategies in the 2016 East Texas Regional Water Plan.

PHASE 1 - 2030 DECADE		**Total Capacity (ac-ft per year)**			**11,210**
Treated Water Quantity	**11,210**	AF/Y		**10**	MGD
Pipeline & Treatment Facility	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline from Sam Rayburn	36 in.	65,500	LF	$171	$11,177,000
Right of Way Easements Rural (ROW)		65,500	LF	$26	$1,849,870
Engineering and Contingencies (30%)					$3,353,000
Subtotal of Pipeline	**12.4**	**Miles**			**$16,379,870**
Pump Station(s)					
Lake Intake and Pump Station	600 HP	1	LS	$2,454,000	$2,454,000
Booster Pump Station	500 HP	0	LS	$3,607,000	$0
Engineering and Contingencies (35%)					$858,900
Subtotal of Pump Station(s)					**$3,312,900**
Water Treatment Facility					
Storage	5.00 MG	1	EA	$1,464,000	$1,464,000
Water Treatment Facility	10 MGD	1	LS	$17,860,000	$17,860,000
Engineering and Contingencies (35%)					$6,763,400
Subtotal of WTP					**$26,087,400**
Permitting and Mitigation					$358,133
CONSTRUCTION TOTAL					**$46,138,000**
Interest During Construction			24	Months	$3,230,000
PHASE I TOTAL CAPITAL COST					**$49,368,000**
Debt Service (5.5% for 20 years)					$4,131,000
Debt Service from Previous Phase					$0
Operational Costs*					$4,514,000
Total Annual Costs					**$12,503,000**

UNIT COSTS (Until Amortized)	
Per Acre-Foot of treated water	$1,115
Per 1,000 Gallons	$3.42
UNIT COSTS (After Amortization)	
Per Acre-Foot	$747
Per 1,000 Gallons	$2.29

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PHASE 2 - 2040 DECADE		**Total Capacity (ac-ft per year)**			**22,240**	
Treated Water Quantity	**11,210** AF/Y				**10** MGD	
Upgrades to Pump Stations						
Lake Intake and Pump Station	600 HP	1	LS	$2,454,000		$2,454,000
Booster Pump Station	500 HP	0	LS	$3,607,000		$0
Engineering and Contingencies (35%)						$858,900
Subtotal of Pump Station(s)						**$3,312,900**
Water Treatment Facility						
Storage	0.00 MG	0	EA	$0		$0
Upgrade Treatment Facility	15 MGD	1	LS	$23,491,000		$23,491,000
Engineering and Contingencies (35%)						$8,221,850
Subtotal of WTP						**$31,712,850**
Permitting and Mitigation						$360,409
CONSTRUCTION TOTAL						**$35,386,000**
Interest During Construction			24	Months		$2,477,000
PHASE 2 TOTAL CAPITAL COST						**$37,863,000**
Debt Service (5.5% for 20 years)						$3,168,000
Debt Service from Previous Phase						$4,131,000
Operational Costs*						$8,417,000
Total Annual Costs						**$23,373,000**
UNIT COSTS (Until Amortized)						
Per Acre-Foot of treated water						$1,051
Per 1,000 Gallons						$3.23
UNIT COSTS (After Amortization)						
Per Acre-Foot						$723
Per 1,000 Gallons						$2.22

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PHASE 3 - 2050 DECADE	**Total Capacity (ac-ft per year)**				**28,000**	
Treated Water Quantity	**5,760** AF/Y				**5** MGD	
Pump Station(s)						
Lake Intake and Pump Station	200 HP	1	LS	$1,666,000		$1,666,000
Booster Pump Station	500 HP	0	LS	$3,607,000		$0
Engineering and Contingencies (35%)						$583,100
Subtotal of Pump Station(s)						**$2,249,100**
Water Treatment Facility						
Storage	5.00 MG	0	EA	$1,464,000		$0
Water Treatment Facility	10 MGD	0	LS	$17,860,000		$0

Engineering and Contingencies (35%)			$0
Subtotal of WTP			**$0**
Permitting and Mitigation			$330,133
CONSTRUCTION TOTAL			**$2,579,000**
Interest During Construction	24	Months	$181,000
PHASE 3 TOTAL CAPITAL COST			**$2,760,000**
Debt Service (5.5% for 20 years)			$231,000
Debt Service from Previous Phase			$3,168,000
Operational Costs*			$9,776,000
Total Annual Costs			**$22,797,000**
UNIT COSTS (Until Amortized)			
Per Acre-Foot of treated water			$814
Per 1,000 Gallons			$2.50
UNIT COSTS (After Amortization)			
Per Acre-Foot			$693
Per 1,000 Gallons			$2.13

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

This strategy benefits both municipal and non-municipal customers in Angelina County, specifically manufacturing water users. Angelina Manufacturing has a recommended strategy to purchase water from Lufkin created by this new supply (Strategy ID: ANGL-MFG1). Overall, providing conveyance from Sam Rayburn to Kurth Lake will have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. This project may reduce demands on other water resources in Angelina County; however, the project is not expected to impact any other State water resources.

Based on the analyses provided above, the City of Lufkin recommended strategy to develop supplies from Sam Rayburn in Angelina County was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	28,000 ac-ft per year
Reliability	4	Highly Reliable Supply
Cost	3	Medium Cost
Environmental Factors	4	Minimum to moderate impacts to the environment from construction
Impact on Other State Water Resources	4	Low Impact
Threat to Agricultural Resources/Rural Areas	4	Low
Interbasin Transfers		No
Other Natural Resources	4	No known Impacts
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	4	Sponsorship by City of Lufkin
Implementation Issues	4	No known risks

REFERENCES

2011 East Texas Regional Water Plan.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR NACOGDOCHES RAW WATER TRANSMISSION

Project Name:	Lake Columbia to Nacogdoches Raw Water Transmission System
Project ID:	NACP-COL
Project Type:	Existing Surface Water Source
Potential Supply Quantity (Rounded):	8,500 ac-ft per year (7.6 MGD)
Implementation Decade:	2030
Development Timeline:	2 years
Project Capital Cost:	$35,829,000 (Sept. 2013)
Project Annual Cost:	$5,995,000 (Sept. 2013)
Unit Water Cost (Rounded):	$705 per ac-ft (during loan period) $2.16 (per 1,000 gallons)

PROJECT DESCRIPTION

Lake Columbia is a water management strategy for Angelina Nacogdoches River Authority. Angelina Neches River Authority has contracts with several customers that are participants in the project development. City of Nacogdoches is included in the list, participating at 10 percent contribution respectively. It is assumed that Nacogdoches will be purchasing raw water from Angelina Neches River Authority. City of Nacogdoches will need a transmission project to transfer supplies from Lake Columbia to the City.

The water management strategy associated with the transmission project is discussed in this technical memorandum. The total current contract amount for City of Nacogdoches is 8,500 acre feet. It is assumed that the transmission strategy will be developed for a potential supply of 8,500 acre feet per year (7.6 MGD). The transmission project will include a 3.5-mile pipeline from Lake Columbia to the City, an intake pump station, and a 12-MGD water treatment plant to treat the supplies before delivery.

PERMITTING AND DEVELOPMENT

No additional permitting issues associated with the project. The project will commence after the commencement of the Lake Columbia project by Angelina Neches River Authority.

PLANNING LEVEL OPINION OF COST

Included below is a planning level opinion of cost (PLOC) for the pipeline from Lake Columbia to City of Nacogdoches. Costs are estimated for 3.5 miles of pipeline in urban areas and 4.5 miles of pipeline in rural areas. The transmission system cost estimate also includes the cost of 400 HP intake pump station and a 12 MGD water treatment plant for treating the raw water. The annual costs are calculated assuming 5.5% interest rate and 20 years of return period. The estimate includes the cost for the purchase of raw water from Angelina Neches River Authority.

WWP NAME: **Nacogdoches**
STRATEGY: **Lake Columbia Transmission System**

Quantity: **8,500** AF/Y 11.37 MGD

CAPITAL COSTS

Pipeline to Lake Nacogdoches	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	30 in.	18,117	LF	$137	$2,488,000
Right of Way Easements Rural (ROW)		18,117	LF	$16	$311,410
Engineering and Contingencies (30%)					$746,000
Subtotal of Pipeline					**$3,545,410**
Pump Station(s)					
Pump with intake & building	344 HP	1	LS	$2,048,000	$2,048,000
Booster Pump Station	0 HP	1	LS	$0	$0
Engineering and Contingencies (35%)					$716,800
Subtotal of Pump Station(s)					**$2,764,800**
Water Treatment Facility					
Expand Existing Water Treatment Plant	11 MGD	1	LS	$19,363,000	$19,363,000
Storage Tanks	1.42 MG	1	LS	$665,000	$665,000
Engineering and Contingencies (35%)					$7,009,800
Subtotal of WTP					**$27,037,800**
Permitting and Mitigation					$136,529
Construction Total					**$33,485,000**
Interest During Construction			24	Months	$2,344,000
TOTAL COST					**$35,829,000**

ANNUAL COSTS

Debt Service (5.5% for 20 years)	$2,998,000
Operational Costs*	$2,997,000
Total Annual Costs	**$5,995,000**

UNIT COSTS (Until Amortized)

Per Acre-Foot of treated water	$705
Per 1,000 Gallons	$2.16

UNIT COSTS (After Amortization)

Per Acre-Foot	$353
Per 1,000 Gallons	$1.08

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

Based on the analysis provided above, the Lake Columbia to Nacogdoches Raw Water Transmission System project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	8,500 ac-ft per year
Reliability	4	Highly Reliable Supply
Cost	3	Medium Cost
Environmental Factors	4	Low Impacts
Impact on Other State Water Resources	4	Low Impact
Threat to Agricultural Resources/Rural Areas	4	Low
Interbasin Transfers		No
Other Natural Resources	4	No known Impacts
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	4	City of Nacogdoches is the local sponsor
Implementation Issues	3	Dependent on the completion of Lake Columbia project

REFERENCES

2011 East Texas Regional Water Plan

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR CITY OF PORT ARTHUR CONSERVATION

Project Name:	City of Port Arthur – Municipal Conservation
Project ID:	PORT-CONS
Project Type:	Conservation
Potential Supply Quantity (Rounded):	10,340 ac-ft per year
Implementation Decade:	2020
Development Timeline:	1 years
Project Capital Cost:	$50,075,000 (Sept. 2013)
Unit Water Cost (Rounded):	$333 per ac-ft (during loan period) $1.02(per 1,000 gallons)

PROJECT DESCRIPTION

The City provides treated water to municipal users both inside and outside their city limits and industrial users including Cheniere LNG and Motiva Enterprises. Port Arthur is not projected to have a water shortage within the planning period. However, the City had an average per capita consumption of 320 gpcd in 2011. This value is well over the statewide goal of 140 gpcd. In addition, their 2013 Water Loss Report submitted to the TWDB had a total percent loss of over 66%. After performing a conservation analysis, the ETRWPG believes a water conservation strategy for the City is economically achievable. The recommended water management strategy for Port Arthur is water conservation, which includes planning level opinion of probable construction cost estimates related to enhanced public and school education, water conservation pricing implementation, and an enhanced water loss control program.

SUPPLY DEVELOPMENT

The supply for this strategy represents conservation savings due to enhanced public and school education, water conservation pricing implementation, and an enhanced water loss control program.

ENVIRONMENTAL CONSIDERATIONS

No environmental considerations associated with this strategy.

PERMITTING AND DEVELOPMENT

No additional permitting required for this strategy

PLANNING LEVEL OPINION OF COST

The planning level opinion of cost (PLOC) for this strategy includes no capital costs; the annual cost for this strategy is $2,150,000. The unit cost is $333 per ac-ft of supply and $1.02 per 1,000 gallons of supply.

PROJECT EVALUATION

Based on the analysis provided above, the City of Port Arthur Municipal Conservation project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	10,340 ac-ft per year
Reliability	4	Reliable Supply
Cost	4	Low Cost
Environmental Factors	4	Low Impacts
Impact on Other State Water Resources	4	Low Impact
Threat to Agricultural Resources/Rural Areas	4	Low
Interbasin Transfers		No
Other Natural Resources	4	No known Impacts
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	4	City of Port Arthur is the local sponsor
Implementation Issues	4	No known risks

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR SRA TOLEDO BEND PERMIT AMENDMENT

Project Name:	Sabine River Authority – Toledo Bend Permit Amendment
Project ID:	SRA-TB
Project Type:	New Surface Water Source
Potential Supply Quantity (Rounded):	293,300 ac-ft per year
Implementation Decade:	2020
Development Timeline:	1 years
Project Capital Cost:	$0 (Sept. 2013)
Unit Water Cost (Rounded):	$0 per ac-ft (during loan period) $0 (per 1,000 gallons)

PROJECT DESCRIPTION

To support the increased use of water from Toledo Bend reservoir, the SRA has submitted a permit amendment to TCEQ to fully utilize Texas' share of the reservoir's firm yield. The application requested an additional 293,300 ac-ft per year of supply based on the TCEQ-approved Sabine River Basin WAM. The application has been declared administratively complete and TCEQ is currently reviewing the permit request. For planning purposes, the supply available from the permit amendment is based on the unpermitted yield for Toledo Bend as determined by the Sabine WAM that was used for regional water planning. The actual amount will be determined through the permitting process.

SUPPLY DEVELOPMENT

The volume associated with this strategy is the amount SRA is planning to request from Toledo Bend Reservoir. Water Availability Modeling using Sabine WAM (without environmental flows) has indicated that the actual supplies available are less than the amount requested for the permit. The actual supplies are approximately 215,300 ac-ft per year in 2020, reducing to 195,000 ac-ft per year due to sedimentation issues.

ENVIRONMENTAL CONSIDERATIONS

The implementation of this strategy would not require construction of additional infrastructure; therefore, the environmental impacts associated with this projected are expected to be minimal. In addition, the project should have minimum impacts to environmental water needs and the surrounding habitat, and no impacts to cultural resources in the area are expected.

PERMITTING AND DEVELOPMENT

The implementation of this strategy would not require additional infrastructure or studies. However, this permit amendment is dependent upon coordination with the TCEQ.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) was not developed for this strategy because costs associated with the permit amendment are considered minimal. Any costs incurred by the Lower Neches Valley Authority will be related to engineering and lawyer fees.

PROJECT EVALUATION

This strategy benefits both municipal and non-municipal customers of the Sabine River Authority and would have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. An amendment to allow the Sabine River Authority to pull water from Toledo Bend Reservoir will reduce demands on other water supplies in the region and will have no other apparent impact on other State water resources. From a third party social and economic perspective, this permit amendment for existing surface water supplies will be beneficial because it provides water for economic growth.

Based on the analyses provided above, the Sabine River Authority recommended strategy for a permit amendment was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	293,300 ac-ft per year
Reliability	3	Moderately Reliable Supply
Cost	5	No Cost (Excluding Administrative and Lawyer Fees)
Environmental Factors	4	Low to No Impacts
Impact on Other State Water Resources	4	Low to No Impacts
Threat to Agricultural Resources/Rural Areas	4	Low
Interbasin Transfers		No
Other Natural Resources	4	No known risks
Major Impacts on Key Water Quality Parameters	4	No known risks
Political Feasibility	5	Sabine River Authority is the local sponsor
Implementation Issues	3	Permit Approval by TCEQ

REFERENCES

2011 East Texas Regional Plan.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR SRA PUMP STATION

Project Name:	Sabine River Authority – Pump Station
Project ID:	SRA-PS
Project Type:	Existing Surface Water Source
Potential Supply Quantity (Rounded):	89,680 ac-ft per year
Implementation Decade:	2020
Development Timeline:	2 years
Project Capital Cost:	$72,832,675 (Sept. 2013)
Unit Water Cost (Rounded):	$812.2 per ac-ft

PROJECT DESCRIPTION

SRA is also considering another water management strategy for a new raw water Pump Station. SRA intends to construct a new raw water Pump Station along the Sabine River, approximately 7 miles upstream of the existing raw water pump station. A water management strategy for developing the raw water Pump Station infrastructure is included in the list of strategies for SRA. The infrastructure improvements will include a 80 MGD raw water intake Pump Station, settling basin for the Sabine River supplies, and pipeline connecting the proposed Pump Station to the existing SRA canal system.

SUPPLY DEVELOPMENT

Additional supply available from this water management strategy is approximately 89,680 ac-ft per year. The implementation of this strategy restores access to SRA's supplies from Toledo Bend.

ENVIRONMENTAL CONSIDERATIONS

The impact to the environment due to pipeline construction is expected to be moderate. The strategy will have minimum impact to environmental water needs, no impact to the surrounding habitat, and a low impact to cultural resources in the area. Before this project could be pursued, Sabine River Authority would need to perform a site selection study to identify environmental impacts associated with the project.

PERMITTING AND DEVELOPMENT

No known issues identified.

PLANNING LEVEL OPINION OF COST

A detailed cost estimate was provided by SRA based on a detailed preliminary engineering study that was conducted for the Sabine River pump station and pipelines associated with this strategy. The recommended infrastructure configuration assumes construction of a pump station structure capable of future expansion by addition of pumps. The pump station, pipeline, and intake structure will contain enough capacity for potential transfer of Toledo Bend supplies to Jefferson County. An 80 MGD pump station with structure constructed for 285 MGD, a 72-inch pipeline and power supply to accommodate 285 MGD were considered for the cost estimate.

- Pump Station Cost - $27,729,100
- Pipeline Cost - $45,103,575
- Total Construction Cost - $72,832,675

PROJECT EVALUATION

This strategy benefits both municipal and non-municipal customers of the Sabine River Authority and would have a positive impact on their water supply security. This analysis did not identify any impacts to agricultural or natural resources or to key parameters of water quality. Infrastructure Improvements will allow the Sabine River Authority to pull water from Toledo Bend Reservoir, will reduce demands on other water supplies in the region, and will have no other apparent impact on other State water resources. From a third party social and economic perspective, this infrastructure improvement strategy allows better access to existing surface water supplies and will be beneficial to the region because it provides water for economic growth.

Based on the analyses provided above, the Sabine River Authority recommended strategy for infrastructure improvements was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the 2016 East Texas Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	89,680 ac-ft per year
Reliability	4	Reliable Supply
Cost	3	Medium Cost
Environmental Factors	4	Low Impacts
Impact on Other State Water Resources	4	Low Impact
Threat to Agricultural Resources/Rural Areas	4	Low
Interbasin Transfers		No
Other Natural Resources	4	No known Impacts
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	5	Sabine River Authority is the local sponsor.
Implementation Issues	4	No known risks

REFERENCES

Discussions with Sabine River Authority.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR CITY OF TYLER LAKE PALESTINE EXPANSION

Project Name:	City of Tyler – Lake Palestine Expansion
Project ID:	TYLR-PAL
Project Type:	Existing Surface Water Source
Potential Supply Quantity (Rounded):	16,815 ac-ft per year
Implementation Decade:	2020
Development Timeline:	1 years
Project Capital Cost:	$93,050,000 (Sept. 2013)
Project Annual Cost:	$15,135,000 (Sept. 2013)
Unit Water Cost (Rounded):	$900 per ac-ft (during loan period) $2.76 (per 1,000 gallons)

PROJECT DESCRIPTION

The current supplies for the City include 34 MGD from Lake Tyler, 30 MGD from Lake Palestine, 0.4 MGD from Bellwood Lake, and 12 groundwater wells in Carrizo Wilcox aquifer producing approximately 8 MGD. The City of Tyler is shown to have sufficient supplies through the planning period using the TWDB approved demand projections.

In addition, there is considerable interest in other users in Smith County contracting with the City of Tyler for water supplies. There are recommended strategies for Tyler to provide additional water to Bullard, Crystal Systems Inc., Lindale, Walnut Grove WSC, Mining, and Manufacturing in Smith County. Until 2060, City of Tyler has sufficient supplies to meet the proposed demands for the potential future customers. City of Tyler has a small shortage in 2070 when current and future customer demands are taken into consideration.

City of Tyler proposed the following recommended strategies for the 2016 regional plan. City of Tyler will develop the additional 30 MGD of Lake Palestine water. The City has developed about half of its contracted supply in Lake Palestine and plans to develop the remaining supply by 2030, as part of its long-term water supply plan.

SUPPLY DEVELOPMENT

The supply for this strategy represents City of Tyler's contract with Upper Neches River Municipal Water Authority for 67,200 ac-ft per year supplies from Lake Palestine. City of Tyler has transmission capacity to access half of the supplies and plans to develop this recommended strategy to access the other half. The reliability of this water supply is not considered high due to reduction in Lake Palestine yield due to sedimentation issues.

ENVIRONMENTAL CONSIDERATIONS

A specific location for the new water treatment plant has been determined. The new water treatment plant will be at the same location as the current plant and the process train will be a mirror image of the current process train. For the purposes of this analysis, it is assumed that the current site would have acceptable

impacts. Once the water treatment plant is constructed, expanding the water treatment plant will have minimum environmental impacts.

During the construction of the pipeline, impacts to the environment and other natural resources are expected to be minimal and temporary.

PERMITTING AND DEVELOPMENT

Additional study and mitigation may be required before construction of the transmission pipeline.

PLANNING LEVEL OPINION OF COST

A planning level opinion of cost (PLOC) for this strategy is included in the table below. The total capital cost assumes a pipeline length of 5 miles, and 30 MGD water treatment plant would include a 2 million gallon storage tank. The annual cost was estimated assuming a debt service of 5.5% for 20 years as well as electrical and operation and maintenance costs. Overall, this strategy has a low cost compared to other strategies in the 2016 East Texas Regional Water Plan.

WWP NAME:	**City of Tyler**				
STRATEGY:	**Lake Palestine Expansion**				
			30		
Quantity:	**16,815** AF/Y		MGD		
CAPITAL COSTS					
Pipeline	**Size**	**Quantity**	**Unit**	**Unit Price**	**Cost**
Pipeline Rural	36 in.	23,400	LF	$171	$3,993,000
Pipeline Urban	36 in.	3,000	LF	$239	$718,000
Right of Way Easements Rural (ROW)		23,400	LF	$26	$660,880
Right of Way Easements Urban (ROW)		3,000	LF	$154	$508,310
Engineering and Contingencies (30%)					$1,413,000
Subtotal of Pipeline					**$7,293,190**
Pump Station(s)					
Ground Storage Tanks	1.88 MG	1	LS	$771,000	$771,000
Booster Pump Station	1400 HP	1	LS	$7,173,000	$7,173,000
Engineering and Contingencies (35%)					$2,780,400
Subtotal of Pump Station(s)					**$10,724,400**
Water Treatment Facility					
Expand Water Treatment Plant	30 MGD	1	LS	$53,135,000	$53,135,000
Engineering and Contingencies (35%)					$18,597,250
Subtotal of WTP					**$71,732,250**
Permitting and Mitigation					$153,000
CONSTRUCTION TOTAL					**$89,903,000**
Interest During Construction			12	Months	$3,147,000
TOTAL COST					**$93,050,000**
Debt Service (5.5% for 20 years)					$7,786,000
Operational Costs*					$7,349,000
Total Annual Costs					**$15,135,000**
UNIT COSTS (Until Amortized)					
Per Acre-Foot of treated water					$900
Per 1,000 Gallons					$2.76

UNIT COSTS (After Amortization)

Per Acre-Foot	$780
Per 1,000 Gallons	$2.40

* Includes, as appropriate, operation and maintenance, power, water purchase (raw or treated), water treatment chemicals, well pumping (for groundwater), ongoing regulatory support (as needed) and other anticipated annual operating costs.

PROJECT EVALUATION

Based on the analysis provided above, the City of Tyler Lake Palestine Expansion project was evaluated across eleven different criteria for the purpose of quick comparison against alternative projects that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	16,815 ac-ft per year
Reliability	4	Moderately Reliable Supply
Cost	3	Medium Cost
Environmental Factors	4	Low Impacts
Impact on Other State Water Resources	4	Low Impact
Threat to Agricultural Resources/Rural Areas	4	Low
Interbasin Transfers		No
Other Natural Resources	4	No known Impacts
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	3	City of Tyler is the local sponsor
Implementation Issues	4	No known risks

REFERENCES

2011 East Texas Regional Water Plan.

ETRWPA WATER MANAGEMENT STRATEGY ANALYSIS TECHNICAL MEMORANDUM FOR UNRMWA RUN-OF-RIVER SUPPLIES

WMS Name:	Neches River Run-of-River Diversion
WMS Project ID:	UNM-ROR
WMS Type:	New Surface Water Source
Potential Supply Quantity (Rounded):	68,625 ac-ft/yr (61.2 MGD)
Implementation Decade:	2020 (2020)
Development Timeline:	2-4 years
Strategy Capital Cost:	$444,085,000 (Sept. 2011)
Strategy Annual Cost:	$41,285,000 (Sept 2011)
Unit Water Cost (Rounded):	$1.85 per 1,000 gallons (during loan period)

STRATEGY DESCRIPTION

Lake Fastrill was a recommended water management strategy for Upper Neches River MWA in the approved *2006 ETRWPA Water Plan* and the *2007 State Water Plan* and was designated by the Texas Legislature as a unique site for reservoir development. The lake was intended to meet projected water supply needs for the Dallas and water user groups in Anderson, Cherokee, Henderson, and Smith counties in Region I. A decision of the United States Supreme Court on February 22, 2010 not to hear the appeals of the State of Texas and Dallas has effectively supported the creation of the Neches River National Wildlife Refuge (NRNWR) and rendered the development of Lake Fastrill extremely unlikely.

The Neches Run-of-the-River Diversion strategy is one potential alternative to Lake Fastrill and recommended strategy for Upper Neches River MWA in the 2016 ETRWPA Regional Plan. It would involve run-of-the-river diversions from the Neches River in Anderson and Cherokee Counties downstream of Lake Palestine and the Neches River National Wildlife Refuge and upstream of the Weches Dam site. The run-of-the-river diversions would be subject to senior water rights and environmental flow restrictions and would not be available at all times. Hence, the run-of-the-river project would include one or more "off-channel" storage reservoirs located on tributaries of the Neches River in Anderson and Cherokee counties which would be refilled during periods when water is available for diversion from the Neches River.

Using the run-of-river diversions operated as a system with Lake Palestine is the recommended strategy. Run-of-river diversions operated as a system with off-channel tributary storage and as conjunctive use along with groundwater are proposed as alternative strategies. All the potentially feasible WMSs for UNRMWA and City of Dallas are discussed in the 2015 Report *Upper Neches River Water Supply Project Feasibility Study.*

It was stated in the feasibility study that "The selected Upper Neches Project strategy includes a new river intake and pump station for a run-of-river diversion from the Neches River near the SH 21 crossing. Facilities include a small diversion dam on the Neches River, a river intake and pump station, and a transmission pipeline and booster pump station with delivery to the IPL pump station site near Lake Palestine." It is anticipated that this project will be online by 2060 and will provide 62 MGD (68,625

acre-feet/year) of supply. Hence, the run-of-river project would be operated as a system with Lake Palestine using available storage capacity therein during drought.

STRATEGY DEVELOPMENT

Neches Run-of-River Diversions with Lake Palestine (Recommended). This recommended strategy includes run-of-river diversions near SH 21 on Neches River operated as a system with storage in Lake Palestine. UNRMWA will be the project sponsor for this WMS. . The run-of-river diversions will be taken from the river segment between the existing Rocky Point diversion and the Weches Dam site below the SH21 crossing, between the Neches River National Wildlife Refuge and upstream of the Weches Dam site. The run-of-the-river diversions will be authorized under a new appropriation of surface water, subject to senior water rights and environmental flows. New facilities required for this WMS include a small diversion dam on the Neches River, a river intake and pump station, and a transmission pipeline and booster pump station supporting transmission to Lake Palestine. The run-of-river diversions are an interruptible supply and the firm yield associated with the WMS is the incremental increase in the firm yield of Lake Palestine resulting from the system operation of the new diversions and the transmission facilities with the Lake Palestine.

The feasibility report includes multiple infrastructure alternatives for the recommended strategy, each resulting in a different amount of firm yield at Lake Palestine. It should be noted that the project configuration for the recommended WMS for UNRMWA in the 2016 ETRWPA Regional Plan is different from the configuration discussed in Dallas' October 2014 *Draft Long Range Water Supply Plan* (Draft LRWSP). The project configuration discussed in the City of Dallas Draft LRWSP resulted in a firm yield of 47,250 ac-ft per year (42 MGD) that is projected to meet Dallas needs starting 2060, whereas the project configuration developed for UNRMWA in the 2016 ETRWPA Regional Plan resulted in a firm yield of 68,625 ac-ft per year (61.2 MGD) and it is projected to meet both Dallas demands and the ETRWPA water needs. The unit cost of this strategy is approximately $602/acft/yr during the debt service period.

Neches Run-of-River Diversions with Tributary Storage (Alternative). The first alternate strategy for DWU includes new run-of-river diversions from the Neches River segment between the existing Rocky Point diversion dam and the Weches dam site with storage in a new tributary or off-channel reservoir. This alternative strategy includes system operations with Lake Palestine. System operations of this alternate strategy with Lake Palestine could result in a firm yield of 75,000 acft/yr (67 MGD) at a unit cost of $434/acft/yr during the debt service period. Facilities for implementation of this WMS include a small diversion dam on the Neches River, a high capacity river intake pump station, a transmission pipeline to the reservoir, and a tributary or off-channel reservoir. The interruptible run-of-river diversions will be backed up using stored water in the tributary or off-channel reservoir. Run-of-river diversions and any impoundment of local runoff in a tributary or off-channel reservoir are subject to inflow passage for senior water rights and environmental protection.

Neches Run-of-River Diversions with Groundwater (Alternative). A conjunctive use WMS is the second proposed alternative strategy for DWU. The WMS includes new run-of-river diversions from the Neches River segment between the existing Rocky Point diversion dam and the Weches dam site with groundwater supplies from new wells in Carrizo, Wilcox, and Queen City aquifers in Anderson and Cherokee Counties. System operations of this alternate strategy with Lake Palestine could result in a firm yield of 84,875 acft/yr (76 MGD) at a unit cost of $414/acft/yr during the debt service period. This alternative strategy includes system operations with Lake Palestine. New facilities for the implementation of this WMS include a small diversion dam on the Neches River, a river intake and pump station, wells located on properties controlled by Campbell Timberland Management, LLC and Forestar (USA) Real Estate Group, Inc., and a transmission system for the delivery of the supplies to the potential customers.

The interruptible run-of-river supplies will be backed up using groundwater delivered to the run-of-river diversion point using bed and banks of the Neches River and several tributary streams. The run-of-river diversions are subject to inflow passage for senior water rights and environmental protection, but the groundwater supplies are not.

SUPPLY DEVELOPMENT

Availability of the Run-of-River supplies was determined using the Neches Basin Water Availability Model and reported in the 2014 Report *Upper Neches River Water Supply Project Feasibility Study.*

PERMITTING AND DEVELOPMENT

The Neches River Run-of-the-River Diversion would require a new water rights permit and an interbasin transfer permit.

Cost Analysis

The cost estimates for the Run-of-River strategy were obtained from the 2014 Report *Upper Neches River Water Supply Project Feasibility Study.* Additional details of the cost estimates can be obtained from the report.

WATER MANAGEMENT STRATEGY EVALUATION

Based on the analysis provided above, the Neches River Run-of-the-River Diversion strategy was evaluated across eleven different criteria for the purpose of quick comparison against alternative strategies that may be incorporated into the Regional Water Plan. The results of this evaluation can be seen in the table below.

Criteria	Rating	Explanation
Quantity	4	68,625 ac-ft per year
Reliability	4	Reliable Supply
Cost	3	Low – Medium Cost
Environmental Factors	3	Medium Impacts
Impact on Other State Water Resources	4	Low Impacts
Threat to Agricultural Resources/Rural Areas	4	Low Impacts
Interbasin Transfers		No
Other Natural Resources	4	No known Impacts
Major Impacts on Key Water Quality Parameters	4	No known Impacts
Political Feasibility	3	UNRMWA is the local sponsor for this strategy
Implementation Issues	2	Need to secure the run-of-river rights

WATER USER GROUP APPLICATION

The Neches River Run-of-the-River Diversion strategy was evaluated on a basis of several criteria to determine the Water User Groups (WUGs) to which it may be applied. Consideration was given to the proximity of the project to identified needs, the volume of the supply made available, the quality of the water provided, and the unit cost of the strategy as well as other factors that may relate to the auditability of the strategy to the WUGs served.

REFERENCES

Discussions with Upper Neches River Municipal Water Authority.

Appendix 5B-B

Quantification of Environmental Impacts of Water Management Strategies and Strategy Evaluation Matrix

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In accordance with TWDB rules and guidelines pursuant to TAC 357.5 (e)(4), the East Texas Regional Planning Group (ETRWPG) is required to summarize the approach used for identifying and selecting Water Management Strategies (WMS) for development of the 2016 Regional Water Plan (RWP). This approach classifies the strategies using the TWDB's standard categories developed for regional water planning.

Potential WMSs were developed based on the needs identified for Water User Groups (WUGs) from a comparison of projected demands and existing supplies. Similarly, Wholesale water providers (WWP) supplies and existing contracts were reviewed to determine the needs. Appropriate WMSs were developed for the WWPs to address the needs. In some cases, WMSs were developed for WUGs and WWPs that wanted to increase their system reliability and develop additional supplies even if there was no immediate need.

The viability of the WMS for a given WUG or WWP was determined by using the following considerations:

- Is it preferable to identify a groundwater or surface water or reuse or demand reduction strategy for the WUG/WWP?
- Does this strategy alone meet the entire need for the WUG/WWP or does it need to be paired with other strategy?
- Is the strategy within the reasonable proximity to the location of the water need?
- Is this the most preferred strategy for the WUG/WWP?
- Is the unit cost supportable by the WUG/WWP?

- Are there any flaws identified with the implementation or formulation of the strategy for the WUG/WWP?

After the strategies are developed based on the initial screening process, each WMS was evaluated based on the matrix criteria listed below. Each WMS was given a score from one to five for each analysis criterion and a matrix of rated WMS was developed. The analysis criteria include the following:

- Quantity
- Reliability
- Cost
- Environmental Factors
- Impact on Other State Water Resources
- Threat to Agricultural Resources/Rural Areas
- Interbasin Transfers
- Other Natural Resources
- Major Impacts on Key Water Quality Parameters
- Political Feasibility
- Implementation Issues

Included below is a discussion of the analysis criterion. A summary of the scoring used for ranking the strategies for each one of the criterion in the evaluation matrix is included in Table 5B-B.2. The evaluation matrix with the ranks for the WMSs is included in Table 5B-B.3.

Quantity is evaluated and scored based on the percentage of the WUG/WWP need the given WMS is expected to meet.

Reliability is evaluated based on the potential for the water to be available during drought. Strategies in which there is considerable competition for water or temporary supplies are rated as low reliability. Strategies that use water from a source that would not

exceed 90% of available supply is rated as medium reliability. Strategies that use water from a source that would not exceed 80% of available supply is rated as high reliability. The reliability ranges are presented in Table 5B-B.2.

Cost is evaluated based on the gradation of the unit cost for the given WMS compared to the range defining the scores 1 to 5. The ranges are presented in Table 5B-B.2 below.

Environmental impacts from the WMS to the existing conditions were quantified using the environmental matrix to determine the score of the 'Environmental Factors' category on the Evaluation Matrix. Each category is quantitatively assessed and assigned a ranking from 1 to 5. The Overall Environmental Impacts column averages all of the rankings assigned to the strategy. This value is also illustrated in the Evaluation Matrix as the Environmental Factors rank. Table 5B-B.1 shows the correlation between the rank assigned within each category. The Environmental Matrix takes into consideration the following categories:

- Total Acres Impacted
- Total Wetland Acres Impacted
- Environmental Water Needs
- Habitat
- Threatened and Endangered Species
- Cultural Resources
- Bays & Estuaries

Table 5B-B.1 - Environmental Matrix Category Ranking Correlation

Rank	Acres Impacted	Threatened and Endangered Species	All Remaining Categories
1	Greater than 500 Acres and/or Wetlands	Greater than 20	High Impact
2	100-500 Acres	Between 15-20	Medium Impact
3	50-100 Acres	Between 10-15 or 'varies'	Low Impact
4	0-50 Acres	Between 5-10	No Impact to Low Impact
5	None	Between 0-5 (or n/a)	No Impact

Acres Impacted refers to the total amount of area that will be impacted due to the implementation of a strategy. The following conservative assumptions were made (unless more detailed information was available):

- Each well will impact approximately 1 acre of land
- The acres impacted for pipelines is equivalent to the right of way easements required
- Reservoirs will impact an area equal to their surface area
- A conventional water treatment plant will impact 5 acres

Wetland Acres refers to the number of acres that are classified as wetlands are impacted by implementation of the strategy. The only strategy that had an impact on surrounding wetlands was the Lake Columbia strategy.

Environmental Water Needs refers to how the strategy will impact the area's overall environmental water needs. Water is vital to the environmental health of a region, and so it is important to take into account how strategies will impact the amount of water that will be available to the environment. It was conservatively assumed that majority of the strategies will have a low impact on the environmental water needs (unless more detailed information was available).

Habitat refers to how the strategy will impact the habitat of the local area. The more area that is impacted due to the implementation of the strategy, the more the area's habitat will be disrupted. It was assumed that strategies with less than 100 acres impacted will have a low impact and strategies above 100 acres impacted will have a medium impact.

Threatened and Endangered Species refers to how the strategy will impact those species in the area once implemented. The following conservative assumptions were made (unless more detailed information was available);

- Only applicable to strategies implementing infrastructure
- Rankings were based on the amount of threatened and endangered species located within the county. This amount was found using the Texas Parks and Wildlife Database located at http://tpwd.texas.gov/gis/rtest/ and the U.S. Fish and Wildlife Service Database located at http://www.fws.gov/endangered/ .
- This ranking only includes threatened and endangered species as defined in the TWDB guidelines and does not include species without official protection such as those proposed for listing or species that are considered rare or otherwise of special concern.

Cultural Resources refers to how the strategy will impact cultural resources located within the area. Cultural resources are defined as the collective evidence of the past activities and accomplishments of people. Locations, buildings and features with scientific, cultural or historic value are considered to be cultural resources. It was conservatively assumed that all strategies implementing infrastructure will have a low impact on cultural resources.

Bays and Estuaries Impact to Bays and Estuaries (if any) due to the WMSs was identified and quantified accordingly.

Threat to Agricultural Resources/Rural Areas is quantified based on the impacts to water supplies to these users. If a strategy will reduce the available water to agricultural or rural areas by the greater of 10% current use or 5,000 ac-ft/yr, the strategy is determined to have high impacts. If the entity already holds water rights for the strategy, the impacts would be low.

Interbasin Transfer is quantified by means of a yes or no qualifier. If there is an interbasin transfer triggered because of the WMS then the impact is quantified as a "yes" and if there is no interbasin transfer triggered, then the impact is quantified as a "no".

Other Natural Resources is quantified based on the impact of the WMS to other natural resources in the region. If the strategy significantly alters the natural condition of other resources, the strategy is determined to have high impacts. If the strategy does not alter the natural condition of other resources, the strategy is determined to have no impacts.

Major Impacts on Key Water Quality Parameters is quantified based on the impact that the implementation of the strategy will have on the area's applicable water quality.

Political Feasibility evaluates the local preference and likelihood for public support or opposition created by the WMS. This evaluation also takes into consideration if a local sponsor is identifiable and committed to implementing the WMS.

Implementation Issues evaluates the potential for factors such as permitting and land acquisition to affect the WMS. It also evaluates the risk to the strategy's ability to deliver water from natural or man-made disasters such as hurricanes, climate change, or terrorism.

Table 5B-B.2 – ETRWPA WMS Evaluation Matrix Rating Criteria

Category	Rating Criteria				
	1	2	3	4	5
Quantity	Meets 0-25% Shortage	Meets 25-50% of Shortage	Meets 50-75% of Shortage	Meets 75-100% of Shortage	Exceeds Shortage
Reliability	Low	Low to Medium	Medium	Medium to High	High
Cost	>$5,000/ac-ft (High)	$1,000 to $5,000/ac-ft (Medium-High)	$500 to $1,000/ac-ft (Medium)	$0 to $500/ac-ft (Low)	No Cost
Environmental Factors	Significant Negative Impacts	Medium Negative Impacts	Low Negative Impacts	Low Negative Impacts/Some Positive Impacts	High Positive Impacts
Impact on Other State Water Resources	Significant Negative Impacts	Medium Negative Impacts	Low Negative Impacts	Low Negative Impacts/Some Positive Impacts	High Positive Impacts
Threat to Agricultural Resources/Rural Areas	Significant Negative Impacts	Medium Negative Impacts	Low Negative Impacts	Low Negative Impacts/Some Positive Impacts	High Positive Impacts
Interbasin Transfers	Yes/No				
Other Natural Resources	Significant Negative Impacts	Medium Negative Impacts	Low Negative Impacts	Low Negative Impacts/Some Positive Impacts	High Positive Impacts
Major Impacts on Key Water Quality Parameters	Significant Negative Impacts	Medium Negative Impacts	Low Negative Impacts	Low Negative Impacts/Some Positive Impacts	High Positive Impacts
Political Feasibility	No sponsor readily identifiable.	Sponsor identifiable, but uncommitted.	Sponsor(s) identified, commitment level uncertain.	Sponsor(s) are identified and committed to strategy.	Sponsors identified and strategy is in development.
Implementation Issues	High implementation Issues.	Medium High Implementation Issues	Low Implementation Issues	Low Implementation Issues	Low to No Implementation Issues

Table 5B-B.3 – ETRWPA WMS Evaluation Matrix Rankings for Recommended and Alternative Water Management Strategies (Alternative strategies are identified in italics)

Number	County	Entity	Basin Used	Strategy	Strategy Key	Quantity (Ac-Ft/Yr)	Quantity	Reliability	Cost ($/Ac-Ft)	Cost	Impacts of Strategy on:						Political Feasibility	Implementation Issues
											Environmental Factors	Water Resources and Other WMS	Agricultural Resources/ Rural Areas	Interbasin Transfers	Other Natural Resources	Key Water Quality Parameters		
#	Name	Name(s)	Name	Name	Name	(Ac-Ft/Yr)	(1-5)	(1-5)	$	(1-5)	(1-5)	(1-5)	(1-5)		(1-5)	(1-5)	(1-5)	(1-5)
1	Anderson	Steam Electric Power	Neches	Purchase from City of Palestine	AND-SEP1	23,669	3	4	$522	3	4	4	4	No	4	4	1	4
2	Angelina	Manufacturing	Neches	Purchase from Lufkin	ANGL-MFG	17,195	4	5	$326	4	4	4	4	No	4	4	1	4
3	Angelina	Mining	Neches	Purchase from ANRA	ANGL-MIN	573	4	3	$1,644	2	4	4	4	No	4	4	1	4
4	Cherokee	Alto Rural WSC	Neches	New wells in Carrizo-Wilcox Aquifer	CHER-ALT	250	4	4	$1,212	2	4	4	4	No	4	4	3	4
5	Cherokee	Mining	Neches	Purchase from ANRA	CHER-MIN	250	4	4	$2,560	2	4	4	4	No	4	4	3	4
6	Cherokee	Steam Electric Power	Neches	Purchase from ANRA	CHER-SEP	20,000	4	4	$1,056	2	4	4	4	No	4	4	3	4
7	Henderson	Chandler	Neches	Purchase from City of Tyler	HDSN-CHN	350	4	4	$863	3	4	4	4	No	4	4	3	4
8	Houston	Irrigation	Neches	New wells in Yegua-Jackson Aquifer	HOUS-IRR	2,340	4	4	$704	3	4	4	5	No	4	4	1	4
9	Jasper	Manufacturing	Neches	Purchase from LNVA	JASP-MFG	8,420	4	4	$720	3	4	4	4	No	4	4	1	4
10	Jefferson	County-Other	Neches	Purchase from LNVA	JEFF-CTR	3,413	4	4	$739	3	4	4	4	No	4	4	1	4
11	Jefferson	Manufacturing	Neches	Purchase from LNVA	JEFF-MFG	309,322	4	4	$452	4	4	4	4	No	4	4	1	4
12	Jefferson	Steam Electric Power	Neches	Purchase from LNVA	JEFF-SEP	30,839	4	4	$507	4	4	4	4	No	4	4	1	4
13	Nacogdoches	County-Other	Neches	Lake Naconiche Regional Water System	NACN-LK	1,700	4	4	$3,102	2	4	4	4	No	4	4	4	4
14	Nacogdoches	D&M WSC	Neches	New wells in Carrizo-Wilcox Aquifer	NACW-DMW	250	4	4	$1,536	3	4	4	4	No	4	4	2	4
15	Nacogdoches	Livestock	Neches	New wells in Carrizo-Wilcox Aquifer	NACW-LTK	3,059	4	4	$904	3	4	4	4	No	4	4	1	4
16	Nacogdoches	Mining	Neches	Purchase from ANRA	NACW-MIN	5,475	4	3	$1,209	3	4	4	4	No	4	4	4	4

Table 5B-B.3 – ETRWPA WMS Evaluation Matrix Rankings for Recommended and Alternative Water Management Strategies (Alternative strategies are identified in italics)

Number	County	Entity	Basin Used	Strategy	Strategy Key	Quantity (Ac-Ft/Yr)	Quantity	Reliability	Cost ($/Ac-Ft)	Cost	Impacts of Strategy on:						Political Feasibility	Implementation Issues
											Environmental Factors	Water Resources and Other WMS	Agricultural Resources/ Rural Areas	Interbasin Transfers	Other Natural Resources	Key Water Quality Parameters		
#	Name	Name(s)	Name	Name	Name	(Ac-Ft/Yr)	(1-5)	(1-5)	$	(1-5)	(1-5)	(1-5)	(1-5)		(1-5)	(1-5)	(1-5)	(1-5)
17	Nacogdoches	Steam Electric Power	Neches	Purchase from ANRA	NACW-SEP1	8,500	4	3	$619	3	4	4	4	No	4	4	1	4
18	Nacogdoches	Steam Electric Power	Neches	New wells in Carrizo-Wilcox Aquifer	NACW-SEP2	2,000	4	4	$938	3	4	4	4	No	4	4	1	4
19	Newton	Mining	Neches	Purchase from SRA	NEWT-MIN	115	4	4	$965	3	4	4	4	No	4	4	1	4
20	Newton	Steam Electric Power	Neches	Purchase from SRA	NEWT-SEP	19,021	4	4	$531	3	4	4	4	No	4	4	1	4
21	Orange	Irrigation	Sabine	Purchase from SRA	ORAN-IRR	2,758	4	4	$764	3	4	4	5	No	4	4	1	4
22	Orange	Manufacturing	Sabine	Purchase from SRA	ORAN-MFG	31,850	4	4	$467	2	4	4	4	No	4	4	1	4
23	Orange	Steam Electric Power	Sabine	Purchase from SRA	ORAN-SEP	4,486	4	4	$686	3	4	4	4	No	4	4	1	4
24	Panola	Manufacturing	Sabine	Purchase from City of Carthage	PANL-MFG	309	4	4	$327	4	4	4	4	No	4	4	1	4
25	Rusk	Mining	Neches	Purchase from ANRA	RUSK-MIN	2,092	4	3	$1,635	2	4	4	4	No	4	4	4	4
26	Rusk	Steam Electric Power	Neches	Purchase from SRA	RUSK-SEP	18,868	4	4	$628	3	4	4	4	No	4	4	1	4
27	San Augustine	Mining	Neches	Purchase from ANRA	SAUG-MIN	2,012	4	4	$1,920	2	4	4	4	No	4	4	4	4
28	Shelby	Livestock	Sabine	Purchase from SRA	SHEL-LTK	6,925	4	4	$699	3	4	4	4	No	4	4	1	4
29	Smith	Bullard	Neches/Trinity	Purchase from City of Tyler	SMTH-BLD	995	4	4	$852	3	4	4	4	No	4	4	2	4
30	Smith	Crystal Systems Inc.	Neches/Trinity	Purchase from City of Tyler	SMTH-CYS	642	3	4	$650	3	4	4	4	No	4	4	1	4
31	Smith	Lindale	Neches/Trinity	Purchase from City of Tyler	SMTH-LDL	826	4	4	$1,044	2	4	4	4	No	4	4	1	4
32	Smith	Manufacturing	Neches/Trinity	Purchase from City of Tyler	SMTH-MFG	2,879	4	4	$590	3	4	4	4	No	4	4	1	4
33	Smith	Mining	Neches/Trinity	Purchase from City of Tyler	SMTH-MIN	114	4	4	$3,526	2	4	4	4	No	4	4	1	4

Table 5B-B.3 – ETRWPA WMS Evaluation Matrix Rankings for Recommended and Alternative Water Management Strategies (Alternative strategies are identified in italics)

Number	County	Entity	Basin Used	Strategy	Strategy Key	Quantity (Ac-Ft/Yr)	Quantity	Reliability	Cost ($/Ac-Ft)	Cost	Impacts of Strategy on:						Political Feasibility	Implementation Issues
											Environmental Factors	Water Resources and Other WMS	Agricultural Resources/ Rural Areas	Interbasin Transfers	Other Natural Resources	Key Water Quality Parameters		
#	Name	Name(s)	Name	Name	Name	(Ac-Ft/Yr)	(1-5)	(1-5)	$	(1-5)	(1-5)	(1-5)	(1-5)		(1-5)	(1-5)	(1-5)	(1-5)
34	*Trinity*	*Irrigation*	*Trinity*	*Purchase from County Other (Yegua-Jackson Aquifer)*	*TRTY-IRR1*	*331*	*3*	*4*	*$988*	*3*	*4*	*4*	*4*	*No*	*4*	*4*	*1*	*4*
35	Multiple	Multiple	-	Conservation	WUG-CONS	-	-	4	-	3	5	5	5	No	5	5	2	4
36	Angelina	Angelina Neches River Authority	Neches	Lake Columbia	ANRA-COL	75,600	4	4	$333	4	3	4	4	No	4	4	4	3
37	Angelina	Angelina Neches River Authority	Neches	ANRA Water Treatment Plant and Distribution System	ANRA-WTP	22,232	4	3	$1,883	2	4	4	4	No	4	4	4	3
38	Angelina	Angelina Neches River Authority	Neches	ANRA Groundwater wells	ANRA-GW	5,600	4	4	$578	3	4	4	4	No	4	4	4	4
39	Angelina	Angelina Neches River Authority	Neches	ANRA Run of River Supplies	ANRA-ROR	30,000	4	3	-	5	4	4	4	No	4	4	4	4
40	Henderson	Athens MWA	Trinity	Indirect Reuse of Flows from Fish Hatcheries	AMWA-FH	2,872	4	4	-	5	4	4	4	No	4	4	4	3
41	*Henderson*	*Athens MWA*	*Trinity*	*Additional Groundwater wells in Carrizo Wilcox*	*AMWA-GW*	*4,840*	*4*	*2*	*$277*	*2*	*4*	*4*	*4*	*No*	*4*	*4*	*4*	*1*
42	Henderson	Athens MWA	Trinity	Pump Station Improvements	AMWA-WTP	1,121	4	4	$59	5	4	4	4	No	4	4	5	4
43	Henderson	Angelina Nacogdoches WCID#1	Neches	Volumetric Surveys of Lake Striker	ANCD-VOL	-	-	-	-	5	4	4	4	No	4	4	4	4
44	Henderson	Angelina Nacogdoches WCID#1	Neches	Hydraulic Dredging of Lake Striker	ANCD-DRE	2,100	3	3	-	4	4	4	4	No	4	4	5	4
45	Henderson	Angelina Nacogdoches WCID#1	Neches	Normal Pool Elevation Adjustment of Lake Striker	ANCD-NPA	3,500	4	3	-	5	4	4	4	No	4	4	3	3
46	Jefferson	Beaumont	Neches-Trinity	Municipal Conservation	BEAU-CONS	9,966	4	4	$317	4	4	4	4	No	4	4	3	4

Table 5B-B.3 – ETRWPA WMS Evaluation Matrix Rankings for Recommended and Alternative Water Management Strategies (Alternative strategies are identified in italics)

Number	County	Entity	Basin Used	Strategy	Strategy Key	Quantity (Ac-Ft/Yr)	Quantity	Reliability	Cost ($/Ac-Ft)	Cost	Impacts of Strategy on:						Political Feasibility	Implementation Issues
											Environmental Factors	Water Resources and Other WMS	Agricultural Resources/ Rural Areas	Interbasin Transfers	Other Natural Resources	Key Water Quality Parameters		
#	Name	Name(s)	Name	Name	Name	(Ac-Ft/Yr)	(1-5)	(1-5)	$	(1-5)	(1-5)	(1-5)	(1-5)		(1-5)	(1-5)	(1-5)	(1-5)
47	Shelby	Center	Sabine	Reuse Pipeline from WWTP to Lake Center	CENT-REU	1,120	4	5	$1,493	2	3	4	4	No	4	3	4	4
48	Shelby	Center	Sabine	Pipeline from Toledo Bend to Lake Center	CENT-TOL	2,242	4	4	$1,544	2	4	4	4	No	4	4	4	4
49	Shelby	Center	Sabine	Volumetric Surveys	CENT-VOL	-	NA	NA	-	4	4	4	4	No	4	4	4	4
50	Houston	Houston County WCID#1	Neches	Permit Amendment for Houston County Lake	HCWC-PA	3,500	4	3	-	5	4	4	4	No	4	4	4	4
51	*Houston*	*Houston County WCID#1*	*Neches*	*New wells in Carrizo-Wilcox Aquifer*	*HCWC-GW*	*3,500*	*4*	*3*	*$747*	*3*	*4*	*4*	*4*	*No*	*4*	*4*	*4*	*3*
52	Cherokee	Jacksonville	Neches	Lake Columbia to Jacksonville Raw Water Transmission System	JACK-COL	1,700	4	4	$1,556	2	4	4	4	No	4	4	4	3
53	Jefferson	Lower Neches Valley Authortiy	Neches-Trinity	Purchase from SRA	LNVA-SRA	200,000	4	4	$526	4	4	4	4	No	4	4	4	3
54	Jefferson	Lower Neches Valley Authortiy	Neches-Trinity	Permit Amendment for Lake Sam Rayburn	LNVA-PA	28,000	4	5	-	5	4	4	4	No	4	4	4	4
55	Jefferson	Lower Neches Valley Authortiy	Neches-Trinity	Transfer to Region H (Sam Rayburn)	LNVA-RGH	55,000	4	4	$435	4	4	4	5	Yes	4	3	4	3
56	Jefferson	Lower Neches Valley Authortiy	Neches-Trinity	Constructed Levy	LNVA-JEFF	1,600	4	4	$1,909	2	4	4	4	No	4	4	1	4
57	Angelina	Lufkin	Neches	Conveyance from Sam Rayburn to Kurth Lake	LUFK-RAY	28,000	4	4	$814	3	4	4	4	No	4	4	4	4

Table 5B-B.3 – ETRWPA WMS Evaluation Matrix Rankings for Recommended and Alternative Water Management Strategies (Alternative strategies are identified in italics)

Number	County	Entity	Basin Used	Strategy	Strategy Key	Quantity (Ac-Ft/Yr)	Quantity	Reliability	Cost ($/Ac-Ft)	Cost	Impacts of Strategy on:						Political Feasibility	Implementation Issues
											Environmental Factors	Water Resources and Other WMS	Agricultural Resources/ Rural Areas	Interbasin Transfers	Other Natural Resources	Key Water Quality Parameters		
#	Name	Name(s)	Name	Name	Name	(Ac-Ft/Yr)	(1-5)	(1-5)	$	(1-5)	(1-5)	(1-5)	(1-5)		(1-5)	(1-5)	(1-5)	(1-5)
58	Nacogdoches	Nacogdoches	Neches	Lake Columbia to Nacogdoches Raw Water Transmission System	NACP-COL	8,500	4	4	$705	3	4	4	4	No	4	4	4	3
59	Jefferson	Port Arthur	Neches-Trinity	Municipal Conservation	PORT-CONS	10,340	4	4	$333	4	4	4	4	No	4	4	4	4
60	Orange	Sabine River Authority	Sabine	SRA Toledo Bend Amendment	SRA-TB	293,300	4	3	-	5	4	4	4	No	4	4	5	3
61	Orange	Sabine River Authority	Sabine	SRA Pump Station	SRA-PS	89,680	4	4	$812	3	4	4	4	No	4	4	5	4
62	Smith	Tyler	Neches	City of Tyler - Lake Palestine Expansion	TYLR-PAL	16,815	4	4	$900	3	4	4	4	No	4	4	3	4
63	Anderson	Upper Neches River Municipal Water Authority	Neches	Neches Run-of-River Diversion	UNM-ROR	68,625	4	4	$602	3	3	4	4	No	4	4	3	2

Appendix 5B-C

Recommended Water Management Strategies by WUG

DB17 Report

This appendix includes a copy of the Water User Group Recommended Water Management Strategy data from the TWDB Data Web Interface known as the DB17. The summary is divided by Water User Group.

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Recommended Water User Group (WUG) Water Management Strategies (WMS)

UG Entity Primary Region: I

				Water Management Strategy Supplies							
WUG Entity Name	WMS Sponsor Region	WMS Name	Source Name	2020	2030	2040	2050	2060	2070	Unit Cost 2020	Unit Cost 2070
ALTO	I	ANRA-COL - LAKE COLUMBIA	I | COLUMBIA LAKE/RESERVOIR	0	428	428	428	428	85	N/A	$333
ALTO RURAL WSC	I	ALRU ENHANCED PUBLIC AND SCHOOL EDUCATION	DEMAND REDUCTION	0	0	5	7	9	11	N/A	$489
ALTO RURAL WSC	I	CHE-ALT - ALTO RURAL WSC	I | CARRIZO-WILCOX AQUIFER | CHEROKEE COUNTY	0	0	0	61	130	250	N/A	$13
ARP	I	ANRA-COL - LAKE COLUMBIA	I | COLUMBIA LAKE/RESERVOIR	0	428	428	428	428	85	N/A	$13
BEAUMONT	I	BEAU ENHANCED PUBLIC AND SCHOOL EDUCATION	DEMAND REDUCTION	0	413	540	688	859	1,055	N/A	$57
BEAUMONT	I	BEAU ENHANCED WATER LOSS CONTROL PROGRAM	DEMAND REDUCTION	0	2,670	4,477	6,015	7,353	8,516	N/A	$260
BEAUMONT	I	BEAU WATER CONSERVATION PRICING	DEMAND REDUCTION	0	155	324	344	368	395	N/A	$0
BETHEL-ASH WSC	C	CONSERVATION - BETHEL-ASH WSC	DEMAND REDUCTION	1	2	3	4	5	7	$0	$0
BETHEL-ASH WSC	C	CONSERVATION, WATER LOSS CONTROL - BETHEL-ASH WSC	DEMAND REDUCTION	1	1	0	0	0	0	$397	N/A
BULLARD	I	BULL ENHANCED PUBLIC AND SCHOOL EDUCATION	DEMAND REDUCTION	4	7	10	14	19	24	$489	$489
BULLARD	I	BULL WATER CONSERVATION PRICING	DEMAND REDUCTION	7	17	20	24	28	32	$0	$0
BULLARD	I	TYL-PAL-EXISTING SURPLUS FOR TYLER	I | PALESTINE LAKE/RESERVOIR	49	215	385	570	760	955	$896	$896
CENTER	I	CENT-REU-CITY OF CENTER REUSE	I | CENTER LAKE/RESERVOIR	1,120	1,120	1,120	1,120	1,120	1,120	$1493	$479
CENTER	I	CENT-TOL - TOLEDO BEND PIPELINE	I | TOLEDO BEND LAKE/RESERVOIR	0	0	2,242	2,242	2,242	2,242	N/A	$865
CHANDLER	I	CHAN ENHANCED PUBLIC AND SCHOOL EDUCATION	DEMAND REDUCTION	0	0	0	6	9	12	N/A	$489
CHANDLER	I	CHAN WATER CONSERVATION PRICING	DEMAND REDUCTION	0	0	0	10	21	24	N/A	$0
CHANDLER	I	TYL-PAL-EXISTING SURPLUS FOR TYLER	I | PALESTINE LAKE/RESERVOIR	0	0	0	350	350	350	N/A	$411
COUNTY-OTHER, CHEROKEE	I	ANRA-COL - LAKE COLUMBIA	I | COLUMBIA LAKE/RESERVOIR	0	3,848	3,848	3,848	3,848	767	N/A	$13
COUNTY-OTHER, HENDERSON	C	CONSERVATION - HENDERSON COUNTY	DEMAND REDUCTION	1	2	2	3	3	3	$0	$0
COUNTY-OTHER, HENDERSON	C	CONSERVATION, WATER LOSS CONTROL - HENDERSON	DEMAND REDUCTION	2	2	0	0	0	0	$456	N/A
COUNTY-OTHER, HENDERSON	C	DWU - MAIN STEM REUSE	C | TRINITY INDIRECT REUSE	0	0	0	0	11	0	N/A	N/A
COUNTY-OTHER, HENDERSON	C	SULPHUR BASIN SUPPLY	D | MARVIN NICHOLS LAKE/RESERVOIR	0	0	0	0	0	14	N/A	$1131
COUNTY-OTHER, HENDERSON	C	SULPHUR BASIN SUPPLY	D | WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	4	5	5	N/A	$1131
COUNTY-OTHER, HENDERSON	C	TRWD - ADDITIONAL CEDAR CREEK AND RICHLAND-CHAMBERS	C | TRINITY INDIRECT REUSE	0	5	8	3	3	2	N/A	$239
COUNTY-OTHER, HENDERSON	C	TRWD - ADDITIONAL CEDAR CREEK AND RICHLAND-CHAMBERS	C | TRWD LAKE/RESERVOIR SYSTEM	0	1	1	1	1	1	N/A	$239
COUNTY-OTHER, HENDERSON	C	TRWD - CEDAR CREEK WETLANDS	C | TRINITY INDIRECT REUSE	0	8	13	16	10	6	N/A	$114
COUNTY-OTHER, HENDERSON	C	TRWD - TEHUACANA	C | TEHUACANA LAKE/RESERVOIR	0	0	6	8	3	3	N/A	$149
COUNTY-OTHER, JEFFERSON	I	JEFF-CTR CONTRACT EXPANSION	I | SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	0	0	0	797	2,041	3,413	N/A	$390
COUNTY-OTHER, JEFFERSON - UNASSIGNED WATER VOLUMES	I	CONSTRUCTED LEVY	I | SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	1,600	1,600	1,600	1,600	1,600	1,600	$1909	$86

Recommended Water User Group (WUG) Water Management Strategies (WMS)

Water Management Strategy Supplies

WUG Entity Name	WMS Sponsor Region	WMS Name	Source Name	2020	2030	2040	2050	2060	2070	Unit Cost 2020	Unit Cost 2070
COUNTY-OTHER, NACOGDOCHES	I	ANRA-COL - LAKE COLUMBIA	I | COLUMBIA LAKE/RESERVOIR	0	428	428	428	428	85	N/A	$13
COUNTY-OTHER, NACOGDOCHES - UNASSIGNED WATER VOLUMES	I	LK-NACN-LAKE NACONICHE REGIONAL WATER SYSTEM	I | LAKE NACONICHE/RESERVOIR	1,700	1,700	1,700	1,700	1,700	1,700	$3102	$1431
COUNTY-OTHER, TRINITY	H	WATER LOSS REDUCTION, COUNTY-OTHER - TRINITY COUNTY	DEMAND REDUCTION	7	13	19	24	30	35	$555	$554
D&M WSC	I	NACW-DMW - NACOGDOCHES D&M WSC	I | CARRIZO-WILCOX AQUIFER | NACOGDOCHES COUNTY	0	0	0	0	112	250	N/A	$370
G M WSC	I	GM-WSC	I | TOLEDO BEND LAKE/RESERVOIR	284	283	283	283	283	283	$2215	$2215
HENDERSON	I	LAKE STRIKER DREDGING	I | STRIKER LAKE/RESERVOIR	0	0	5,600	5,600	5,600	5,600	N/A	$476
HOUSTON COUNTY WCID #1 - UNASSIGNED WATER VOLUMES	I	HCWC PERMIT AMENDMENT	I | HOUSTON COUNTY LAKE/RESERVOIR	1,978	1,978	1,728	1,728	1,478	1,478	$0	$0
IRRIGATION, HENDERSON	I	AMWA ATHENS FISH HATCHERY REUSE	I | NECHES INDIRECT REUSE	0	0	0	0	29	32	N/A	$0
IRRIGATION, HENDERSON	I	AMWA-BOOSTER PUMPSTATION IMPROVEMENTS	I | ATHENS LAKE/RESERVOIR	2	9	6	3	1	0	$59	N/A
IRRIGATION, HOUSTON	I	HOUS-IRR NEW WELLS	I | YEGUA-JACKSON AQUIFER | HOUSTON COUNTY	757	997	1,265	1,563	1,892	2,340	$704	$241
IRRIGATION, ORANGE	I	SRA-INF-PUMPSTATION	I | TOLEDO BEND LAKE/RESERVOIR	2,432	2,685	2,858	2,920	2,855	2,758	$764	$419
JACKSON WSC	I	ANRA-COL - LAKE COLUMBIA	I | COLUMBIA LAKE/RESERVOIR	0	855	855	855	855	855	N/A	[redacted]
JACKSONVILLE	I	ANRA-COL - LAKE COLUMBIA	I | COLUMBIA LAKE/RESERVOIR	0	4,275	4,275	4,275	4,275	4,275	N/A	$13
LIVESTOCK, HENDERSON	I	AMWA ATHENS FISH HATCHERY REUSE	I | NECHES INDIRECT REUSE	2,145	2,183	2,215	2,250	1,482	902	$0	$0
LIVESTOCK, HENDERSON	I	AMWA-BOOSTER PUMPSTATION IMPROVEMENTS	I | ATHENS LAKE/RESERVOIR	33	152	106	63	18	0	$59	N/A
LIVESTOCK, NACOGDOCHES	I	NACW-LTK - NACOGDOCHES LIVESTOCK	I | CARRIZO-WILCOX AQUIFER | NACOGDOCHES COUNTY	1,644	1,837	2,061	2,320	2,617	3,059	$904	$254
LIVESTOCK, SHELBY	I	SHEL-LTK NEW CONTRACT	I | TOLEDO BEND LAKE/RESERVOIR	1,367	2,375	3,602	5,099	6,924	6,924	$699	$431
LOWER NECHES VALLEY AUTHORITY - UNASSIGNED WATER VOLUMES	I	LNVA PERMIT AMENDMENT	I | SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	28,000	28,000	28,000	28,000	28,000	28,000	$0	$0
LOWER NECHES VALLEY AUTHORITY - UNASSIGNED WATER VOLUMES	I	LNVA-SRA NEW CONTRACT	I | TOLEDO BEND LAKE/RESERVOIR	0	0	0	200,000	200,000	200,000	N/A	$526
LUFKIN	I	LUFK-RAY SAM RAYBURN INFRASTRUCTURE	I | SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	0	5,043	14,949	19,372	18,137	16,805	N/A	$693
MANUFACTURING, ANGELINA	I	ANGL-MFG CONTRACT EXPANSION	I | KURTH LAKE/RESERVOIR	6,000	6,000	6,000	6,000	6,000	6,000	$326	$326
MANUFACTURING, ANGELINA	I	LUFK-RAY SAM RAYBURN INFRASTRUCTURE	I | SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	0	6,167	7,471	8,628	9,863	11,195	N/A	$326
MANUFACTURING, JASPER	I	JASP-MFG CONTRACT EXPANSION	I | SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	0	3,049	6,021	8,250	8,335	8,420	N/A	$387
MANUFACTURING, JEFFERSON	I	JEFF-MFG CONTRACT EXPANSION	I | SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	181,181	262,193	273,826	285,499	297,181	309,323	$452	$398

Recommended Water User Group (WUG) Water Management Strategies (WMS)

Water Management Strategy Supplies

UG Entity Name	WMS Sponsor Region	WMS Name	Source Name	2020	2030	2040	2050	2060	2070	Unit Cost 2020	Unit Cost 2070
MANUFACTURING, ORANGE	I	SRA-INF-PUMPSTATION	I | TOLEDO BEND LAKE/RESERVOIR	3,943	9,890	15,850	21,141	27,092	33,477	$467	$372
MANUFACTURING, PANOLA	I	PANL-MFG-INFRASTRUCTURE	I | CARRIZO-WILCOX AQUIFER | PANOLA COUNTY	134	156	176	194	230	309	$327	$327
MANUFACTURING, RUSK	I	ANRA-GW-NEW WELLS IN CARRIZO WILCOX AQUIFER IN RUSK COUNTY	I | CARRIZO-WILCOX AQUIFER | CHEROKEE COUNTY	1,600	1,600	1,600	1,600	1,600	1,600	$578	$190
MANUFACTURING, RUSK	I	ANRA-GW-NEW WELLS IN CARRIZO WILCOX AQUIFER IN RUSK COUNTY	I | CARRIZO-WILCOX AQUIFER | RUSK COUNTY	4,000	4,000	4,000	4,000	4,000	4,000	$578	$190
MANUFACTURING, SMITH	I	TYL-PAL-EXISTING SURPLUS FOR TYLER	I | PALESTINE LAKE/RESERVOIR	2,039	2,257	2,467	2,645	2,889	3,154	$590	$404
MINING, ANGELINA	I	ANRA-RUN-OF-RIVER (SUBMITTED APPLICATION)	I | NECHES RUN-OF-RIVER	474	573	398	300	225	168	$1644	$1059
MINING, CHEROKEE	I	ANRA-RUN-OF-RIVER (NEW APPLICATION)	I | NECHES RUN-OF-RIVER	238	247	210	147	84	40	$2560	$1148
MINING, HOUSTON	I	HCWC PERMIT AMENDMENT	I | HOUSTON COUNTY LAKE/RESERVOIR	0	0	250	250	500	500	N/A	$0
MINING, NACOGDOCHES	I	ANRA-RUN-OF-RIVER (SUBMITTED APPLICATION)	I | NECHES RUN-OF-RIVER	5,475	2,975	118	0	0	0	$1209	N/A
MINING, NEWTON	I	SRA-INF-PUMPSTATION	I | TOLEDO BEND LAKE/RESERVOIR	115	59	0	0	0	0	$965	N/A
MINING, RUSK	I	ANRA-RUN-OF-RIVER (SUBMITTED APPLICATION)	I | NECHES RUN-OF-RIVER	1,075	2,092	1,955	1,809	1,774	1,765	$1635	$1095
MINING, SAN AUGUSTINE	I	ANRA-RUN-OF-RIVER (SUBMITTED APPLICATION)	I | NECHES RUN-OF-RIVER	2,102	1,102	0	0	0	0	$1920	N/A
MINING, TRINITY	H	EXPANDED USE OF GROUNDWATER, TRINITY COUNTY	H | CARRIZO-WILCOX AQUIFER | TRINITY COUNTY	100	100	100	100	100	100	$2188	$1283
NACOGDOCHES	I	ANRA-COL - LAKE COLUMBIA	I | COLUMBIA LAKE/RESERVOIR	0	8,551	8,551	8,551	8,551	8,551	N/A	$13
NEW LONDON	I	ANRA-COL - LAKE COLUMBIA	I | COLUMBIA LAKE/RESERVOIR	0	855	855	855	855	170	N/A	$1442
NEW SUMMERFIELD	I	ANRA-COL - LAKE COLUMBIA	I | COLUMBIA LAKE/RESERVOIR	0	2,565	2,565	2,565	2,565	511	N/A	$1442
NORTH CHEROKEE WSC	I	ANRA-COL - LAKE COLUMBIA	I | COLUMBIA LAKE/RESERVOIR	0	4,275	4,275	4,275	4,275	852	N/A	$539
OVERTON	I	OVER ENHANCED PUBLIC AND SCHOOL EDUCATION	DEMAND REDUCTION	0	0	5	6	9	11	N/A	$489
OVERTON	I	OVER ENHANCED WATER LOSS CONTROL PROGRAM	DEMAND REDUCTION	17	18	97	167	223	269	$0	$425
OVERTON	I	OVER WATER CONSERVATION PRICING	DEMAND REDUCTION	0	0	4	8	9	9	N/A	$0
PORT ARTHUR	I	PORT ENHANCED PUBLIC AND SCHOOL EDUCATION	DEMAND REDUCTION	266	331	392	456	521	585	$227	$103
PORT ARTHUR	I	PORT ENHANCED WATER LOSS CONTROL PROGRAM	DEMAND REDUCTION	4,629	6,922	7,929	8,966	9,626	8,988	$182	$135
PORT ARTHUR	I	PORT WATER CONSERVATION PRICING	DEMAND REDUCTION	99	198	196	195	195	195	$0	$0
RUSK	I	ANRA-COL - LAKE COLUMBIA	I | COLUMBIA LAKE/RESERVOIR	0	4,275	4,275	4,275	4,275	852	N/A	$13
RUSK RURAL WSC	I	ANRA-COL - LAKE COLUMBIA	I | COLUMBIA LAKE/RESERVOIR	0	855	855	855	855	170	N/A	$13
SABINE RIVER AUTHORITY - UNASSIGNED WATER VOLUMES	I	SRA-INF-PUMPSTATION	I | TOLEDO BEND LAKE/RESERVOIR	82,500	73,952	63,940	53,788	42,051	29,578	$1443	$1443
SABINE RIVER AUTHORITY - UNASSIGNED WATER VOLUMES	I	SRA-TOL - PERMIT AMENDMENT FOR TOLEDO BEND	I | TOLEDO BEND LAKE/RESERVOIR	215,300	210,800	206,200	201,600	197,000	195,000	$0	$0
STEAM ELECTRIC POWER, ANDERSON	I	ANDE-SEP1 ANDERSON STEAM ELECTRIC POWER	I | PALESTINE LAKE/RESERVOIR	11,306	13,218	15,549	18,390	21,853	21,632	$522	$365
STEAM ELECTRIC POWER, CHEROKEE	I	ANRA-RUN-OF-RIVER (NEW APPLICATION)	I | NECHES RUN-OF-RIVER	8,000	15,000	20,000	20,000	20,000	20,000	$1076	$1006

Recommended Water User Group (WUG) Water Management Strategies (WMS)

Water Management Strategy Supplies

WUG Entity Name	WMS Sponsor Region	WMS Name	Source Name	2020	2030	2040	2050	2060	2070	Unit Cost 2020	Unit Cost 2070
STEAM ELECTRIC POWER, JEFFERSON	I	JEFF-SEP NEW CONTRACT	I | SAM RAYBURN-STEINHAGEN LAKE/RESERVOIR SYSTEM	13,426	15,696	18,464	21,838	25,951	30,839	$507	$377
STEAM ELECTRIC POWER, NACOGDOCHES	I	HCWC PERMIT AMENDMENT	I | HOUSTON COUNTY LAKE/RESERVOIR	1,000	1,000	1,000	1,000	1,000	1,000	$0	$0
STEAM ELECTRIC POWER, NACOGDOCHES	I	NACW-SEP1 - NACOGDOCHES STEAM ELECTRIC POWER PURCHASE FROM ANRA	I | CARRIZO-WILCOX AQUIFER | NACOGDOCHES COUNTY	2,000	2,000	2,000	2,000	2,000	1,989	$938	$267
STEAM ELECTRIC POWER, NACOGDOCHES	I	NACW-SEP1 - NACOGDOCHES STEAM ELECTRIC POWER PURCHASE FROM ANRA	I | NACOGDOCHES LAKE/RESERVOIR	8,500	8,500	7,742	6,741	5,645	4,521	$619	$365
STEAM ELECTRIC POWER, NACOGDOCHES	I	NACW-SEP2 - NEW WELLS IN CARRIZO WILCOX	I | CARRIZO-WILCOX AQUIFER | NACOGDOCHES COUNTY	0	0	0	0	0	2,000	N/A	$938
STEAM ELECTRIC POWER, NEWTON	I	SRA-INF-PUMPSTATION	I | TOLEDO BEND LAKE/RESERVOIR	690	3,080	5,994	9,545	13,875	19,021	$531	$380
STEAM ELECTRIC POWER, ORANGE	I	SRA-INF-PUMPSTATION	I | TOLEDO BEND LAKE/RESERVOIR	0	14	1,038	2,286	3,807	4,846	N/A	$419
STEAM ELECTRIC POWER, RUSK	I	RUSK-SEP NEW CONTRACT	I | SABINE RUN-OF-RIVER	0	0	0	462	8,873	18,868	N/A	$628
THE CONSOLIDATED WSC	H	EXPANDED USE OF GROUNDWATER, WALKER COUNTY	H | YEGUA-JACKSON AQUIFER | WALKER COUNTY	100	100	100	100	100	100	$2188	$1283
THE CONSOLIDATED WSC	I	HCWC PERMIT AMENDMENT	I | HOUSTON COUNTY LAKE/RESERVOIR	522	522	522	522	522	522	$0	$0
TROUP	I	ANRA-COL - LAKE COLUMBIA	I | COLUMBIA LAKE/RESERVOIR	0	4,275	4,275	4,275	4,275	852	N/A	$1442
WEST HARDIN WSC	H	WATER LOSS REDUCTION, WEST HARDIN WSC	DEMAND REDUCTION	1	3	5	7	8	11	$555	$
WHITEHOUSE	I	ANRA-COL - LAKE COLUMBIA	I | COLUMBIA LAKE/RESERVOIR	0	8,551	8,551	8,551	8,551	1,704	N/A	$1442
WOODVILLE	I	WOOD ENHANCED PUBLIC AND SCHOOL EDUCATION	DEMAND REDUCTION	0	0	6	7	9	10	N/A	$387
WOODVILLE	I	WOOD WATER CONSERVATION PRICING	DEMAND REDUCTION	0	0	4	9	9	9	N/A	$0
Region I Total RecommendedWMS Supplies				599,966	751,751	791,241	1,017,932	1,045,731	1,050,074		

Recommended Projects Associated with Water Management Strategies

Project Sponosr Region: I

Sponsor Name	Is Sponsor a WWP?	Project Name	Project Description	Capital Cost	Online Decade
ALTO RURAL WSC	N	CHE-ALT - NEW WELLS IN CARRIZO WILCOX	CONVEYANCE/TRANSMISSION PIPELINE; LOWER GROUNDWATER WELL PUMP; MULTIPLE WELLS/WELL FIELD; STORAGE TANK	$2,682,000	2050
ANGELINA & NECHES RIVER AUTHORITY	Y	ANRA-COL - LAKE COLUMBIA CONSTRUCTION	RESERVOIR CONSTRUCTION	$344,498,000	2030
ANGELINA & NECHES RIVER AUTHORITY	Y	ANRA-GW-NEW GROUNDWATER WELLS INFRASTRUCTURE	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK	$26,023,000	2020
ANGELINA & NECHES RIVER AUTHORITY	Y	ANRA-WTP-WTP CONSTRUCTION	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK; WATER TREATMENT PLANT EXPANSION	$117,250,000	2030
ANGELINA & NECHES RIVER AUTHORITY	Y	CHER-MIN-INFRASTRUCTURE	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK	$4,214,000	2020
ANGELINA NACOGDOCHES WCID #1	Y	LAKE-STRIKER-DREDGING	DREDGE TO RECOVER CAPACITY	$23,716,000	2040
ANGELINA NACOGDOCHES WCID #1	Y	STRIKER-VOLUMETRIC SURVEY	NEW AGREEMENT	$25,000	2020
ATHENS MUNICIPAL WATER AUTHORITY	Y	AMWA-WTP - ATHENS MWA BOOSTER PS IMPROVEMENTS	PUMP STATION	$2,900,000	2020
BEAUMONT	Y	BEAU ENHANCED WATER LOSS CONTROL PROGRAM	WATER LOSS CONTROL	$52,623,000	2030
BULLARD	N	SMTH-BLD-INFRASTRUCTURE	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK	$5,260,000	2020
CENTER	Y	CENT-REU-PIPELINE FROM WWTP TO LAKE CENTER	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK; WATER TREATMENT PLANT EXPANSION	$13,579,000	2020
CENTER	Y	CENT-TOL-TOLEDO BEND TO CENTER	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK; WATER TREATMENT PLANT EXPANSION	$27,775,000	2040
CHANDLER	N	HDSN-CHN - PURCHASE FROM TYLER	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION	$1,886,000	2020
COUNTY-OTHER, JEFFERSON	N	JEFF-CTR INFRASTRUCTURE	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK	$14,236,000	2050
COUNTY-OTHER, NACOGDOCHES	N	NACN-LK - LAKE NACONICHE INFRASTRUCTURE	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK; WATER TREATMENT PLANT EXPANSION	$34,492,000	2040
CRYSTAL SYSTEMS INC	N	SMTH-CYS - INFRASTRUCTURE	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK	$2,021,000	2020
D&M WSC	N	NACW-DMW - NEW WELLS IN CARRIZO AQUIFER	CONVEYANCE/TRANSMISSION PIPELINE; LOWER GROUNDWATER WELL PUMP; MULTIPLE WELLS/WELL FIELD; STORAGE TANK	$3,484,000	2020
G M WSC	N	GM-WSC-ELEVATED TANK	STORAGE TANK	$745,500	2020
G M WSC	N	GM-WSC-SURFACE WATER PLANT IMPROVEMENTS	WATER TREATMENT PLANT EXPANSION	$2,483,000	2020
G M WSC	N	GM-WSC-WATER SYSTEM EXPANSION	CONVEYANCE/TRANSMISSION PIPELINE	$1,990,490	2020
G M WSC	N	GM-WSC-WATERLINE IMPROVEMENTS	CONVEYANCE/TRANSMISSION PIPELINE	$2,680,400	2020
HOUSTON COUNTY WCID #1	Y	HCWC-GW INFRASTRUCTURE	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD	$22,793,000	2020
IRRIGATION, HOUSTON	N	HOUS-IRR INFRASTRUCTURE	MULTIPLE WELLS/WELL FIELD; CONVEYANCE/TRANSMISSION PIPELINE	$12,926,000	2020
IRRIGATION, ORANGE	N	ORAN-IRR-INFRASTRUCTURE	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK	$13,281,000	2020
IRRIGATION, TRINITY	N	TRTY-IRR INFRASTRUCTURE	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK	$2,174,000	2020
JACKSONVILLE	Y	JACK-COL	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK; WATER TREATMENT PLANT EXPANSION	$20,645,000	2030
LINDALE	N	SMTH-LDL-INFRASTRUCTURE	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK	$5,803,000	2020

Recommended Projects Associated with Water Management Strategies

Sponsor Name	Is Sponsor a WWP?	Project Name	Project Description	Capital Cost	Online Decade
LIVESTOCK, NACOGDOCHES	N	NACW-LTK - NEW WELLS IN CARRIZO WILCOX	CONVEYANCE/TRANSMISSION PIPELINE; LOWER GROUNDWATER WELL PUMP; MULTIPLE WELLS/WELL FIELD; STORAGE TANK	$23,770,000	2020
LIVESTOCK, SHELBY	N	SHEL-LTK INFRASTRUCTURE	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK	$25,238,000	2020
LOWER NECHES VALLEY AUTHORITY	Y	LNVA-JEFF - CONSTRUCTED LEVY	PUMP STATION; RESERVOIR CONSTRUCTION	$34,989,000	2020
LOWER NECHES VALLEY AUTHORITY	Y	LNVA-SRA INFRASTRUCTURE	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK	$399,955,000	2040
LUFKIN	Y	LUFK-RAY PHASE 1	CONVEYANCE/TRANSMISSION PIPELINE; NEW WATER TREATMENT PLANT; PUMP STATION; STORAGE TANK	$49,368,000	2030
LUFKIN	Y	LUFK-RAY PHASE 2	PUMP STATION; WATER TREATMENT PLANT EXPANSION	$37,863,000	2040
LUFKIN	Y	LUFK-RAY PHASE 3	PUMP STATION	$2,760,000	2050
MANUFACTURING, JASPER	N	JASP-MFG INFRASTRUCTURE	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK	$33,497,000	2030
MANUFACTURING, JEFFERSON	N	JEFF-MFG INFRASTRUCTURE	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK	$312,255,000	2020
MANUFACTURING, ORANGE	N	ORAN-MFG	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK	$42,621,000	2020
MANUFACTURING, SMITH	N	SMTH-MFG-INFRASTRUCTURE	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK	$7,272,000	2020
MINING, ANGELINA	N	ANGL-MIN-INFRASTRUCTURE	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK	$4,005,000	2020
MINING, NACOGDOCHES	N	NACW-MIN-INFRASTRUCTURE	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK	$12,465,000	2020
MINING, RUSK	N	RUSK-MIN	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK	$14,158,000	2020
MINING, SAN AUGUSTINE	N	SAUG-MIN-INFRASTRUCTURE	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK	$21,064,000	2020
MINING, SMITH	N	SMTH-MIN-INFRASTRUCTURE	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK	$3,103,000	2020
NACOGDOCHES	Y	NACP-COL	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK; WATER TREATMENT PLANT EXPANSION	$35,829,000	2040
OVERTON	N	OVER ENHANCED WATER LOSS CONTROL PROGRAM	WATER LOSS CONTROL	$2,105,000	2040
PORT ARTHUR	Y	PORT ENHANCED WATER LOSS CONTROL PROGRAM	WATER LOSS CONTROL	$50,075,000	2020
SABINE RIVER AUTHORITY	Y	SRA-INF - PUMPSTATION FOR SRA	CANAL LINING; CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK	$72,832,675	2020
STEAM ELECTRIC POWER, ANDERSON	N	AND-SEP1 - PIPELINE FROM LAKE PALESTINE - CONTRACT WITH CITY OF PALESTINE	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION	$44,576,000	2020
STEAM ELECTRIC POWER, CHEROKEE	N	CHER-SEP INFRASTRUCTURE	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK	$16,735,000	2020
STEAM ELECTRIC POWER, JEFFERSON	N	JEFF-SEP INFRASTRUCTURE	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK	$54,518,000	2020
STEAM ELECTRIC POWER, NACOGDOCHES	N	NACW-SEP1 - LAKE COLUMBIA INFRASTRUCTURE	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK	$25,805,000	2030
STEAM ELECTRIC POWER, NACOGDOCHES	N	NACW-SEP2 - NEW WELLS IN CARRIZO WILCOX	CONVEYANCE/TRANSMISSION PIPELINE; LOWER GROUNDWATER WELL PUMP; MULTIPLE WELLS/WELL FIELD; STORAGE TANK	$16,021,000	2070
STEAM ELECTRIC POWER, NEWTON	N	NEWT-SEP INFRASTRUCTURE	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK	$38,170,000	2020
STEAM ELECTRIC POWER, ORANGE	N	ORAN-SEP	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK	$15,847,000	2020
STEAM ELECTRIC POWER, RUSK	N	RUSK-SEP INFRASTRUCTURE	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK	$57,718,000	2050
TYLER	Y	TYL-PAL - PALESTINE INFRASTRUCTURE	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; WATER TREATMENT PLANT EXPANSION	$93,050,000	2030
UPPER NECHES RIVER MUNICIPAL WATER AUTHORITY	Y	UNM-ROR-NECHES RUN OF RIVER INFRASTRUCTURE	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK	$444,085,000	2020

Recommended Projects Associated with Water Management Strategies

Region I Total Recommended Capital Cost	**$2,753,935,065**

***Projects with a capital cost of zero are excluded from the report list.**

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Appendix 5B-D

Alternate Water Management Strategies by WUG

DB17 Report

This appendix includes a copy of the Water User Group Alternate Water Management Strategy data from the TWDB Data Web Interface known as the DB17. The summary is divided by Water User Group.

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Alternative Water User Group (WUG) Water Management Strategies (WMS)

WUG Entity Primary Region: I

Water Management Strategy Supplies

WUG Entity Name	WMS Sponsor Region	WMS Name	Source Name	2020	2030	2040	2050	2060	2070	Unit Cost 2020	Unit Cost 2070
ATHENS MUNICIPAL WATER AUTHORITY - UNASSIGNED WATER VOLUMES	C	ALTERNATIVE - ATHENS MWA NEW WELLS	C | CARRIZO-WILCOX AQUIFER | HENDERSON COUNTY	0	0	0	0	0	0	N/A	N/A
HOUSTON COUNTY WCID #1 - UNASSIGNED WATER VOLUMES	I	HCWC-GW1 NEW WELLS	I | CARRIZO-WILCOX AQUIFER | HOUSTON COUNTY	1,054	1,054	1,054	1,054	1,054	1,054	$225	$225
HOUSTON COUNTY WCID #1 - UNASSIGNED WATER VOLUMES	I	HCWC-GW2 AVAILABILITY INCREASE	I | CARRIZO-WILCOX AQUIFER | HOUSTON COUNTY	2,446	2,446	2,446	2,446	2,446	2,446	$522	$522
IRRIGATION, TRINITY	I	TRTY-IRR NEW CONTRACT	I | YEGUA-JACKSON AQUIFER | TRINITY COUNTY	331	331	331	331	331	331	$988	$988
			Region I Total Alternative WMS Supplies	3,831	3,831	3,831	3,831	3,831	3,831		

Alternative Projects Associated with Water Management Strategies

Project Sponsor Region: I

Sponsor Name	Is Sponsor a WWP?	Project Name	Project Description	Capital Cost	Online Decade
			Region I Total Alternative Capital Cost		

*Projects with a capital cost of zero are excluded from the report list.

Appendix 5B-E

Management Supply Factor DB17 Report

This appendix will include a copy of the Management Supply Factor data from the TWDB Data Web Interface known as the DB17. The summary will be divided by Water User Group and Wholesale Water Provider by decade. Management supply factors may be used to take into account uncertainties associated with:

- Projections of populations;
- Projections of water demands;
- Climate variability;
- Yield of recommended WMSs;
- Permitting or other uncertainties impacting implementation of projects; and/or
- Other uncertainties.

The TWDB will make this DB17 report available to RWPGs after submittal of the 2016 Initially Prepared Plan.

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Water User Group (WUG) Management Supply Factor

REGION I	WUG MANAGEMENT SUPPLY FACTOR					
	2020	2030	2040	2050	2060	2070
ALTO	2.0	3.5	3.3	3.0	2.8	1.6
ALTO RURAL WSC	1.2	1.1	1.0	1.0	1.0	1.0
ANGELINA WSC	2.1	2.1	2.1	2.0	1.9	1.8
APPLEBY WSC	1.4	1.3	1.2	1.1	1.0	1.0
ARP	1.0	3.5	3.5	3.4	3.3	1.4
BEAUMONT	1.0	1.1	1.1	1.1	1.1	1.1
BECKVILLE	4.4	4.0	3.9	3.7	3.6	3.5
BERRYVILLE	1.0	1.0	1.0	1.0	1.0	1.0
BETHEL-ASH WSC	1.8	1.7	1.5	1.4	1.3	1.2
BEVIL OAKS	1.0	1.0	1.0	1.0	1.0	1.0
BRIDGE CITY	1.0	1.0	1.1	1.0	1.0	1.0
BROWNSBORO	1.0	1.0	1.0	1.0	1.0	1.0
BRUSHY CREEK WSC	2.5	2.5	2.6	2.6	2.6	2.5
BULLARD	1.0	1.0	1.0	1.0	1.0	1.0
BURKE	1.0	1.0	1.0	1.0	1.0	1.0
CARTHAGE	1.0	1.0	1.0	1.0	1.0	1.0
CENTER	1.6	1.6	2.6	2.6	2.5	2.4
CENTRAL WCID OF ANGELINA COUNTY	1.8	1.8	1.7	1.6	1.5	1.5
CHALK HILL SUD	3.2	3.0	2.9	2.7	2.4	2.2
CHANDLER	1.4	1.2	1.1	1.3	1.2	1.1
CHINA	1.0	1.0	1.0	1.0	1.0	1.0
COLMESNEIL	2.4	2.4	2.5	2.5	2.5	2.5
CORRIGAN	1.3	1.2	1.2	1.1	1.0	1.0
COUNTY-OTHER, ANDERSON	1.1	1.1	1.1	1.1	1.1	1.1
COUNTY-OTHER, ANGELINA	1.2	1.2	1.2	1.1	1.1	1.0
COUNTY-OTHER, CHEROKEE	1.6	4.7	4.5	4.1	3.8	1.7
COUNTY-OTHER, HARDIN	1.0	1.0	1.0	1.0	1.0	1.0
COUNTY-OTHER, HENDERSON	1.4	1.5	1.5	1.5	1.5	1.6
COUNTY-OTHER, HOUSTON	2.0	2.1	2.2	2.2	2.2	2.2
COUNTY-OTHER, JASPER	1.1	1.1	1.1	1.2	1.2	1.2
COUNTY-OTHER, JEFFERSON	1.1	1.1	1.1	1.0	1.0	1.0
COUNTY-OTHER, NACOGDOCHES	1.0	1.3	1.3	1.3	1.2	1.0
COUNTY-OTHER, NEWTON	1.5	1.5	1.6	1.6	1.6	1.6
COUNTY-OTHER, ORANGE	1.0	1.0	1.0	1.0	1.0	1.0
COUNTY-OTHER, PANOLA	1.1	1.1	1.1	1.1	1.1	1.1
COUNTY-OTHER, RUSK	1.5	1.4	1.3	1.2	1.1	1.0
COUNTY-OTHER, SABINE	5.1	5.5	5.7	5.8	5.8	5.8
COUNTY-OTHER, SAN AUGUSTINE	1.8	1.9	2.0	2.0	2.0	2.0
COUNTY-OTHER, SHELBY	1.2	1.1	1.1	1.1	1.1	1.1
COUNTY-OTHER, TRINITY	3.2	3.1	3.1	3.2	3.1	3.0
COUNTY-OTHER, TYLER	1.0	1.0	1.0	1.0	1.0	1.0
CRAFT-TURNEY WSC	1.0	1.0	1.0	1.0	1.0	1.0
CROCKETT	1.6	1.6	1.6	1.6	1.6	1.6
CROSS ROADS SUD	2.7	2.6	2.4	2.3	2.1	1.9
CUSHING	1.8	1.7	1.6	1.4	1.3	1.2
D&M WSC	1.3	1.2	1.1	1.0	1.0	1.0
DEAN WSC	1.0	1.0	1.0	1.0	1.0	1.0
DIBOLL	4.0	3.9	3.8	3.7	3.5	3.4
ELKHART	1.7	1.7	1.7	1.7	1.7	1.7
FOUR PINES WSC	1.6	1.6	1.7	1.7	1.7	1.7

Water User Group (WUG) Management Supply Factor

REGION I	WUG MANAGEMENT SUPPLY FACTOR					
	2020	2030	2040	2050	2060	2070
FOUR WAY SUD	2.5	2.4	2.3	2.2	2.1	2.1
FRANKSTON	1.6	1.6	1.6	1.6	1.6	1.5
G M WSC	1.6	1.6	1.6	1.6	1.6	1.6
GARRISON	2.5	2.3	2.1	1.9	1.7	1.6
GRAPELAND	3.4	3.5	3.6	3.7	3.7	3.7
GROVES	1.0	1.0	1.0	1.0	1.0	1.0
HEMPHILL	2.4	2.5	2.5	2.5	2.5	2.5
HENDERSON	1.8	1.7	2.8	2.5	2.3	2.1
HUDSON	1.7	1.6	1.6	1.5	1.5	1.5
HUDSON WSC	2.8	2.7	2.5	2.4	2.3	2.2
HUNTINGTON	4.6	4.5	4.4	4.3	4.1	4.0
IRRIGATION, ANDERSON	4.0	4.0	4.0	4.0	4.0	4.0
IRRIGATION, ANGELINA	1.7	1.7	1.7	1.7	1.7	1.7
IRRIGATION, CHEROKEE	1.2	1.2	1.2	1.2	1.2	1.2
IRRIGATION, HARDIN	1.0	1.0	1.0	1.0	1.0	1.0
IRRIGATION, HENDERSON	2.0	2.0	2.0	2.0	1.9	1.8
IRRIGATION, HOUSTON	1.0	1.0	1.0	1.0	1.0	1.0
IRRIGATION, JASPER	3.5	3.5	3.5	3.5	3.5	3.5
IRRIGATION, JEFFERSON	1.3	1.2	1.2	1.2	1.2	1.2
IRRIGATION, NACOGDOCHES	1.3	1.3	1.3	1.3	1.3	1.3
IRRIGATION, NEWTON	1.0	1.0	1.0	1.0	1.0	1.0
IRRIGATION, ORANGE	1.0	1.0	1.0	1.0	1.0	1.0
IRRIGATION, PANOLA	9.0	9.0	9.0	9.0	9.0	9.0
IRRIGATION, POLK	1.8	1.8	1.8	1.8	1.8	1.8
IRRIGATION, RUSK	6.0	6.0	6.0	6.0	6.0	6.0
IRRIGATION, SAN AUGUSTINE	1.0	1.0	1.0	1.0	1.0	1.0
IRRIGATION, SHELBY	3.8	3.8	3.8	3.8	3.8	3.8
IRRIGATION, SMITH	1.0	1.0	1.0	1.0	1.0	1.0
IRRIGATION, TRINITY	0.3	0.3	0.3	0.3	0.3	0.3
IRRIGATION, TYLER	1.0	1.0	1.0	1.0	1.0	1.0
IVANHOE	2.4	2.4	2.5	2.5	2.5	2.5
IVANHOE NORTH	3.5	3.6	3.7	3.7	3.7	3.7
JACKSON WSC	1.0	3.0	2.9	2.7	2.5	2.4
JACKSONVILLE	1.0	2.5	2.4	2.3	2.2	2.1
JASPER	2.8	2.8	2.9	2.9	2.9	2.9
JASPER COUNTY WCID #1	4.8	5.1	5.2	5.2	5.2	5.2
JEFFERSON COUNTY WCID #10	1.0	1.0	1.0	1.0	1.0	1.0
JOAQUIN	1.3	1.3	1.3	1.3	1.3	1.3
KIRBYVILLE	1.5	1.5	1.5	1.5	1.5	1.5
KOUNTZE	4.1	4.2	4.4	4.4	4.4	4.4
LILLY GROVE SUD	1.8	1.6	1.5	1.4	1.2	1.1
LIVESTOCK, ANDERSON	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, ANGELINA	1.1	1.1	1.1	1.1	1.1	1.1
LIVESTOCK, CHEROKEE	1.1	1.1	1.1	1.1	1.1	1.1
LIVESTOCK, HARDIN	1.4	1.4	1.4	1.4	1.4	1.4
LIVESTOCK, HENDERSON	3.4	3.4	3.4	3.3	2.7	2.2
LIVESTOCK, HOUSTON	1.4	1.3	1.3	1.2	1.2	1.1
LIVESTOCK, JASPER	2.2	2.2	2.2	2.2	2.2	2.2
LIVESTOCK, JEFFERSON	1.1	1.1	1.1	1.1	1.1	1.1
LIVESTOCK, NACOGDOCHES	1.0	1.0	1.0	1.0	1.0	1.0

Water User Group (WUG) Management Supply Factor

REGION I	WUG MANAGEMENT SUPPLY FACTOR					
	2020	2030	2040	2050	2060	2070
LIVESTOCK, NEWTON	2.1	2.1	2.1	2.1	2.1	2.1
LIVESTOCK, ORANGE	1.6	1.6	1.6	1.6	1.6	1.6
LIVESTOCK, PANOLA	1.1	1.1	1.1	1.1	1.1	1.1
LIVESTOCK, POLK	1.6	1.6	1.6	1.6	1.6	1.6
LIVESTOCK, RUSK	1.2	1.2	1.2	1.2	1.2	1.2
LIVESTOCK, SABINE	4.6	3.4	2.6	2.0	1.6	1.6
LIVESTOCK, SAN AUGUSTINE	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, SHELBY	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, SMITH	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, TRINITY	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, TYLER	1.1	1.1	1.1	1.1	1.1	1.1
LOVELADY	1.8	1.8	1.8	1.9	1.9	1.9
LUFKIN	1.0	1.8	3.2	3.8	3.5	3.2
LUMBERTON	1.0	1.0	1.0	1.0	1.0	1.0
LUMBERTON MUD	5.6	5.3	5.0	4.9	4.7	4.5
MANUFACTURING, ANDERSON	1.0	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, ANGELINA	0.7	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, CHEROKEE	1.0	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, HARDIN	1.0	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, HOUSTON	1.1	1.1	1.1	1.1	1.1	1.1
MANUFACTURING, JASPER	1.0	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, JEFFERSON	1.0	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, NACOGDOCHES	4.9	4.6	4.3	4.1	3.9	3.7
MANUFACTURING, NEWTON	1.0	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, ORANGE	1.0	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, PANOLA	1.0	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, POLK	1.0	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, RUSK	18.8	17.5	16.5	15.8	14.8	13.8
MANUFACTURING, SABINE	1.8	1.6	1.4	1.3	1.2	1.1
MANUFACTURING, SAN AUGUSTINE	2.1	1.9	1.7	1.5	1.4	1.3
MANUFACTURING, SHELBY	1.2	1.2	1.2	1.2	1.2	1.2
MANUFACTURING, SMITH	1.1	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, TYLER	1.0	1.0	1.0	1.0	1.0	1.0
MAURICEVILLE SUD	2.4	2.4	2.4	2.3	2.3	2.3
MEEKER MUD	1.2	1.2	1.1	1.1	1.0	1.0
MELROSE WSC	1.6	1.5	1.4	1.2	1.1	1.0
MINING, ANDERSON	1.4	1.2	1.2	1.3	1.7	2.2
MINING, ANGELINA	1.0	1.0	1.0	1.0	1.0	1.0
MINING, CHEROKEE	1.0	1.0	1.0	1.0	1.0	1.0
MINING, HARDIN	1.0	1.0	1.0	1.0	1.0	1.0
MINING, HOUSTON	1.0	1.0	2.3	3.1	10.8	23.7
MINING, JASPER	1.0	1.0	1.0	1.0	1.0	1.0
MINING, JEFFERSON	1.0	1.0	1.0	1.0	1.0	1.0
MINING, NACOGDOCHES	1.0	1.0	1.0	1.2	1.6	2.2
MINING, NEWTON	1.0	1.0	1.1	1.5	2.2	2.9
MINING, ORANGE	1.1	1.0	1.0	1.0	1.0	1.0
MINING, PANOLA	1.6	1.6	1.8	2.1	2.6	2.4
MINING, RUSK	1.0	1.0	1.0	1.0	1.0	1.0
MINING, SABINE	1.5	1.7	1.9	2.2	2.6	2.9
MINING, SAN AUGUSTINE	1.0	1.0	1.3	1.6	2.1	2.9

Water User Group (WUG) Management Supply Factor

REGION I	WUG MANAGEMENT SUPPLY FACTOR					
	2020	2030	2040	2050	2060	2070
MINING, SHELBY	1.0	1.0	1.1	1.4	1.2	1.6
MINING, TRINITY	10.5	10.5	10.5	10.5	10.5	10.5
MINING, TYLER	1.5	1.2	1.6	2.3	4.3	8.2
MURCHISON	1.0	1.0	1.0	1.0	1.0	1.0
NACOGDOCHES	1.0	2.2	2.1	2.0	1.9	1.8
NEDERLAND	1.0	1.0	1.0	1.0	1.0	1.0
NEW CHAPEL HILL	1.0	1.0	1.0	1.0	1.0	1.0
NEW LONDON	1.5	3.4	3.1	2.9	2.6	1.3
NEW SUMMERFIELD	1.6	17.0	15.9	14.7	13.5	3.4
NEWTON	1.1	1.1	1.1	1.1	1.2	1.2
NOME	1.0	1.0	1.0	1.0	1.0	1.0
NOONDAY	1.0	1.0	1.0	1.0	1.0	1.0
NORTH CHEROKEE WSC	1.0	7.7	7.3	6.8	6.3	2.0
NORTH HARDIN WSC	3.5	3.4	3.3	3.2	3.1	3.0
ORANGE	1.0	1.0	1.0	1.0	1.0	1.0
ORANGEFIELD WSC	1.0	1.0	1.0	1.0	1.0	1.0
OVERTON	1.2	1.1	1.1	1.1	1.1	1.1
PALESTINE	1.0	1.0	1.0	1.0	1.0	1.0
PINEHURST	1.0	1.0	1.0	1.0	1.0	1.0
PINELAND	1.1	1.1	1.2	1.2	1.2	1.2
PORT ARTHUR	1.3	1.4	1.4	1.5	1.5	1.5
PORT NECHES	1.0	1.0	1.0	1.0	1.0	1.0
REDLAND WSC	3.9	3.9	3.7	3.6	3.5	3.4
ROSE CITY	6.8	6.7	6.7	6.6	6.5	6.4
RUSK	1.4	5.2	4.9	4.5	4.1	1.6
RUSK RURAL WSC	1.5	3.7	3.5	3.3	3.0	1.4
SAN AUGUSTINE	1.0	1.0	1.0	1.0	1.0	1.0
SILSBEE	1.8	1.8	1.9	1.9	1.9	1.8
SOUR LAKE	3.3	3.3	3.2	3.2	3.1	3.1
SOUTH NEWTON WSC	1.5	1.5	1.5	1.5	1.5	1.5
SOUTHERN UTILITIES COMPANY	1.0	1.0	1.0	1.0	1.0	1.0
STEAM ELECTRIC POWER, ANDERSON	1.0	1.0	1.0	1.0	1.0	0.8
STEAM ELECTRIC POWER, ANGELINA	16.8	16.8	16.8	16.8	16.8	16.8
STEAM ELECTRIC POWER, CHEROKEE	7.3	9.6	10.2	8.6	7.2	6.5
STEAM ELECTRIC POWER, JEFFERSON	1.0	1.0	1.0	1.0	1.0	1.0
STEAM ELECTRIC POWER, NACOGDOCHES	2.7	2.3	1.9	1.5	1.2	1.1
STEAM ELECTRIC POWER, NEWTON	1.0	1.0	1.0	1.0	1.0	1.0
STEAM ELECTRIC POWER, ORANGE	1.2	1.0	1.0	1.0	1.0	1.0
STEAM ELECTRIC POWER, RUSK	1.6	1.4	1.2	1.0	1.0	1.0
STEAM ELECTRIC POWER, TYLER	1.0	1.0	1.0	1.0	1.0	1.0
SWIFT WSC	1.6	1.4	1.3	1.2	1.1	1.0
TATUM	1.4	1.3	1.2	1.1	1.0	1.0
TENAHA	1.9	1.9	1.8	1.7	1.6	1.6
THE CONSOLIDATED WSC	2.2	2.3	2.3	2.4	2.3	2.3
TIMPSON	3.2	3.0	2.9	2.8	2.7	2.6
TROUP	1.0	10.7	10.0	9.3	8.7	2.4
TYLER	1.0	1.0	1.0	1.0	1.0	1.0
TYLER COUNTY WSC	1.6	1.6	1.7	1.7	1.7	1.7
VIDOR	1.0	1.0	1.0	1.0	1.0	1.0
WALNUT GROVE WSC	1.9	1.7	1.5	1.3	1.2	1.0

Water User Group (WUG) Management Supply Factor

REGION I	WUG MANAGEMENT SUPPLY FACTOR					
	2020	2030	2040	2050	2060	2070
WALSTON SPRINGS WSC	1.0	1.0	1.0	1.1	1.1	1.1
WELLS	2.7	2.6	2.4	2.2	2.1	1.9
WEST HARDIN WSC	2.7	2.7	2.6	2.6	2.6	2.6
WEST JEFFERSON COUNTY MWD	1.0	1.0	1.0	1.0	1.0	1.0
WEST ORANGE	1.0	1.0	1.0	1.0	1.0	1.0
WHITEHOUSE	1.0	7.4	6.7	6.0	5.5	1.8
WODEN WSC	2.3	2.2	2.0	1.8	1.7	1.5
WOODVILLE	6.5	6.6	6.7	6.7	6.7	6.7
WRIGHT CITY WSC	1.5	1.4	1.3	1.2	1.1	1.0
ZAVALLA	1.0	1.0	1.0	1.0	1.0	1.0

*WUG supplies and projected demands are entered for each of a WUG's region-county-basin divisions. To calculate the Management Supply Factor for each WUG as a whole, not split by region-county-basin the combined total of existing and future supply is divided by the total projected demand.

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Appendix 5C-A

Model Water Conservation Plan for Public Water Suppliers

This appendix includes a Model Water Conservation Plan for Municipal Water Users in the ETRWPA. The model plan addresses the latest Texas Commission on Environment Quality requirements and is intended to be modified by each user to best reflect the activities appropriate to the entity. The model plan also includes sample appendices required:

- Appendix A – List of References
- Appendix B – Texas Commission on Environmental Quality Rules on Municipal Water Conservation Plans
- Appendix C – TCEQ Utility Profile
- Appendix D – TCEQ Water Conservation Implementation Report
- Appendix E – TWDB Annual Water Conservation Report
- Appendix F – City Council Resolution Adopting Plan

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Water Conservation Plan for [Entity]

Date

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   - 9.2 Reservoir System Operation Plan
   - 9.3 Considerations for Landscape Water Management Regulations (Optional)
   - 9.4 Requirement for Water Conservation Plans by Wholesale Customers
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10. IMPLEMENTATION AND ENFORCEMENT OF THE WATER CONSERVATION PLAN

APPENDICES

APPENDIX A	List of References
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Water Conservation Plan for [Entity]

1. INTRODUCTION AND OBJECTIVES

Recognizing the need for efficient use of existing water supplies, the Texas Commission on Environmental Quality (TCEQ) has developed guidelines and requirements governing the development of water conservation plans for public water suppliers.

The objectives of this water conservation plan are as follows:

- To reduce water consumption from the levels that would prevail without conservation efforts.
- To reduce the loss and waste of water.
- To improve efficiency in the use of water.
- To document the level of recycling and reuse in the water supply.
- To extend the life of current water supplies by reducing the rate of growth in demand.

The water conservation plan presented in this document is a model water conservation plan intended for use as a template by retail public water suppliers in Region I. This model plan includes all of the elements required by TCEQ. In order to modify this plan, each water supplier will need to do the following:

- Complete the TCEQ water utility profile (provided in Appendix C).
- Complete the TCEQ water conservation implementation report (provided in Appendix D).
- Complete the Texas Water Development Board (TWDB) annual water conservation report (provided in Appendix E).
- Set five- and ten-year goals for per capita water use.
- Adopt ordinance(s) or regulation(s) approving the model plan.

The final adopted version should be provided to the TCEQ and the TWDB.

2. TEXAS COMMISSION ON ENVIRONMENTAL QUALITY RULES

2.1 Conservation Plans

The TCEQ rules governing development of water conservation plans for public water suppliers are contained in Title 30, Part 1, Chapter 288, Subchapter A, Rule 288.2 of the Texas Administrative Code, which is included in Appendix B. For the purpose of these rules, a water conservation plan is defined as "A strategy or combination of strategies for reducing the volume of water withdrawn from a water supply source, for reducing the loss or waste of water, for maintaining or improving the efficiency in the use of water, for increasing the recycling and reuse of water, and for preventing the pollution of water."[1] The elements in the TCEQ water conservation rules covered in this conservation plan are listed below.

Minimum Conservation Plan Requirements

The minimum requirements in the Texas Administrative Code for Water Conservation Plans for Public Water Suppliers are covered in this report as follows:

- 288.2(a)(1)(A) – Utility Profile – Section 3 and Appendix C
- 288.2(a)(1)(B) – Record Management System – Section 4
- 288.2(a)(1)(C) – Specification of Goals – Section 5
- 288.2(a)(1)(D) – Accurate Metering – Section 6.1
- 288.2(a)(1)(E) – Universal Metering – Section 6.1
- 288.2(a)(1)(F) – Determination and Control of Water Loss – Section 6.2
- 288.2(a)(1)(G) – Public Education and Information Program – Section 7
- 288.2(a)(1)(H) – Non-Promotional Water Rate Structure – Section 8
- 288.2(a)(1)(I) – Reservoir System Operation Plan – Section 9.2

[1] Title 30 of the Texas Administrative Code, Part 1, Chapter 288, Subchapter A, Rules 288.1 and 288.2, and Subchapter B, Rule 288.20, downloaded from http://www.tnrcc.state.tx.us/oprd/rules/pdflib/288a.pdf, May 2014.

- 288.2(a)(1)(J) – Means of Implementation and Enforcement – Section 10
- 288.2(a)(1)(K) – Coordination with Regional Water Planning Group – Section 9.5
- 288.2(c) – Review and Update Plan – Section 10

Conservation Additional Requirements (Population over 5,000)

The Texas Administrative Code includes additional requirements for water conservation plans for cities with a population over 5,000:

- 288.2(a)(2)(A) – Leak Detection, Repair, and Water Loss Accounting – Sections 6.2, 6.3, and 6.4
- 288.2(a)(2)(B) – Requirement for Water Conservation Plans by Wholesale Customers – Section 9.4

Additional Conservation Strategies

TCEQ rules also list additional optional but not required conservation strategies, which may be adopted by suppliers. The following optional strategies are included in this plan:

- 288.2(a)(3)(A) – Conservation Oriented Water Rates – Section 8
- 288.2(a)(3)(B) – Ordinances, Plumbing Codes or Rules on Water-Conserving Fixtures – Section 9.1
- 288.2(a)(3)(F) – Considerations for Landscape Water Management Regulations – Section 9.3
- 288.2(a)(3)(G) – Monitoring Method – Section 6.4

3. WATER UTILITY PROFILE

Appendix C to this water conservation plan is a sample water utility profile based on the format recommended by the TCEQ.

[Water supplier is to complete the utility profile and provide information on the public water supply system and customers if appropriate for this section.]

4. RECORD MANAGEMENT SYSTEM

As required by TAC Title 30, Part 1, Chapter 288, Subchapter A, Rule 288.2(a)(1)(B), the record management system allows for the separation of water sales and uses into single-family residential, multi-family residential, commercial, public/institutional, industrial, agricultural, and wholesale categories. This information will be included in an annual water conservation implementation report, as described in Section 6.4 below.

For those entities whose record management systems do not currently allow for the separation of water sales as described above, they will move to implement such a system upon the purchase of new billing software.

5. SPECIFICATION OF WATER CONSERVATION GOALS

[Current TCEQ rules require the adoption of specific water conservation goals for a water conservation plan. As part of plan adoption, each water supplier will develop 5-year and 10-year targets for water savings to include goals for water loss programs and goals for municipal use in total gallons per capita per day (GPCD) and residential GPCD.]

The goals for this water conservation plan include the following:

- Strive to attain the total per capita municipal water use below the specified amount in gallons per capita per day shown in the "Targets and Goals" section of Appendix D using a 5-year rolling average calculation. (See 5-year and 10-year goals in Appendix D).
- Similarly, strive to attain residential per capita water use of *[gpcd]* by *[5 years]* and *[gpcd]* by *[10 years]*.
- Conduct water audits as required by the TCEQ and maintain water loss to *[insert amount]* percent of the total water used through existing and new maintenance programs.
- Raise public awareness of water conservation and encourage responsible public

behavior by a public education and information program, as discussed in Section 7.

6. METERING, WATER USE RECORDS, CONTROL OF UNACCOUNTED WATER, AND LEAK DETECTION AND REPAIR

One of the key elements in water conservation is careful tracking of water use and control of losses through illegal diversions and leaks. Careful metering of water deliveries and water use, detection and repair of leaks in the distribution system and regular monitoring of unaccounted water are important in controlling losses. *[Water suppliers serving a population of 5,000 people or more or a having a projected population of greater than 5,000 people or more within the next ten years must include the following elements in their water conservation plans:]*

6.1 Metering of Customer and Public Uses and Meter Testing, Repair, and Replacement

All customers of wholesale or retail public water suppliers, including public and governmental users, should be metered. In many cases, water suppliers already meter all of their water users. For those water suppliers who do not currently meter all of their water uses, these entities will implement a program to meter all water uses within the next five years.

Most water suppliers test and replace their customer meters on a regular basis. All customer meters should be replaced on a 15-year cycle. Those who do not currently have a meter testing and replacement program will implement such a program over the next five years.

6.2 Determination and Control of Water Loss

Total water loss is the volume of water diverted or purchased minus water delivered to customers minus authorized but unmetered uses. (Authorized but unmetered uses would include use for fire fighting, releases for flushing of lines, etc.) The TWDB water loss

audit worksheet divides total water loss into apparent losses and real losses:

- Apparent water loss is water which is used by customers but for which the utility is not compensated. Reducing apparent losses increases the city's utility revenue but does not reduce water usage. Apparent water losses include:
  - Inaccuracies in customer meters. (Customer meters tend to run more slowly as they age and under-report actual use.)
  - Losses due to illegal connections and theft.
  - Systematic data handling errors
- Real water loss is water which is physically lost from the water system before it can be used by customers. Identifying and preventing real losses decreases a utility's costs and decreases water usage. Real water losses include:
  - Reported leaks.
  - Unreported leaks.

Measures to control water loss are part of the routine operations of water suppliers. Water audits are useful methods of accounting for water usage within a system. Water audits will be conducted by water suppliers in order to decrease water loss. Maintenance crews and personnel will look for and report evidence of leaks in the water distribution system. The leak detection and repair program is described in Section 6.3 below. Meter readers are asked to watch for and report signs of illegal connections, so they can be addressed quickly. Water loss is calculated as part of the water conservation implementation report (Appendix D) and the annual water conservation report (Appendix E).

6.3 Leak Detection and Repair

City crews and personnel will look for and report evidence of leaks in the water distribution system. Areas of the water distribution system in which numerous leaks and line breaks occur are targeted for replacement as funds are available.

6.4 Monitoring of Effectiveness and Efficiency - Water Conservation Reports

[Entities that are required to submit a water conservation plan must also submit a water conservation implementation report with the plan (30 TAC 288.30(2). This report includes statistics from the previous five-year implementation period. The TCEQ has provided a template on its web site.[5]

The Texas Water Development Board (TWDB) also requires entities that serve 3,300 connections or more, that hold a surface water right, or that are applying for or receiving more than $500,000 in financial assistance from the TWDB to file an annual water conservation report with the TWDB by May 1 each year. This report includes statistics from the previous year. The TWDB has provided a template on its web site.[6]*]*

A completed five-year water conservation implementation report is attached in Appendix D. The city will use this report to monitor the effectiveness and efficiency of the water conservation program and to plan conservation-related activities. In this report, the city has documented water use accounting, system data, per-capita water use and water loss, water conservation programs and activities, and estimated water savings for previous five years. In addition, the city has compared current per capita water use to the targets and goals established in this plan (Section 4.3).

An annual water conservation report will be completed by *[insert date]* of the following year and will be submitted to the TWDB. This report will record water use accounting, system data, targets and goals, per-capita water use and water loss, and water conservation programs and activities for the previous year. The report will be used to monitor the effectiveness and efficiency of the water conservation program and to plan conservation-related activities for the next year. The report for *[last year]* is attached in Appendix E.

7. CONTINUING PUBLIC EDUCATION AND INFORMATION CAMPAIGN

The continuing public education and information campaign on water conservation includes the following elements: *[Water provider is to select the appropriate measures for its system.]*

- Insert water conservation information with water bills. Inserts will include material developed by the [water supplier] staff and material obtained from the TWDB, the TCEQ, and other sources.
- Encourage local media coverage of water conservation issues and the importance of water conservation.
- Make the *Texas Smartscape CD*, water conservation brochures, and other water conservation materials available to the public.
- Make information on water conservation available on its website (if any) and include links to the *Texas Smartscape* website and to information on water conservation on the TWDB and TCEQ web sites.
- Provide water conservation materials to schools and utilize existing age-appropriate education programs available through the TCEQ and TWDB.
- Support the State-initiated Water Conservation Awareness and Education Campaign.

8. WATER RATE STRUCTURE

[If a water supplier has a decreasing block rate structure, it is recommended that a flat rate or increasing rate structure be adopted.]

An increasing block rate water structure that is intended to encourage water conservation and discourage excessive use and waste of water will be adopted upon completion of the next rate study or within five years. An example water rate structure is as follows:

Residential Rates

1. Monthly minimum charge. This can (but does not have to) include up to 2,000 gallons water use with no additional charge.
2. Base charge per 1,000 gallons up to the approximate average residential use.
3. 2nd tier (from the average to 2 times the approximate average) at 1.25 to 2.0 times the base charge.
4. 3rd tier (above 2 times the approximate average) at 1.25 to 2.0 times the 2nd tier.
5. The residential rate can also include a lower tier for basic household use up to 4,000 gallons per month or so.

Commercial/Industrial Rates

Commercial/industrial rates should include at least 2 tiers, with rates for the 2nd tier at 1.25 to 2.0 times the first tier.

[If a water supplier has an increasing rate structure, state the current rate structure as follows.]

The [water supplier] has adopted an increasing block rate water structure that is intended to encourage water conservation and discourage excessive use and waste of water. The water rate structure adopted on *[insert date]* is as follows:

Residential Rates

[To be completed by the supplier]

Commercial/Industrial Rates

[To be completed by the supplier]

9. OTHER WATER CONSERVATION MEASURES

9.1 Ordinances, Plumbing Codes, or Rules on Water-Conserving Fixtures

The State of Texas has required water-conserving fixtures in new construction and renovations since 1992. The state standards call for flows of no more than 2.2 gallons per minute (gpm) for faucets, 2.5 gpm for showerheads, and 1.28 gallons per flush for toilets. These standards assure that all new construction and renovations will use water-conserving fixtures.

Federal rules require that all clothes washers manufactured by 2007 use 9.5 gallons of water per cubic foot per cycle or less. These standards became more stringent for commercial clothes washers in 2013 and are scheduled to become more stringent for residential clothes washers in 2015 and again in 2018.

Federal rules require that all residential dishwashers manufactured on or after May 30, 2013, must achieve water consumption of 5 gallons per cycle or less.

The potential savings from these efficient fixtures can be significant, but historically have been difficult to measure independently from other factors.

9.2 Reservoir System Operation Plan

[Insert description of reservoir system operation plan if public supplier has such a plan.]

or

The [water supplier] purchases water from [name] and does not have surface water supplies for which to implement a reservoir system operation plan.

9.3 Considerations for Landscape Water Management Regulations (Optional)

[The water supplier may choose to adopt landscape water management regulations as part of the development of this water conservation plan. These regulations are intended to minimize waste in landscape irrigation. The proposed regulations might include the following elements:

- *Require that all new irrigation systems be in compliance with state design and installation regulations (TAC Title 30, Part 1, Chapter 344).*
- *Prohibit irrigation systems that spray directly onto impervious surfaces or onto other non-irrigated areas. (Wind-driven water drift will be taken into consideration.)*
- *Prohibit use of poorly maintained sprinkler systems that waste water.*
- *Prohibit outdoor watering during any form of precipitation.*
- *Enforce the regulations by a system of warnings followed by fines for continued or repeat violations.*
- *Implement other measures to encourage off-peak water use.]*

9.4 Requirement for Water Conservation Plans by Wholesale Customers

[Required for cities with populations over 5,000.]

Every contract for the wholesale sale of water by customers that is entered into, renewed, or extended after the adoption of this water conservation plan will include a requirement that the wholesale customer and any wholesale customers of that wholesale customer develop and implement a water conservation plan meeting the requirements of Title 30, Part 1, Chapter 288, Subchapter A, Rule 288.2 of the Texas Administrative Code. The requirement will also extend to each successive wholesale customer in the resale of the water.

9.5 Coordination with Regional Water Planning Group

In accordance with TCEQ regulations, a copy of this adopted water conservation plan will be sent to the East Texas Region water planning group.

10. IMPLEMENTATION AND ENFORCEMENT OF THE WATER CONSERVATION PLAN

A copy of [an ordinance, order, or resolution] adopted by the [City Council or governing board] regarding this water conservation plan is attached to and made part of this plan

(Appendix F). The [ordinance, order, or resolution] designates responsible officials to implement and enforce the water conservation plan.

As required by TCEQ rules, the City will review this water conservation plan every five years, beginning in *[five years from date of plan]*. The plan will be updated as appropriate based on new or updated information. As the plan is reviewed and subsequently updated, a copy of the revised water conservation plan will be submitted to the TCEQ, the TWDB, and the East Texas Region water planning group for their records.

Appendix A

List of References

Appendix A
List of References

(1) Title 30 of the Texas Administrative Code, Part 1, Chapter 288, Subchapter A, Rules 288.1 and 288.2, and Subchapter B, Rule 288.20, downloaded from http://www.tceq.texas.gov/assets/public/legal/rules/rules/pdflib/288a.pdf, May 2014.

The following conservation plans and related documents were reviewed in the development of this plan.

(2) Freese and Nichols, Inc.: *Draft Model Water Conservation Plan for North Texas Municipal Water District Member Cities and Customers,* prepared for the North Texas Municipal Water District, Fort Worth, February 2014.

(3) Freese and Nichols, Inc.: *Water Resource and Emergency Management Plan,* prepared for the North Texas Municipal Water District, Fort Worth, April 2014.

(4) Dallas Water Utilities: *City of Dallas Drought Contingency Plan*, adopted by the City Council, Dallas, February 26, 2014.

(5) Texas Commission on Environmental Quality: *Drought Contingency Plan for a Retail Public Water Supplier*, accessed online at http://www.tceq.texas.gov/assets/public/permitting/watersupply/drought/20191.doc, June 2014.

(6) Texas Commission on Environmental Quality: *Utility Profile and Water Conservation Plan Requirements for Municipal Use by Retail Public Water Suppliers*, TCEQ Form No. 10218, revised June 14, 2013, accessed online at http://www.tceq.texas.gov/assets/public/permitting/forms/10218.docx, June 2014..

(7) Texas Commission on Environmental Quality: *Water Conservation Implementation Report Public Water Supplier*, TCEQ Form No. 20646, revised September 18, 2013, accessed online at http://www.tceq.texas.gov/assets/public/permitting/watersupply/conservation/20646.docx, June 2014.

(8) Texas Water Development Board, *Water Conservation Plan Report – Retail Water Supplier*, TWDB Form No. 1966, revised August 13, 2013, accessed online at http://www.twdb.texas.gov/conservation/municipal/plans/doc/RWS_1966.pdf, June 2014.

(9) Texas Water Development Board: *Report 362 Water Conservation Best Management Practices Guide*, Austin, November 2004.

Appendix B

Texas Commission on Environmental Quality Rules on Municipal Water Conservation Plans

Texas Administrative Code

TITLE 30	ENVIRONMENTAL QUALITY
PART 1	TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
CHAPTER 288	WATER CONSERVATION PLANS, DROUGHT CONTINGENCY PLANS, GUIDELINES AND REQUIREMENTS
SUBCHAPTER A	WATER CONSERVATION PLANS
RULE §288.2	**Water Conservation Plans for Municipal Uses by Public Water Suppliers**

(a) A water conservation plan for municipal water use by public water suppliers must provide information in response to the following. If the plan does not provide information for each requirement, the public water supplier shall include in the plan an explanation of why the requirement is not applicable.

(1) Minimum requirements. All water conservation plans for municipal uses by public water suppliers must include the following elements:

(A) a utility profile in accordance with the Texas Water Use Methodology, including, but not limited to, information regarding population and customer data, water use data (including total gallons per capita per day (GPCD) and residential GPCD), water supply system data, and wastewater system data;

(B) a record management system which allows for the classification of water sales and uses into the most detailed level of water use data currently available to it, including, if possible, the sectors listed in clauses (i) - (vi) of this subparagraph. Any new billing system purchased by a public water supplier must be capable of reporting detailed water use data as described in clauses (i) - (vi) of this subparagraph:

(i) residential;
(I) single family;
(II) multi-family;
(ii) commercial;
(iii) institutional;
(iv) industrial;
(v) agricultural; and,
(vi) wholesale.

(C) specific, quantified five-year and ten-year targets for water savings to include goals for water loss programs and goals for municipal use in total GPCD and residential GPCD. The goals established by a public water supplier under this subparagraph are not enforceable;

(D) metering device(s), within an accuracy of plus or minus 5.0% in order to measure and account for the amount of water diverted from the source of supply;

(E) a program for universal metering of both customer and public uses of water, for meter testing and repair, and for periodic meter replacement;

(F) measures to determine and control water loss (for example, periodic visual inspections along distribution lines; annual or monthly audit of the water system to determine illegal connections; abandoned services; etc.);

(G) a program of continuing public education and information regarding water conservation;

(H) a water rate structure which is not "promotional," i.e., a rate structure which is cost-based and which does not encourage the excessive use of water;

(I) a reservoir systems operations plan, if applicable, providing for the coordinated operation of reservoirs owned by the applicant within a common watershed or river basin in order to optimize available water supplies; and

(J) a means of implementation and enforcement which shall be evidenced by:

(i) a copy of the ordinance, resolution, or tariff indicating official adoption of the water conservation plan by the water supplier; and

(ii) a description of the authority by which the water supplier will implement and enforce the conservation plan; and

(K) documentation of coordination with the regional water planning groups for the service area of the public water supplier in order to ensure consistency with the appropriate approved regional water plans.

(2) Additional content requirements. Water conservation plans for municipal uses by public drinking water suppliers serving a current population of 5,000 or more and/or a projected population of 5,000 or more within the next ten years subsequent to the effective date of the plan must include the following elements:

(A) a program of leak detection, repair, and water loss accounting for the water transmission, delivery, and distribution system;

(B) a requirement in every wholesale water supply contract entered into or renewed after official adoption of the plan (by either ordinance, resolution, or tariff), and including any contract extension, that each successive wholesale customer develop and implement a water conservation plan or water conservation measures using the applicable elements in this chapter. If the customer intends to resell the water, the contract between the initial supplier and customer must provide that the contract for the resale of the water must have water conservation requirements so that each successive customer in the resale of the water will be required to implement water conservation measures in accordance with the provisions of this chapter.

(3) Additional conservation strategies. Any combination of the following strategies shall be selected by the water supplier, in addition to the minimum requirements in paragraphs (1) and (2) of this subsection, if they are necessary to achieve the stated water conservation goals of the plan. The commission may require that any of the following strategies be implemented by the water supplier if the commission determines that the strategy is necessary to achieve the goals of the water conservation plan:

(A) conservation-oriented water rates and water rate structures such as uniform or increasing block rate schedules, and/or seasonal rates, but not flat rate or decreasing block rates;

(B) adoption of ordinances, plumbing codes, and/or rules requiring water-conserving plumbing fixtures to be installed in new structures and existing structures undergoing substantial modification or addition;

(C) a program for the replacement or retrofit of water-conserving plumbing fixtures in existing structures;

(D) reuse and/or recycling of wastewater and/or graywater;

(E) a program for pressure control and/or reduction in the distribution system and/or for customer connections;

(F) a program and/or ordinance(s) for landscape water management;

(G) a method for monitoring the effectiveness and efficiency of the water conservation plan; and

(H) any other water conservation practice, method, or technique which the water supplier shows to be appropriate for achieving the stated goal or goals of the water conservation plan.

(b) A water conservation plan prepared in accordance with 31 TAC §363.15 (relating to Required Water Conservation Plan) of the Texas Water Development Board and substantially meeting the requirements of this section and other applicable commission rules may be submitted to meet application requirements in accordance with a memorandum of understanding between the commission and the Texas Water Development Board.

(c) A public water supplier for municipal use shall review and update its water conservation plan, as appropriate, based on an assessment of previous five-year and ten-year targets and any other new or updated information. The public water supplier for municipal use shall review and update the next revision of its water conservation plan every five years to coincide with the regional water planning group.

Source Note: The provisions of this §288.2 adopted to be effective May 3, 1993, 18 TexReg 2558; amended to be effective February 21, 1999, 24 TexReg 949; amended to be effective April 27, 2000, 25 TexReg 3544; amended to be effective October 7, 2004, 29 TexReg 9384; amended to be effective December 6, 2012, 37 TexReg 9515

Appendix C

TCEQ Utility Profile

Texas Commission on Environmental Quality

UTILITY PROFILE AND WATER CONSERVATION PLAN REQUIREMENTS FOR MUNICIPAL WATER USE BY RETAIL PUBLIC WATER SUPPLIERS

This form is provided to assist retail public water suppliers in water conservation plan development. If you need assistance in completing this form or in developing your plan, please contact the conservation staff of the Resource Protection Team in the Water Availability Division at (512) 239-4691.

Name: Click to add text

Address: _____

Telephone Number: ( ) _____ Fax: ( ) _____

Water Right No.(s): _____

Regional Water Planning Group: _____

Form Completed by: _____

Title: _____

Person responsible for implementing conservation program: _____ Phone: ( ) _____

Signature: _____ Date: / / _____

NOTE: If the plan does not provide information for each requirement, include an explanation of why the requirement is not applicable.

UTILITY PROFILE

I. POPULATION AND CUSTOMER DATA

A. Population and Service Area Data

1. Attach a copy of your service-area map and, if applicable, a copy of your Certificate of Convenience and Necessity (CCN).

2. Service area size (in square miles):
   (Please attach a copy of service-area map)

3. Current population of service area:

4. Current population served for:
   Water _____
   Wastewater _____

5. Population served for previous five years:

Year	*Population*

6. Projected population for service area in the following decades:

Year	*Population*
2020	
2030	
2040	
2050	
2060	

7. List source or method for the calculation of current and projected population size.

B. Customers Data

Senate Bill 181 requires that uniform consistent methodologies for calculating water use and conservation be developed and available to retail water providers and certain other water use sectors as a guide for preparation of water use reports, water conservation plans, and reports on water conservation efforts. A water system must provide the most detailed level of customer and water use data available to it, however, any new billing system purchased must be capable of reporting data for each of the sectors listed below. http://www.tceq.texas.gov/assets/public/permitting/watersupply/water_rights/sb181_guidance.pdf

1. Current number of active connections. Check whether multi-family service is counted as ☐ Residential or ☐ Commercial?

Treated Water Users	*Metered*	*Non-Metered*	**Totals**
Residential			
Single-Family			
Multi-Family			
Commercial			
Industrial/Mining			
Institutional			
Agriculture			
Other/Wholesale			

2. List the number of new connections per year for most recent three years.

Year			
Treated Water Users			
Residential			
Single-Family			
Multi-Family			
Commercial			
Industrial/Mining			
Institutional			
Agriculture			
Other/Wholesale			

3. List of annual water use for the five highest volume customers.

Customer	*Use (1,000 gal/year)*	*Treated or Raw Water*
1.		
2.		
3.		
4.		
5.		

II. WATER USE DATA FOR SERVICE AREA

A. Water Accounting Data

1. List the amount of water use for the previous five years (in 1,000 gallons). Indicate whether this is ☐ diverted or ☐ treated water.

Year					
Month					
January					
February					
March					
April					
May					
June					
July					
August					
September					
October					
November					
December					
Totals					

Describe how the above figures were determine (e.g, from a master meter located at the point of a diversion from the source, or located at a point where raw water enters the treatment plant, or from water sales).

2. Amount of water (in 1,000 gallons) delivered/sold as recorded by the following account types for the past five years.

Year					
Account Types					
Residential					
Single-Family					
Multi-Family					
Commercial					
Industrial/Mining					
Institutional					
Agriculture					
Other/Wholesale					

3. List the previous records for water loss for the past five years (the difference between water diverted or treated and water delivered or sold).

Year	*Amount (gallons)*	*Percent %*

B. Projected Water Demands

If applicable, attach or cite projected water supply demands from the applicable Regional Water Planning Group for the next ten years using information such as population trends, historical water use, and economic growth in the service area over the next ten years and any additional water supply requirements from such growth.

III. WATER SUPPLY SYSTEM DATA

A. Water Supply Sources

List all current water supply sources and the amounts authorized (in acre feet) with each.

Water Type	*Source*	*Amount Authorized*
Surface Water		
Groundwater		
Contracts		
Other		

B. Treatment and Distribution System

1. Design daily capacity of system (MGD):

2. Storage capacity (MGD):
   a. Elevated _____
   b. Ground _____

3. If surface water, do you recycle filter backwash to the head of the plant?
   ☐ Yes ☐ No If yes, approximate amount (MGD):

IV. WASTEWATER SYSTEM DATA

A. *Wastewater System Data (if applicable)*

1. Design capacity of wastewater treatment plant(s) (MGD):

2. Treated effluent is used for ☐ on-site irrigation, ☐ off-site irrigation, for ☐ plant wash-down, and/or for ☐ chlorination/dechlorination.

   If yes, approximate amount (in gallons per month):

3. Briefly describe the wastewater system(s) of the area serviced by the water utility. Describe how treated wastewater is disposed. Where applicable, identify treatment plant(s) with the TCEQ name and number, the operator, owner, and the receiving stream if wastewater is discharged.

B. *Wastewater Data for Service Area (if applicable)*

1. Percent of water service area served by wastewater system: _____%

2. Monthly volume treated for previous five years (in 1,000 gallons):

Year					
Month					
January					
February					
March					
April					
May					
June					
July					
August					
September					
October					
November					
December					
Totals					

Appendix D

TCEQ Water Conservation Implementation Report

Texas Commission on Environmental Quality

Water Conservation Implementation Report

Public Water Supplier

This five year report must be completed by entities that are required to submit a water conservation plan to the TCEQ in accordance with Title 30 Texas Administrative Code, Chapter 288. Please complete this report and submit it to the TCEQ. If you need assistance in completing this form, please contact the Resource Protection Team in the Water Availability Division at (512) 239-4691.

CONTACT INFORMATION

Name of Entity:

Public Water Supply Identification Number (PWS ID):Click here to enter text.
CCN numbers: Click here to enter text.
Water Right Permit numbers: Click here to enter text.
Wastewater ID numbers: Click here to enter text.

Check all that apply:

- ☐ Retail Public Water Supplier
- ☐ Wholesale Public Water Supplier

Address: Click here to enter text. City: Click here to enter text. Zip Code: Click here to enter text.

Email: Click here to enter text. Telephone Number: Click here to enter text.

Regional Water Planning Group: Click here to enter text.Map

Groundwater Conservation District: Click here to enter text.Map

Form Completed By: Click here to enter text. Title: Click here to enter text.

Signature: _____ Date: Click here to enter a date.

Contact information for the person or department responsible for implementing the water conservation plan:

Name: Click here to enter text. Phone: Click here to enter text. Email: Click here to enter text.

Report Completed on Date: Click here to enter a date.

Reporting Period (**check only one**):

☐ Fiscal Period Begin:Click here to enter a date. Period End: Click here to enter a date.
☐ Calendar Period Begin:Click here to enter a date. Period End: Click here to enter a date.

Please check all of the following that apply to your entity:

☐ A surface water right holder of 1,000 acre-feet/year or more for non-irrigation uses
☐ A surface water right holder of 10,000 acre-feet/year or more for irrigation uses

Important

If your entity meets the following description, please skip page 3 and go directly to page 4.

Your entity is a Wholesale Public Water Supplier that ONLY provides wholesale water services for public consumption. For example, you only provide wholesale water to other municipalities or water districts.

Water Use Accounting

Retail Water Sold: *All retail water sold for public use and human consumption.*

Helpful Hints: There are two options available for you to provide the requested information. Both options ask the same information; however, the level of detail and break down of information differs between the two options. Please select just one option that works best for your entity and fill in the fields as completely as possible.

Fields that are gray are entered by the user. Select fields that are white and press F9 to updated fields.

For the five-year reporting period, enter the gallons of **RETAIL water sold** in each major water use category. Use **only one** of the following options.

Option 1

Water Use Category*	Gallons Sold
Single Family Residential	
Multi-Family Residential	
TOTAL Residential Use[1]	0
Industrial	
Commercial	
Institutional	
TOTAL Retail Water Sold[2]	0

1. [SF Res +MF Res = Residential Use]
2. [Res +Ind +Com +Ins = Retail Water Sold]

Option 2

Water Use Category *	Gallons Sold
Residential Select all of the sectors that your account for as "Residential". ☐Single Family ☐ Multi-Family	
Commercial Please select all of the sectors that your account for as "Commercial". ☐ Commercial ☐ Multi-Family ☐ Industrial ☐ Institutional	
Industrial Please select all of the sectors that your account for as "Industrial". ☐Industrial ☐ Commercial ☐ Institutional	
Other Please select all of the sectors that your account for as "Other". ☐Commercial ☐Multi-Family ☐ Industrial ☐ Institutional	
TOTAL Retail Water Sold[1]	0.00

1. [Res +Com +Ind + Other = Retail Water Sold]

Wholesale Water Exported: *Wholesale water sold or transferred out of the distribution system.*

For the five-year reporting period, enter the gallons of **WHOLESALE water exported** to each major water use category.

Water Use Category*	**Gallons of Exported Wholesale Water**
Municipal Customers	
Agricultural Customers	
Industrial Customers	
Commercial Customers	
Institutional Customers	
TOTAL Wholesale Water Exported [1]	**0.00**

1. [Mun +Agr +Ind +Com +Ins = Wholesale Water Exported]

System Data

Fields that are gray are entered by the user. Select fields that are white and hit F9 to updated fields.

	Total Gallons During the Five-Year Reporting Period
Water Produced: Volume produced from own sources	
Wholesale Water Imported : Purchased wholesale water imported from other sources into the distribution system	
Wholesale Water Exported: Wholesale water sold or transferred out of the distribution system (Insert Total Volume calculated on Page 4)	
TOTAL System Input : Total water supplied to the infrastructure	0.00 [Produced + Imported – Exported = System Input]
Retail Water Sold : All retail water sold for public use and human consumption (Insert Total Residential Use from Option 1 or Option 2 calculated on Page 3)	
Other Consumption Authorized for Use but not Sold: - back flushing water - line flushing - storage tank cleaning - golf courses - fire department use - parks - municipal government offices	
TOTAL Authorized Water Use: All water that has been authorized for use or consumption.	0.00 [Retail Water Sold + Other Consumption = Total Authorized]
Apparent Losses – Water that has been consumed but not properly measured (Includes customer meter accuracy, systematic data discrepancy, un- authorized consumption such as theft)	
Real Losses – Physical losses from the distribution system prior to reaching the customer destination (Includes physical losses from system or mains, reported breaks and leaks, storage overflow)	
Unidentified Water Losses	0.00 [System Input- Total Authorized - Apparent Losses - Real Losses = Unidentified Water Losses]
TOTAL Water Loss	0.00 [Apparent + Real + Unidentified = Total Water Loss]

Targets and Goals

In the table below, please provide the **specific and quantified five and ten-year targets for water savings** listed in your water conservation plan.

Fields that are gray are entered by the user. Select fields that are white and hit F9 to update fields.

Date	Target for: Total GPCD	Target for: Water Loss (expressed in GPCD)	Target for: Water Loss Percentage (expressed in Percentage)
Five-year target date: dd/mm/yyyy			%
Ten-year target date: dd/mm/yyyy			%

Are targets in the water conservation plan being met? Yes ☐ No ☐

If these targets are not being met, provide an explanation as to why, including any progress on these targets: Click here to enter text.

Gallons per Capita per Day (GPCD) and Water Loss

Compare your current gpcd and water loss to the above targets and goals set in your previous water conservation plan.

Total System Input in Gallons	Permanent Population	Current GPCD
[Produced + Imported – Exported = System Input]		[(System Input ÷ Permanent Population) /5/ 365]

Permanent Population is the total permanent population of the service area. This includes single family, multi-family, and group quarter populations.

Total Residential Use	Permanent Population	Residential GPCD
		[(Residential Use ÷ Residential Population) / 5/ 365]

Residential Population is the total residential population of the service area including single & multi-family population.

Total Water Loss	Total System Input in Gallons	Permanent Population	Water Loss calculated in	
			GPCD [1]	Percent [2]
[Apparent + Real + Unidentified = Total Water Loss]	[Water Produced + Wholesale Imported - Wholesale Exported]			

1. [Total Water Loss ÷ Permanent Population] / 5/ 365 = Water Loss GPCD]
2. [Total Water Loss ÷ Total System Input] x 100 = Water Loss Percentage]

Water Conservation Programs and Activities

As you complete this section, please review your water conservation plan to see if you are making progress towards meeting your stated goals.

Fields that are gray are entered by the user. Select fields that are white and hit F9 to updated fields.

1. Water Conservation Plan

What year did your entity adopt, or revise, their most recent water conservation plan: Click here to enter text.

Does the plan incorporate Best Management Practices? Yes ☐ No ☐

2. Water Conservation Programs

For the reporting period, please select the types of activities and programs that have been actively administered, and estimate the expense and savings that incurred in implementing the conservation activities and programs for the past five years. Leave the field blank if unknown:

Program or Activity	Estimated Expenses	Estimated Gallons Saved
Conservation Analysis & Planning		
☐ Conservation Coordinator		
☐ Water Survey for Single-Family and Multi-Family Customers		
Financial		
☐ Wholesale Agency Assistance Programs		
☐ Water Conservation Pricing/ Rate Structures		
System Operations		
☐ Water Loss Audits		
☐ Leak Detection		
☐ Universal Metering and Metering Repair		
Landscaping		
☐ Landscape Irrigation Conservation and		

Incentives		
☐ Athletic Fields Conservation		
☐ Golf Course Conservation		
☐ Park Conservation		
Education & Public Awareness		
☐ School Education		
☐ Public Information		
Rebate, Retrofit, and Incentive Programs		
☐ Conservation Programs for ICI Accounts		
☐ Residential Clothes Washer Incentive Program		
☐ Water Wise Landscape Design and Conversion Programs		
☐ Showerhead, Aerator, and Toilet Flapper Retrofit		
☐ Residential Toilet Replacement Programs		
☐ Rainwater Harvesting Incentive Program		
☐ ICI Incentive Programs		
Conservation Technology		
☐ Recycling and Reuse Programs (Water or Wastewater Effluent)		
☐ Rainwater Harvesting and Condensate Reuse Programs		
Regulatory and Enforcement		
☐ Prohibition on Wasting Water		
TOTAL	$ 0.00	0

3. Reuse (Water or Wastewater Effluent)

For the reporting period, please provide the following data regarding the types of direct and indirect reuse activities that were administered for the past five years:

Reuse Activity	Estimated Volume (in gallons)
On-site irrigation	
Plant wash down	
Chlorination/de-chlorination	
Industrial	
Landscape irrigation (parks, golf courses)	
Agricultural	
Other, please describe:	
Estimated Volume of Recycled or Reuse	0

4. Water Savings

For the five-year reporting period, estimate the total savings that resulted from your overall water conservation activities and programs?

Estimated Gallons Saved (Total from Conservation Programs Table)	**Estimated Gallons Recycled or Reused** (Total from Reuse Table)	**Total Volume of Water Saved** [1]	**Dollar Value of Water Saved** [2]
		0	

1. [Estimated Gallons Saved + Estimated Gallons Recycled or Reused = Total Volume Saved]
2. Estimate this value by taking into account water savings, the cost of treatment or purchase of your water, and any deferred capital costs due to conservation.

5. Conservation Pricing / Conservation Rate Structures

During the five-year reporting period, have your rates or rate structure changed? Yes ☐ No ☐

Please indicate the type of rate pricing structures that you use:

☐ Uniform rates	☐ Water Budget Based rates	☐ Surcharge - seasonal
☐ Flat rates	☐ Excess Use Rates	☐ Surcharge - drought
☐ Inclining/ Inverted Block	☐ Drought Demand rates	☐ Surcharge - usage demand
☐ Declining Block rates	☐ Tailored rates	
☐ Seasonal rates		

6. Public Awareness and Education Program

For the five-year reporting period, please check the appropriate boxes regarding any public awareness and educational activities that your entity has provided:

	Implemented	**Number/Unit**
Example: Brochures Distributed	☐	*10,000/year*
Example: Educational School Programs	☐	*50 students/month*
Brochures Distributed	☐	
Messages Provided on Utility Bills	☐	
Press Releases	☐	
TV Public Service Announcements	☐	
Radio Public Service Announcements	☐	
Educational School Programs	☐	
Displays, Exhibits, and Presentations	☐	
Community Events	☐	

Social Media campaigns	☐	
Facility Tours	☐	
Other :	☐	

7. Leak Detection

During the five-year reporting period, how many leaks were repaired in the system or at service connections: Click here to enter text.

Please check the appropriate boxes regarding the main cause of water loss in your system during the reporting period:

- ☐ Leaks and breaks
- ☐ Un-metered utility or city uses
- ☐ Master meter problems
- ☐ Customer meter problems
- ☐ Record and data problems
- ☐ Other: Click here to enter text.
- ☐ Other: Click here to enter text.

8. Universal Metering and Meter Repair

For the five-year reporting period, please provide the following information regarding meter repair:

	Total Number	Total Tested	Total Repaired
Production Meters			
Meters larger than 1 ½"			
Meters 1 ½ or smaller			

Does your system have automated meter reading? Yes ☐ No ☐

9. Conservation Communication Effectiveness

In your opinion, how would you rank the effectiveness of your conservation activities in reaching the following types of customers for the past five years?

	Do not have activities or programs that target this type customer.	Less Than Effective	Somewhat Effective	Highly Effective
Residential Customers	☐	☐	☐	☐
Industrial Customers	☐	☐	☐	☐
Institutional Customers	☐	☐	☐	☐
Commercial Customers	☐	☐	☐	☐
Agricultural Customers	☐	☐	☐	☐

10. Drought Contingency and Emergency Water Demand Management

During the five-year reporting period, did you implement your Drought Contingency Plan?

Yes ☐ No ☐

If yes, indicate the number of days that your water use restrictions were in effect: Click here to enter text.

If yes, please check all the appropriate reasons for your drought contingency efforts going into effect.

☐ Water Supply Shortage	☐ Equipment Failure
☐ High Seasonal Demand	☐ Impaired Infrastructure
☐ Capacity Issues	☐ Other:

If you have any questions on how to fill out this form or about the Water Conservation program, please contact us at 512/239-4691.

Individuals are entitled to request and review their personal information that the agency gathers on its forms. They may also have any errors in their information corrected. To review such information, contact us at 512-239-3282.

Appendix E

TWDB Annual Water Conservation Report

Water Conservation Plan Annual Report
Retail Water Supplier

CONTACT INFORMATION

Name of Entity: _____

Public Water Supply Identification Number (PWS ID): _____

Certificate of Convenience and Necessity (CCN) Number: _____

Surface Water Rights ID Number: _____

Wastewater ID Number: _____

Check all that apply:

☐ Retail Water Supplier

☐ Wholesale Water Supplier

☐ Wastewater Treatment Utility

Address: _____ City: _____ Zip Code: _____

Email: _____ Telephone Number: _____

Regional Water Planning Group: _____ Map

Groundwater Conservation District: _____ Map

Form Completed By: _____ Title: _____

Date:

Reporting Period (**check only one**):

○ Fiscal Period Begin (mm/yyyy) Period End (mm/yyyy)

○ Calendar Period Begin (mm/yyyy) Period End (mm/yyyy)

Check all of the following that apply to your entity:

☐ Receive financial assistance of $500,000 or more from TWDB

☐ Have 3,300 or more retail connections

☐ Have a water right with TCEQ

SYSTEM DATA

Retail Customer Categories*

- Residential Single Family
- Residential Multi-family
- Industrial
- Commercial
- Institutional
- Agricultural

**Recommended Customer Categories for classifying your customer water use. For definitions, refer to Guidance and Methodology on Water Conservation and Water Use.*

1. For this reporting period, select the category(s) used to classify customer water use:

☐ Residential Single Family ☐ Commercial
☐ Residential Multi-family ☐ Institutional
☐ Industrial ☐ Agricultural

2. For this reporting period, enter the gallons of **metered retail water** used by each customer category. If the Customer Category does not apply, enter zero or leave blank.

Retail Customer Category	Number of Connections	Gallons Metered
Residential Single Family		
Residential Multi-family		
Industrial		
Commercial		
Institutional		
Agricultural		
Total Retail Water Metered[1]	0	0

1. Residential + Industrial + Commercial + Institutional + Agricultural = Total Retail Water Metered

Water Use Accounting

	Total Gallons During the Reporting Period
Water Produced: Water from permitted sources such as rivers, lakes, streams, and wells. *Same as line 14 of the water loss audit.*	
Wholesale Water Imported: Purchased wholesale water transferred into the system. *Same as line 15 of the water loss audit.*	
Wholesale Water Exported: Wholesale water sold or transferred out of the system. *Same as line 16 of the water loss audit.*	
System Input: Total water supplied to system and available for retail use.	0 Produced + Imported – Exported = System Input
Total Retail Water Metered	0
Other Authorized Consumption: Water that is authorized for other uses such as the following: This water may be metered or unmetered. *Same as the total of lines 19, 20, and 21 of the water loss audit.* - back flushing - line flushing - storage tank cleaning - municipal golf courses/parks C. fire department use D. municipal government offices	
Total Authorized Use: All water that has been authorized for use.	0 Total Retail Water + Other Authorized Consumption = Total Authorized Use
Apparent Losses: Water that has been consumed but not properly measured or billed. *Same as line 28 of the water loss audit.* (*Includes losses due to customer meter accuracy, systematic data discrepancy, unauthorized consumption such as theft*)	
Real Losses: Physical losses from the distribution system prior to reaching the customer destination. *Same as line 29 of the water loss audit.* (*Includes physical losses from system or mains, reported breaks and leaks, or storage overflow*)	
Unidentified Water Losses: Unreported losses not known or quantified.	0 System Input - Total Authorized Use - Apparent Losses - Real Losses = Unidentified Water Losses
Total Water Loss	0 Apparent + Real + Unidentified = Total Water Loss

Targets and Goals

Provide the **specific and quantified five and ten-year targets** as listed in your current Water Conservation Plan. Target dates and numbers should match your current Water Conservation Plan.

Achieve Date	Target for Total GPCD	Target for Water Loss (expressed in GPCD)	Target for Water Loss Percentage (expressed in percentage)
Five-year target date: _____			
Ten-year target date: _____			

Gallons Per Capita per Day (GPCD) and Water Loss

Provide current GPCD and water loss totals. To see if you are making progress towards your stated goals, compare these totals to the above targets and goals. Provide the population and residential water use of your service area.

Total System Input in Gallons	Permanent Population[1]	Total GPCD
0 Water Produced + Wholesale Imported - Wholesale Exported		(System Input ÷ Permanent Population) ÷ 365

1. Permanent Population is the total permanent population of the service area, including single family, multi-family, and group quarter populations.

Residential Use in Gallons (Single Family + Multi-family)	Residential Population[1]	Residential GPCD
		(Residential Use ÷ Residential Population) ÷ 365

1. Residential Population is the total residential population of the service area, including only single family and multi-family populations.

Total Water Loss	Permanent Population	Water Loss GPCD[1]	Water Loss Percent[2]
0 Apparent + Real + Unidentified = Total Water Loss			0%

1. (Total Water Loss ÷ Permanent Population) ÷ 365 = Water Loss GPCD
2. (Total Water Loss ÷ Total System Input) x 100 = Water Loss Percentage

Water Conservation Programs and Activities

As you complete this section, review your utility's water conservation plan to see if you are making progress towards meeting your stated goals.

1. What year did your entity adopt or revise the most recent Water Conservation Plan? _____

2. Does the Plan incorporate Best Management Practices? ○ Yes ○ No

3. Using the table below select the types of Best Management Practices or water conservation strategies actively administered during this reporting period and estimate the savings incurred in implementing water conservation activities and programs. Leave fields blank if unknown.

Methods and techniques for determining gallons saved are unique to each utility as they conduct internal effective cost analyses and long-term financial planning. Texas Best Management Practices can be found at TWDB's Water Conservation Best Management Practices webpage. The Alliance for Water Efficiency Water Conservation Tracking Tool may offer guidance on determining and calculating savings for individual BMPs.

Best Management Practice	Check if Implemented	Estimated Gallons Saved
Conservation Analysis and Planning		
Conservation Coordinator	☐	
Cost Effective Analysis	☐	
Water Survey for Single Family and Multi-family Customers	☐	
Financial		
Wholesale Agency Assistance Programs	☐	
Water Conservation Pricing	☐	
System Operations		
Metering New Connections and Retrofitting Existing Connections	☐	
System Water Audit and Loss Control	☐	
Landscaping		
Landscape Irrigation Conservation and Incentives	☐	
Athletic Fields Conservation	☐	
Golf Course Conservation	☐	
Park Conservation	☐	
Education and Public Awareness		
School Education	☐	
Public Information	☐	
Rebate, Retrofit, and Incentive Programs		
Conservation Programs for ICI Accounts	☐	
Residential Clothes Washer Incentive Program	☐	
Water Wise Landscape Design and Conversion Programs	☐	

Showerhead, Aerator, and Toilet Flapper Retrofit	☐	
Residential Toilet Replacement Programs	☐	
ICI Incentive Programs	☐	
Conservation Technology		
Water Reuse	☐	
New Construction Graywater	☐	
Rainwater Harvesting and Condensate Reuse	☐	
Regulatory and Enforcement		
Prohibition on Wasting Water	☐	
Other, please describe:		
Total Gallons of Water Saved		0

4. For this reporting period, provide the estimated gallons of direct or indirect reuse activities.

Reuse Activity	Estimated Volume (in gallons)
On-site irrigation	
Plant wash down	
Chlorination/de-chlorination	
Industrial	
Landscape irrigation (parks, golf courses)	
Agricultural	
Other, please describe:	
Total Volume of Reuse	0

5. For this reporting period, estimate the savings from water conservation activities and programs.

Gallons Saved/Conserved	Gallons Recycled/Reused	Total Volume of Water Saved[1]	Dollar Value of Water Saved[2]
	0	0	

1. Estimated Gallons Saved/Conserved + Estimated Gallons Recycled/Reused = Total Volume Saved
2. Estimate this value by taking into account water savings, the cost of treatment or purchase of water, and deferred capital costs due to conservation.

6. During this reporting period, did your rates or rate structure change? ○ Yes ○ No

Select the type of rate pricing structures used. Check all that apply.

☐	Uniform Rates	☐	Water Budget Based Rates	☐	Surcharge - seasonal
☐	Flat Rates	☐	Excess Use Rates	☐	Surcharge - drought
☐	Inclining/Inverted Block Rates	☐	Drought Demand Rates		Other, please describe:
☐	Declining Block Rates	☐	Tailored Rates		
☐	Seasonal Rates	☐	Surcharge - usage demand		

7. For this reporting period, select the public awareness or educational activities used.

	Implemented	Number/Unit
Example: Brochures Distributed	√	*10,000/year*
Example: Educational School Programs	√	*50 students/month*
Brochures Distributed	☐	_____
Messages Provided on Utility Bills	☐	_____
Press Releases	☐	_____
TV Public Service Announcements	☐	_____
Radio Public Service Announcements	☐	_____
Educational School Programs	☐	_____
Displays, Exhibits, and Presentations	☐	_____
Community Events	☐	_____
Social Media campaigns	☐	_____
Facility Tours	☐	_____
Other :	☐	_____

Leak Detection and Water Loss

1. During this reporting period, how many leaks were repaired in the system or at service connections? _____

   Select the main cause(s) of water loss in your system.

   ☐ Leaks and breaks
   ☐ Un-metered utility or city uses
   ☐ Master meter problems
   ☐ Customer meter problems
   ☐ Record and data problems
   ☐ Other: _____
   ☐ Other: _____

2. For this reporting period, provide the following information regarding meter repair:

Type of Meter	Total Number	Total Tested	Total Repaired	Total Replaced
Production Meters				
Meters larger than 1 ½"				
Meters 1 ½ or smaller				

3. Does your system have automated meter reading? ○ Yes ○ No

Program Effectiveness and Drought

1. In your opinion, how would you rank the effectiveness of your conservation activities?

Customer Classification	Less Than Effective	Somewhat Effective	Highly Effective	Does Not Apply
Residential Customers	○	○	○	○
Industrial Customers	○	○	○	○
Institutional Customers	○	○	○	○
Commercial Customers	○	○	○	○
Agricultural Customers	○	○	○	○

2. During the reporting period, did you implement your Drought Contingency Plan?

○ Yes ○ No

If yes, how many days were water use restrictions in effect? _____

If yes, check the reason(s) for implementing your Drought Contingency Plan.

☐ Water Supply Shortage
☐ High Seasonal Demand
☐ Capacity Issues
☐ Equipment Failure
☐ Impaired Infrastructure
☐ Other:

3. Select the areas for which you would like to receive more technical assistance:

☐ Best Management Practices
☐ Drought Contingency Plans
☐ Landscape Irrigation
☐ Leak Detection and Equipment
☐ Rainwater Harvesting
☐ Rate Structures
☐ Educational Resources
☐ Water Conservation Annual Reports
☐ Water Conservation Plans
☐ Water IQ: Know Your Water
☐ Water Loss Audits
☐ Recycling and Reuse

Appendix F

City Council Resolution Adopting Plan

[Insert copy of City Council Resolution adopting the Water Conservation Plan.]

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Appendix 5C-B

Model Water Conservation Plan for Industrial Entities

This appendix includes a Model Water Conservation Plan for Industrial water users in the ETRWPA. The model plan addresses the latest Texas Commission on Environment Quality requirements and is intended to be modified by each user to best reflect the activities appropriate to the entity. The model plan also includes sample appendices required:

- Appendix A – List of References
- Appendix B – Texas Commission on Environmental Quality Rules on Water Conservation Plans for Industrial or Mining Use
- Appendix C – Water Conservation Implementation Report

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Water Conservation Plan for [Industrial Entity]

Date

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1. Objectives
2. Description of Water Use
3. Specification of Water Conservation Goals
4. Metering of Industrial and Mining Water Users
5. Leak Detection and Repair and Water Loss Accounting
6. Improving, Modifying, and Auditing Processes and Equipment
7. Other Water Conservation Methods, Practices, or Techniques
8. Implementation and Modifications to Water Conservation Plan

APPENDICES

Appendix A List of References

Appendix B Texas Commission on Environmental Quality Rules on Water Conservation Plans for Industrial or Mining Use

Appendix C Water Conservation Implementation Report

Water Conservation Plan for [Industrial Entity]

1. Objectives

The Texas Commission on Environmental Quality has developed guidelines and requirements governing the development of water conservation plans for industrial or mining use in Title 30, Part 1, Chapter 288, Subchapter A, Rule 288.4 of the Texas Administrative Code (TAC). The minimum requirements are:

TAC Reference	Subject	Plan Location
30 TAC §288.3(a)(1)	Water Use in the Production Process	Section 2
30 TAC §288.3(a)(2)	Water Conservation Goals	Section 3
30 TAC §288.3(a)(3)	Accurate Metering	Section 4
30 TAC §288.3(a)(4)	Leak Detection, Repair, and Water Loss Accounting	Section 5
30 TAC §288.3(a)(5)	Water Use Efficiency Process and/or Equipment Upgrades	Section 6
30 TAC §288.3(a)(6)	Other Conservation Practices	Section 7
30 TAC §288.3(b)	Review and Update of Plan	Section 8
30 TAC §288.30(1)	Water Conservation Implementation Report	Section 8

The purpose of this water conservation plan is to:

- To reduce water consumption from the levels that would exist without conservation efforts.
- To reduce the loss and waste of water.
- To encourage improvement of processes that inefficiently consume water.
- To extend the life of current supplies by reducing the rate of growth in demand.
- To document the level of recycling and reuse in the water supply.

This water conservation plan is intended to serve as a guide to [entity]. The following plan includes all conservation measures required by TCEQ.

2. Description of Water Use

The TCEQ requires that each mining or industrial water user must document how water is used in the production process.

- *[Entity provides information including:*
  - *How water is diverted and transported from the source(s) of supply*
  - *How water is utilized in the production process*
  - *How much water is consumed in the production process and not available for reuse, discharge, or other means of disposal]*

3. Specification of Water Conservation Goals

The TCEQ regulations require that each industrial and mining user adopt quantifiable water conservation goals in their water conservation plan. *[Entity]* has specified a five-year and ten-year target for water savings. *[Include quantifiable water savings targets and the details of the basis for the development of these goals. The goals established by industrial or mining water users under this paragraph are not enforceable.]*

The goals for this water conservation plan include the following:

- *[Name goals.] Potential goals are:*
  - *Meter water use to decrease water loss through leaks*
  - *Regularly inspect systems for leaks and promptly repair in order to control unaccounted water*
  - *Improve, modify, or audit processes in order to increase efficient water use*

4. Metering of Industrial and Mining Water Users

[Entity]'s water use is metered at [description of location]. Submetering is a good strategy for some industrial water users. Processes or equipment that consume large quantities of water could

be usefully submetered. Submetering is an effective way to account for all water use by process, subprocess, or piece of equipment in a facility.

[Identify processes and/or equipment that are currently submetered. This section must include a description of the device(s) and/or method(s) within an accuracy of plus or minus five percent to be used to measure and account for the amount of water diverted from the source of supply.]

5. Leak Detection and Repair and Water Loss Accounting

[Describe leak-detection, repair, and accounting for water loss in the water distribution system.]

Careful metering of water use, detection, and repair of leaks in the distribution system and regular monitoring of water loss are important in controlling losses.

Water loss can be attributed to several things including:

- Inaccuracies in meters. Older meters tend to run slowly and therefore under-report actual use.
- Loss due to leaks and main breaks in the system.
- [Other].

In order to control water loss, personnel are asked to watch for and report water main breaks and leaks. Broken and leaking lines should be replaced or repaired in a timely manner.

[Entity] will implement and maintain a water loss program. This program will serve to reduce losses due to leakage. The measures of the water loss program include *[select applicable measure]*:

- Conducting regular inspections of aboveground piping and pump packing.
- Logging flowmeter readings on a daily basis.

- Metering individual pressure zones
- Controlling pressure just above the minimum standard-of-service level
- Limiting surges in pressure.
- [Other]

6. Improving, Modifying, and Auditing Processes and Equipment

[Entity] can increase water efficiency by improving, modifying, and auditing facility processes and equipment. Water can be conserved through the following measures *[select appropriate measure]*:

- Implementing a Water Waste Reduction Program
- Optimizing the water-use efficiency of cooling systems (other than cooling towers)
- Reducing water loss in cooling towers

Water Waste Reduction Programs cause [Entity] personnel to be more aware of wasteful activities. Measures resulting from a Water Waste Reduction Program include:

- Install water saving devices on equipment.
- Replace current equipment with more water-efficient equipment.
- Recycle water within a process.
- Change to waterless equipment or process.

7. Other Water Conservation Methods, Practices, or Techniques

[This section must include any other water conservation practice, method, or technique which the user shows to be appropriate for achieving the stated goal(s) of the water conservation plan.

Other sections emphasize process water usage, equipment upgrades, and process modifications. This section should report on proposed conservation practices, methods, or techniques that address other water uses, such as domestic water use, housekeeping water use, and landscape irrigation. Potential

conservation methods include retrofit of water-efficient toilets, showerheads, and faucet aerators; water-wise landscaping; employee education; and other methods.]

8. Implementation and Modifications to Water Conservation Plan

Upon implementation of this water conservation plan, [Entity] will update the plan at least every five years. New goals will be based on previous five-year and ten-year goals and any new information.

[Entity] has prepared a water conservation implementation report that details its water conservation efforts and achievements. The implementation report is included in Appendix C. This report includes:

- The list of dates and descriptions of conservation measures implemented
- Amount of water saved
- Data about whether or not targets in the plan are met
- If targets are not met, an explanation as to why the target was not met and a discussion of the progress to meet the target.

Appendix A

List of References

APPENDIX A

List of References

Title 30 of the Texas Administrative Code, Part 1, Chapter 288, Subchapter B, Rule 288.3, downloaded from http://www.sos.state.tx.us/tac, Effective December 6, 2012.

Texas Commission on Environmental Quality, *Water Conservation Implementation Report Non Public Water Supplier*, TCEQ Form No. 20645, Revised September 18, 2013.

Appendix B

Texas Commission on Environmental Quality
Rules on Water Conservation Plans for
Industrial or Mining Use

SUBCHAPTER A: WATER CONSERVATION PLANS
§§288.1 - 288.7
Effective December 6, 2012

§288.3. Water Conservation Plans for Industrial or Mining Use.

(a) A water conservation plan for industrial or mining uses of water must provide information in response to each of the following elements. If the plan does not provide information for each requirement, the industrial or mining water user shall include in the plan an explanation of why the requirement is not applicable.

(1) a description of the use of the water in the production process, including how the water is diverted and transported from the source(s) of supply, how the water is utilized in the production process, and the estimated quantity of water consumed in the production process and therefore unavailable for reuse, discharge, or other means of disposal;

(2) specific, quantified five-year and ten-year targets for water savings and the basis for the development of such goals. The goals established by industrial or mining water users under this paragraph are not enforceable;

(3) a description of the device(s) and/or method(s) within an accuracy of plus or minus 5.0% to be used in order to measure and account for the amount of water diverted from the source of supply;

(4) leak-detection, repair, and accounting for water loss in the water distribution system;

(5) application of state-of-the-art equipment and/or process modifications to improve water use efficiency; and

(6) any other water conservation practice, method, or technique which the user shows to be appropriate for achieving the stated goal or goals of the water conservation plan.

(b) An industrial or mining water user shall review and update its water conservation plan, as appropriate, based on an assessment of previous five-year and ten-year targets and any other new or updated information. The industrial or mining water user shall review and update the next revision of its water conservation plan every five years to coincide with the regional water planning group.

Adopted November 14, 2012 Effective December 6, 2012

Appendix C

Water Conservation Implementation Report

Texas Commission on Environmental Quality

Water Conservation Implementation Report

Non Public Water Supplier

This report must be completed by entities that are required to submit a water conservation plan to the TCEQ in accordance with Title 30 Texas Administrative Code, Chapter 288. Please complete this report and submit it to the TCEQ. If you need assistance in completing this form, please contact the Resource Protection Team in the Water Availability Division at (512) 239-4691.

CONTACT INFORMATION

Name of Entity: Click here to enter text.

Water Rights Permit numbers: Click here to enter text.

Address: Click here to enter text. City: Click here to enter text.

Zip Code: Click here to enter text.

Email: Click here to enter text. Telephone Number: Click here to enter text.

Regional Water Planning Group: _____Map

Groundwater Conservation District: _____Map

Form Completed By: Click here to enter text. Title: Click here to enter text.

Signature: _____ Date: Click here to enter a date.

Contact information for the person or department responsible for implementing the water conservation plan:

Name: Click here to enter text. Phone: Click here to enter text. Email: Click here to enter text.

Report Completed on Date: dd/mm/yyyy

Reporting Period (**check only one**):

☐ Fiscal Period Begin dd/mm/yyyy Period End dd/mm/yyyy

☐ Calendar Period Begin dd/mm/yyyy Period End dd/mm/yyyy

Please check all of the following that apply to your entity:

☐ An entity that has a non-irrigation surface water right greater than 1,000 acre-feet/year

☐ An entity that has an irrigation surface water right greater than 10,000 acre-feet/year

System Data

Fields that are gray are entered by the user. Highlight the 0's that are in white and press F9 to populate these fields.

	Total Gallons During the Reporting Period.
Water Produced: Volume produced from own sources	
Wholesale Water Imported : Purchased wholesale water imported from other sources into the distribution system	
TOTAL System Input : Total water input into the system	0 [Produced + Imported = System Input]
TOTAL System Output : Water used, sold, exported or transferred out of the system	
TOTAL Authorized Water Use: All water that has been authorized for use or consumption.	0 [System Output ÷ 365 = Average Gallons per day]

In the table below please provide the **specific and quantified five and ten-year targets for water savings** as listed in your most current water conservation plan.

Date	**Target for: Water Savings**	**Target for: Water Loss**
Five-year target date: dd/mm/yyyy		
Ten-year target date: dd/mm/yyyy		

Are targets in the water conservation plan being met? Yes ☐ No ☐

If these targets are not being met, provide an explanation as to why, including any progress on these targets. Click here to enter text.

Water Conservation Programs and Activities

Fields that are gray are entered by the user. Highlight the 0's that are in white and press F9 to populate these fields.

As you complete this section, please review your entity's water conservation plan to see if you are making progress towards meeting your stated goals.

1. Water Conservation Plan

What year did your entity adopt, or revise, their most recent water conservation plan?
Click here to enter a date.

Does the plan incorporate Best Management Practices? Yes ☐ No ☐

2. Water Conservation Programs

Has your entity implemented any type of water conservation activities or programs?
Yes ☐ No ☐

If yes: For this reporting period, please select the types of activities and programs that your entity actively administered and estimated volume of water conserved.

Agricultural Activities and Practices	**Estimated Volume (in gallons)**
☐ Irrigation Audit	
☐ Information Gathering and Education Practices	
☐ Cropping and Management Practices	
☐ Scheduling Practices	
☐ Land Management Systems	
☐ On-Farm Water Delivery Systems	
☐ Water District Delivery Systems	
Industrial Activities and Practices	
☐ Industrial Water Audit	
☐ Conservation Analysis and Planning	
☐ Education Practices	
☐ System Operations	
☐ Cooling System Management	
☐ Landscaping	
☐ Sector Specific Practices	
Estimated Volume of Water Conserved	0

Other Activities? Please list or describe: Click here to enter text.

3. Reuse (Water or Wastewater Effluent)

Fields that are gray are entered by the user. Highlight the 0's that are in white and press F9 to populate these fields.

For this reporting period, please provide the following data regarding the types of direct and indirect reuse activities that were administered:

Reuse Activity	Estimated Volume (in gallons)
On-site irrigation	
Plant wash down	
Chlorination/de-chlorination	
Industrial	
Landscape irrigation (parks, golf courses)	
Agricultural	
Other, please describe:	
Estimated Volume of Recycled or Reuse	0

4. Water Savings

For this reporting period, estimate the savings that resulted from your overall water conservation activities and programs?

Estimated Gallons Saved (Total from Conservation Programs Table)	**Estimated Gallons Recycled or Reused** (Total from Reuse Table)	**Total Volume of Water Saved** [1]	**Dollar Value of Water Saved** [2]
		0	

1. [Estimated gallons saved + Estimated gallons recycled or reused = Total Volume Saved]
2. Estimate this value by taking into account water savings, the cost of treatment or purchase of your water, and any deferred capital costs due to conservation.

5. In your opinion, how would you rank the overall effectiveness of your conservation programs and activities, if applicable? Click here to enter text.

Please List Activities and Practices listed in the Water Conservation Activities Tables	Less Than Effective	Somewhat Effective	Highly Effective
	☐	☐	☐
	☐	☐	☐
	☐	☐	☐
	☐	☐	☐
	☐	☐	☐

6. What might your entity do to expand water conservation efforts? Click here to enter text.

If you have any questions on how to fill out this form or about the Water Conservation program, please contact us at 512/239-4691.

Individuals are entitled to request and review their personal information that the agency gathers on its forms. They may also have any errors in their information corrected. To review such information, contact us at 512-239-3282.

Appendix 5C-C

Model Water Conservation Plan for Irrigation Districts

This appendix includes a Model Water Conservation Plan for Irrigation Districts in the ETRWPA. The model plan addresses the latest Texas Commission on Environment Quality requirements and is intended to be modified by each user to best reflect the activities appropriate to the entity. The model plan also includes sample appendices required:

- Appendix A – List of References
- Appendix B – Texas Commission on Environmental Quality Rules on Water Conservation Plans for Irrigation Use
- Appendix C – TCEQ Rules for Water Conservation Plans for Agricultural Users
- Appendix D – Letter to Chair of East Texas Region Water Planning Group
- Appendix E – Sample Implementation Report

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Water Conservation Plan for [Irrigation District]

Date

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5. Specification of Water Conservation Goals
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7. Monitoring and Record Management Program
8. Leak Detection and Repair and Control of Water Loss
9. Customer Assistance Program
10. Wholesale Water Customer Contract Provisions
11. Adoption of Water Conservation Plan and Goals
12. Other Water Conservation Practices
13. Coordination with Regional Water Planning Group
14. Review and Update of Plan
15. Water Conservation Implementation Report

APPENDICES

Appendix A	List of References
Appendix B	Texas Commission on Environmental Quality Rules on Water Conservation Plans for Irrigation Use
Appendix C	TCEQ Rules for Water Conservation Plans for Agricultural Users
Appendix D	Letter to Chair of East Texas Region Water Planning Group
Appendix E	Sample Implementation Report

Water Conservation Plan for [Irrigation District]

1. Objectives

The Texas Commission on Environmental Quality has developed guidelines and requirements governing the development of water conservation plans for systems that provide agricultural water to more than one user in Title 30, Part 1, Chapter 288, Subchapter A, Rule 288.4 of the Texas Administrative Code (TAC). The minimum requirements are:

TAC Reference	Subject	Plan Location
30 TAC §288.4(a)(3)(A)(i)	Inventory of Structural Facilities	Section 2
30 TAC §288.4(a)(3)(A)(ii)	Inventory of Management Practices	Section 3
30 TAC §288.4(a)(3)(A)(iii)	System Profile	Section 4
30 TAC §288.4(a)(3)(B)	Specification of Conservation Goals	Section 5
30 TAC §288.4(a)(3)(C)	Measurement of Diverted Water	Section 6
30 TAC §288.4(a)(3)(D)	Monitoring and Record Management Program	Section 7
30 TAC §288.4(a)(3)(E)	Leak Detection and Repair and Water Loss Accounting	Section 8
30 TAC §288.4(a)(3)(F)	Customer Assistance Program	Section 9
30 TAC §288.4(a)(3)(G)	Wholesale Water Customer Contract Provisions	Section 10
30 TAC §288.4(a)(3)(H)	Adoption of Water Conservation Plan an d Goals	Section 11
30 TAC §288.4(a)(3)(I)	Other Water Conservation Practices	Section 12
30 TAC §288.4(a)(3)(J)	Coordination with Regional Water Planning Group	Section 13
30 TAC §288.4(c)	Review and Update of Plan	Section 14
30 TAC §288.30(3)	Water Conservation Implementation Report	Section 15

The purpose of this water conservation plan is to:

- To reduce water consumption from the levels that would exist without conservation efforts.
- To reduce the loss and waste of water.
- To encourage improvement of processes that inefficiently consume water.
- To extend the life of current supplies by reducing the rate of growth in demand.

This water conservation plan is intended to serve as a guide to [irrigation district]. The following plan includes all conservation measures required by TCEQ.

[The required elements of a water conservation plan are somewhat different for "agricultural users other than irrigation" and an "individual irrigation user." See 30 TAC §288.4 for guidance.]

2. Inventory of Structural Facilities

[Describe structural facilities, including water storage, conveyance, and delivery structures. This inventory should include the following information:

- *Service area description*
- *Miles of main canals and pipelines*
- *Miles of lateral canals and pipelines*
- *Description of conveyance construction*
    - *Miles of unlined canals*
    - *Miles of lined canals*
    - *Miles of enclosed pipelines*
- *Description of canal conditions and recent or planned improvements*
- *Reservoir capacity*
- *Description of pumps and pumping stations*
- *Descriptions of meters and/or measuring devices*
- *Descriptions of customer gates and measuring devices*
- *Description of other structural facilities.]*

3. Inventory of Management Practices

[Describe management practices, including operating rules and regulations, water pricing policy, and a description of practices and/or devices used to account for water deliveries. This inventory should include the following information:

- *Total water available to the district*
- *Water rights*
    - *Maximum water rights allocation to district*
    - *Water rights numbers*
    - *Other water contracted to be delivered to the district.*
- *Average annual water diverted by the district*
- *Average annual water delivered to customers*
- *Delivery efficiency*
- *Historical diversions and deliveries*
- *Practices and/or devices used to account for water deliveries*
- *Water pricing policy*

4. System Profile

[Describe the system profile, including square miles of the service area, the number of customers taking delivery of water by the system, the types of crops, the types of irrigation

systems, the types of drainage systems, and total acreage under irrigation, both historical and projected. This profile should include the following information:

- *Number of acres or square miles in service area*
- *Average number of acres irrigated annually*
- *Projected number of acres to be irrigated in 10 years*
- *Number of active irrigation customers*
- *Total irrigation water delivered annually*
- *Types of crops grown by customers*
- *Types of irrigation systems used by customers*
- *Types of drainage systems used by customers*
- *Further description of irrigation customers*
- *List of municipal customers and number of acre-feet allocated annually*
- *List of industrial and other large customers and number of acre-feet allocated annually]*

5. Specification of Water Conservation Goals

[The Irrigation District must specify a five-year and ten-year target for water savings including maximum allowable losses for the storage and distribution system. The goals established by a system providing agricultural water to more than one user under this subparagraph are not enforceable]

The TCEQ regulations require that each irrigation user adopt quantifiable water conservation goals in their water conservation plan. The *[Irrigation District]* has adopted goals related to improving water use efficiency and water losses from its delivery system. The *[Irrigation District]* will strive to increase water efficiency per irrigated acre by *[insert amount]* percent within 5 years and *[insert amount]* percent within 10 years. In addition, the *[Irrigation District]* will strive to maintain losses from the storage and distribution system below *[insert amount]* percent annually over the next 10 years.

The goals for this water conservation plan will be achieved through the following:

[Select applicable measures and/or include additional measures and provide descriptions:

- *Regular inspections of District storage, conveyance, and delivery structures to identify controllable losses or leaks.*
- *Timely repair of identified losses or leaks.*
- *Installation of meters within the system to help identify areas of loss or inefficient water use.*
- *Increased metering of water deliveries.*

Other best management practices (BMPs) can be found in the Water Conservation Best Management Practices Guide developed by the statewide Water Conservation Implementation Task Force (see list of references).]

In addition, the District has a customer assistance program, as described in Section 9.

6. Measurement of Diverted Water

[Describe the practice(s) and/or device(s) which will be utilized to measure and account for the amount of water diverted from the source(s) of supply]

7. Monitoring and Record Management Program

[Describe the monitoring and record management program for water deliveries, sales, and losses.]

8. Leak Detection and Repair and Water Loss Accounting

[Describe any methods that will be used for leak detection and repair and water loss accounting and control.]

Canal riders and maintenance personnel watch for and report signs of leakage. Customers are also encouraged to report leaks. Drains are monitored for unusual flows. If leakage is detected, the corresponding section of the system can be isolated with shutoff gates while still allowing the rest of the system to function normally. District policy is to repair leaks within 24 hours of detection, and most leaks are repaired within 8 hours of detection.

In addition, the District will conduct an annual water audit of its system and adjust operations to minimize losses if applicable.

9. Customer Assistance Program

[Describe a program to assist customers in the development of on-farm water conservation and pollution prevention plans and/or measures.]

The District's Customer Assistance Program provides education on BMPs and encourages customers to improve volumetric measuring, improve land, and upgrade irrigation equipment to increase water efficiency of their irrigation systems.

Volumetric Measuring
Measuring the volume of water being used to irrigate a crop is useful because it provides [irrigation district] with information needed to evaluate the efficiency of an irrigation system. With this information, [irrigation district] and customers can better manage their crops. Irrigation water users will employ a method of measuring how much irrigation water is used in their system.

The following methods may be used to directly measure amounts of irrigation water being used:

[Select applicable measures and/or include additional measures and provide descriptions:

- *Propeller meters*
- *Orifice, venture or differential pressure meters*
- *Ultrasonic*
- *Stage Discharge Rating Tables*
- *Area/Point Velocity Measurements]*

Indirect methods that may be used to measure irrigation water quantities include:

- Measurement of time of irrigation and size of irrigation delivery system
- Measurement of end-pressure in a sprinkler irrigation system
- Measurement of energy used by a pump supplying water to an irrigation system
- Change in the elevation of water stored in an irrigation water supply reservoir

Irrigation Scheduling

Coordination of irrigation schedules of customers can reduce losses associated with conveying irrigation water. The *[irrigation district]* will implement an irrigation schedule for deliveries to customers to best meet the customers' water needs and minimize conveyance losses.

Land Improvement

To reduce the amount of water required for irrigation, the following land improvement practices are encouraged for customers of the *[irrigation district]*:

- Creation of furrow dikes
- Crop residue management and conservation tillage
- Land leveling
- Contour farming

Irrigation Equipment Improvement

The *[irrigation district]* encourages customers to utilize efficient irrigation equipment, including:

- Installation of a drip/micro-irrigation system
- Installation of gated and flexible pipe for field water distribution systems
- Replacement of on-farm irrigation ditches with pipelines
- Lining of on-farm irrigation ditches
- Installation of low pressure center pivot sprinkler irrigation systems

[Best management practices (BMPs) can be found in the Water Conservation Best Management Practices Guide developed by the statewide Water Conservation Implementation Task Force (see list of references).]

10. Wholesale Water Customer Contract Provisions

Every wholesale water supply contract entered into or renewed after official adoption of this plan (by either ordinance, resolution, or tariff), and including any contract extension, will require that each successive wholesale customer develop and implement a water conservation plan or water conservation measures using the applicable elements in this 30 TAC §288.4. If the customer intends to resell the water, the contract between the initial supplier and customer must provide that the contract for the resale of the water must have water conservation requirements so that each successive customer in the resale of the water will be required to implement water conservation measures in accordance with applicable provisions of this chapter.

11. Adoption of Water Conservation Plan and Goals

The *[Irrigation District]* Board adopted this water conservation plan and its goals by resolution on *[date]*. A copy of the resolution is presented in Appendix C.

12. Other Water Conservation Practices

[Describe any other water conservation practice, method, or technique which the District will use to achieve conservation.]

13. Coordination with Regional Water Planning Group

The *[Irrigation District]* submitted this water conservation plan to the East Texas Region Water Planning Group. A copy of the letter to the chair is presented in Appendix D.

14. Review and Update of Plan

As required by TCEQ rules, the *[Irrigation District]* will review and update this water conservation plan every five years, beginning in *[year]*. Goals for irrigation use will be re-evaluated based on previous five-year and ten-year goals and any new information.

15. Water Conservation Implementation Report

The *[Irrigation District]* has completed a water conservation implementation report that details its water conservation efforts and achievements. The implementation report is presented in Appendix E.

[The plan must include a water conservation implementation report. At a minimum, this report must include the following information:

- *The list of dates and descriptions of the conservation measures implemented;*
- *Data about whether or not targets in the plans are being met;*
- *The actual amount of water saved; and*
- *If the targets are not being met, an explanation as to why any of the targets are not being met, including any progress on that particular target.]*

Appendix A
List of References

Appendix A List of References

Title 30 of the Texas Administrative Code, Part 1, Chapter 3, Subchapter A, Rules 3.2 and Chapter 288, Subchapter A, Rule 288.4, downloaded from http://www.sos.state.tx.us/tac/index.shtml, effective December 6, 2012.

Texas Water Development Board: *Report 362 Water Conservation Best Management Practices Guide*, prepared for the Water Conservation Implementation Task Force, Austin, November 2004.

Texas Commission on Environmental Quality, *System Inventory and Water Conservation Plan for Agricultural Water Suppliers Providing Water to More Than One User*, TCEQ Form No. 10244, Revised April 17, 2013.

Texas Commission on Environmental Quality, *Water Conservation Implementation Report Non Public Water Supplier*, TCEQ Form No. 20645, Revised September 18, 2013.

Appendix B
TCEQ Rules for Water Conservation Plans for Agricultural Use

SUBCHAPTER A: WATER CONSERVATION PLANS
§§288.1 - 288.7
Effective December 6, 2012

§288.4. Water Conservation Plans for Agricultural Use.

(a) A water conservation plan for agricultural use of water must provide information in response to the following subsections. If the plan does not provide information for each requirement, the agricultural water user must include in the plan an explanation of why the requirement is not applicable.

(1) For an individual agricultural user other than irrigation:

(A) a description of the use of the water in the production process, including how the water is diverted and transported from the source(s) of supply, how the water is utilized in the production process, and the estimated quantity of water consumed in the production process and therefore unavailable for reuse, discharge, or other means of disposal;

(B) specific, quantified five-year and ten-year targets for water savings and the basis for the development of such goals. The goals established by agricultural water users under this subparagraph are not enforceable;

(C) a description of the device(s) and/or method(s) within an accuracy of plus or minus 5.0% to be used in order to measure and account for the amount of water diverted from the source of supply;

(D) leak-detection, repair, and accounting for water loss in the water distribution system;

(E) application of state-of-the-art equipment and/or process modifications to improve water use efficiency; and

(F) any other water conservation practice, method, or technique which the user shows to be appropriate for achieving the stated goal or goals of the water conservation plan.

(2) For an individual irrigation user:

(A) a description of the irrigation production process which shall include, but is not limited to, the type of crops and acreage of each crop to be irrigated, monthly irrigation diversions, any seasonal or annual crop rotation, and soil types of the land to be irrigated;

(B) a description of the irrigation method, or system, and equipment including pumps, flow rates, plans, and/or sketches of the system layout;

(C) a description of the device(s) and/or methods, within an accuracy of plus or minus 5.0%, to be used in order to measure and account for the amount of water diverted from the source of supply;

(D) specific, quantified five-year and ten-year targets for water savings including, where appropriate, quantitative goals for irrigation water use efficiency and a pollution

abatement and prevention plan. The goals established by an individual irrigation water user under this subparagraph are not enforceable;

(E) water-conserving irrigation equipment and application system or method including, but not limited to, surge irrigation, low pressure sprinkler, drip irrigation, and nonleaking pipe;

(F) leak-detection, repair, and water-loss control;

(G) scheduling the timing and/or measuring the amount of water applied (for example, soil moisture monitoring);

(H) land improvements for retaining or reducing runoff, and increasing the infiltration of rain and irrigation water including, but not limited to, land leveling, furrow diking, terracing, and weed control;

(I) tailwater recovery and reuse; and

(J) any other water conservation practice, method, or technique which the user shows to be appropriate for preventing waste and achieving conservation.

(3) For a system providing agricultural water to more than one user:

(A) a system inventory for the supplier's:

(i) structural facilities including the supplier's water storage, conveyance, and delivery structures;

(ii) management practices, including the supplier's operating rules and regulations, water pricing policy, and a description of practices and/or devices used to account for water deliveries; and

(iii) a user profile including square miles of the service area, the number of customers taking delivery of water by the system, the types of crops, the types of irrigation systems, the types of drainage systems, and total acreage under irrigation, both historical and projected;

(B) specific, quantified five-year and ten-year targets for water savings including maximum allowable losses for the storage and distribution system. The goals established by a system providing agricultural water to more than one user under this subparagraph are not enforceable;

(C) a description of the practice(s) and/or device(s) which will be utilized to measure and account for the amount of water diverted from the source(s) of supply;

(D) a monitoring and record management program of water deliveries, sales, and losses;

(E) a leak-detection, repair, and water loss control program;

(F) a program to assist customers in the development of on-farm water conservation and pollution prevention plans and/or measures;

(G) a requirement in every wholesale water supply contract entered into or renewed after official adoption of the plan (by either ordinance, resolution, or tariff), and including any contract extension, that each successive wholesale customer develop and implement a water conservation plan or water conservation measures using the applicable elements in this chapter. If the customer intends to resell the water, the contract between the initial supplier and customer must provide that the contract for the resale of the water must have water conservation requirements so that each successive customer in the resale of the water will be required to implement water conservation measures in accordance with applicable provisions of this chapter;

(H) official adoption of the water conservation plan and goals, by ordinance, rule, resolution, or tariff, indicating that the plan reflects official policy of the supplier;

(I) any other water conservation practice, method, or technique which the supplier shows to be appropriate for achieving conservation; and

(J) documentation of coordination with the regional water planning groups, in order to ensure consistency with appropriate approved regional water plans.

(b) A water conservation plan prepared in accordance with the rules of the United States Department of Agriculture Natural Resource Conservation Service, the Texas State Soil and Water Conservation Board, or other federal or state agency and substantially meeting the requirements of this section and other applicable commission rules may be submitted to meet application requirements in accordance with a memorandum of understanding between the commission and that agency.

(c) An agricultural water user shall review and update its water conservation plan, as appropriate, based on an assessment of previous five-year and ten-year targets and any other new or updated information. An agricultural water user shall review and update the next revision of its water conservation plan every five years to coincide with the regional water planning group.

Adopted November 14, 2012 Effective December 6, 2012

Appendix C
Board Resolution Adopting Water Conservation Plan

[Insert a copy of the Board resolution adopting this water conservation plan and its goals.]

Appendix D
Letter to Chair of East Texas Region Water Planning Group

[Insert a copy of the letter submitting this water conservation plan to the chair of the East Texas Region Water Planning Group.]

Appendix E
Water Conservation Implementation Report

Texas Commission on Environmental Quality

Water Conservation Implementation Report

Non Public Water Supplier

This report must be completed by entities that are required to submit a water conservation plan to the TCEQ in accordance with Title 30 Texas Administrative Code, Chapter 288. Please complete this report and submit it to the TCEQ. If you need assistance in completing this form, please contact the Resource Protection Team in the Water Availability Division at (512) 239-4691.

CONTACT INFORMATION

Name of Entity: Click here to enter text.

Water Rights Permit numbers: Click here to enter text.

Address: Click here to enter text. City: Click here to enter text.

Zip Code: Click here to enter text.

Email: Click here to enter text. Telephone Number: Click here to enter text.

Regional Water Planning Group: _____ Map

Groundwater Conservation District: _____ Map

Form Completed By: Click here to enter text. Title: Click here to enter text.

Signature: _____ Date: Click here to enter a date.

Contact information for the person or department responsible for implementing the water conservation plan:

Name: Click here to enter text. Phone: Click here to enter text. Email: Click here to enter text.

Report Completed on Date: dd/mm/yyyy

Reporting Period (**check only one**):

☐ Fiscal Period Begin dd/mm/yyyy Period End dd/mm/yyyy

☐ Calendar Period Begin dd/mm/yyyy Period End dd/mm/yyyy

Please check all of the following that apply to your entity:

☐ An entity that has a non-irrigation surface water right greater than 1,000 acre-feet/year

☐ An entity that has an irrigation surface water right greater than 10,000 acre-feet/year

System Data

Fields that are gray are entered by the user. Highlight the 0's that are in white and press F9 to populate these fields.

	Total Gallons During the Reporting Period.
Water Produced: Volume produced from own sources	
Wholesale Water Imported : Purchased wholesale water imported from other sources into the distribution system	
TOTAL System Input : Total water input into the system	0 [Produced + Imported = System Input]
TOTAL System Output : Water used, sold, exported or transferred out of the system	
TOTAL Authorized Water Use: All water that has been authorized for use or consumption.	0 [System Output ÷ 365 = Average Gallons per day]

In the table below please provide the **specific and quantified five and ten-year targets for water savings** as listed in your most current water conservation plan.

Date	**Target for: Water Savings**	**Target for: Water Loss**
Five-year target date: dd/mm/yyyy		
Ten-year target date: dd/mm/yyyy		

Are targets in the water conservation plan being met? Yes ☐ No ☐

If these targets are not being met, provide an explanation as to why, including any progress on these targets. Click here to enter text.

Water Conservation Programs and Activities

Fields that are gray are entered by the user. Highlight the 0's that are in white and press F9 to populate these fields.

As you complete this section, please review your entity's water conservation plan to see if you are making progress towards meeting your stated goals.

1. Water Conservation Plan

What year did your entity adopt, or revise, their most recent water conservation plan?
Click here to enter a date.

Does the plan incorporate Best Management Practices? Yes ☐ No ☐

2. Water Conservation Programs

Has your entity implemented any type of water conservation activities or programs?
Yes ☐ No ☐

If yes: For this reporting period, please select the types of activities and programs that your entity actively administered and estimated volume of water conserved.

Agricultural Activities and Practices	**Estimated Volume (in gallons)**
☐ Irrigation Audit	
☐ Information Gathering and Education Practices	
☐ Cropping and Management Practices	
☐ Scheduling Practices	
☐ Land Management Systems	
☐ On-Farm Water Delivery Systems	
☐ Water District Delivery Systems	
Industrial Activities and Practices	
☐ Industrial Water Audit	
☐ Conservation Analysis and Planning	
☐ Education Practices	
☐ System Operations	
☐ Cooling System Management	
☐ Landscaping	
☐ Sector Specific Practices	
Estimated Volume of Water Conserved	0

Other Activities? Please list or describe: Click here to enter text.

3. Reuse (Water or Wastewater Effluent)

Fields that are gray are entered by the user. Highlight the 0's that are in white and press F9 to populate these fields.

For this reporting period, please provide the following data regarding the types of direct and indirect reuse activities that were administered:

Reuse Activity	Estimated Volume (in gallons)
On-site irrigation	
Plant wash down	
Chlorination/de-chlorination	
Industrial	
Landscape irrigation (parks, golf courses)	
Agricultural	
Other, please describe:	
Estimated Volume of Recycled or Reuse	0

4. Water Savings

For this reporting period, estimate the savings that resulted from your overall water conservation activities and programs?

Estimated Gallons Saved (Total from Conservation Programs Table)	**Estimated Gallons Recycled or Reused** (Total from Reuse Table)	**Total Volume of Water Saved** [1]	**Dollar Value of Water Saved** [2]
		0	

1. [Estimated gallons saved + Estimated gallons recycled or reused = Total Volume Saved]
2. Estimate this value by taking into account water savings, the cost of treatment or purchase of your water, and any deferred capital costs due to conservation.

5. In your opinion, how would you rank the overall effectiveness of your conservation programs and activities, if applicable? Click here to enter text.

Please List Activities and Practices listed in the Water Conservation Activities Tables	Less Than Effective	Somewhat Effective	Highly Effective
	☐	☐	☐
	☐	☐	☐
	☐	☐	☐
	☐	☐	☐
	☐	☐	☐

6. What might your entity do to expand water conservation efforts? Click here to enter text.

If you have any questions on how to fill out this form or about the Water Conservation program, please contact us at 512/239-4691.

Individuals are entitled to request and review their personal information that the agency gathers on its forms. They may also have any errors in their information corrected. To review such information, contact us at 512-239-3282.

Appendix 5C-D

Plumbing Code Savings

The water volume savings due to the future enhancement of plumbing fixtures and the proposed implementation of modified plumbing codes can be found in the following attachment.

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Volumetric Savings for Municipal WUGs by County (acre feet)

County	Entity Name	2020	2030	2040	2050	2060	2070
ANDERSON	BRUSHY CREEK WSC	29.79	44.05	54.79	60.22	61.23	61.30
ANDERSON	COUNTY-OTHER, ANDERSON	272.93	400.36	496.07	545.21	554.60	554.91
ANDERSON	ELKHART	14.23	20.84	25.81	28.35	28.84	28.86
ANDERSON	FOUR PINES WSC	30.93	43.46	52.04	56.59	57.85	57.89
ANDERSON	FRANKSTON	13.72	20.33	25.22	27.69	28.14	28.18
ANDERSON	PALESTINE	205.87	305.49	381.70	420.79	427.65	427.65
ANDERSON	THE CONSOLIDATED WSC	16.68	24.31	30.28	33.42	34.03	34.05
ANDERSON	WALSTON SPRINGS WSC	40.34	59.13	73.20	80.46	81.87	81.91
ANGELINA	ANGELINA WSC	35.04	54.74	68.21	72.77	76.94	79.78
ANGELINA	BURKE	6.05	8.79	10.80	12.22	13.04	13.54
ANGELINA	CENTRAL WCID OF ANGELINA COUNTY	75.33	98.89	104.32	109.27	113.70	117.63
ANGELINA	COUNTY-OTHER, ANGELINA	197.96	310.85	392.03	418.23	442.36	458.90
ANGELINA	DIBOLL	59.15	91.98	118.59	126.53	133.80	138.71
ANGELINA	FOUR WAY SUD	43.48	62.00	75.50	85.09	90.89	94.42
ANGELINA	HUDSON	45.59	66.83	83.31	94.55	100.41	104.24
ANGELINA	HUDSON WSC	54.17	57.97	61.15	64.05	66.65	68.96
ANGELINA	HUNTINGTON	24.42	37.28	47.86	54.77	57.93	60.10
ANGELINA	LUFKIN	404.27	619.24	797.71	913.01	965.65	1,001.68
ANGELINA	REDLAND WSC	32.14	50.53	54.54	58.27	61.71	64.02
ANGELINA	ZAVALLA	8.25	12.68	16.36	18.73	19.82	20.54
CHEROKEE	ALTO	14.38	22.41	29.39	35.01	38.83	42.52
CHEROKEE	ALTO RURAL WSC	40.90	66.19	74.10	82.88	92.03	100.77
CHEROKEE	BULLARD	0.47	0.69	0.84	0.96	1.07	1.16
CHEROKEE	COUNTY-OTHER, CHEROKEE	94.58	147.24	192.49	229.09	254.75	279.16
CHEROKEE	CRAFT-TURNEY WSC	58.37	92.32	122.20	145.86	161.67	176.94
CHEROKEE	JACKSONVILLE	172.56	270.34	355.93	423.84	470.43	514.97
CHEROKEE	NEW SUMMERFIELD	11.17	16.69	21.26	25.12	28.00	30.70
CHEROKEE	NORTH CHEROKEE WSC	46.22	70.68	91.37	108.33	120.68	132.21
CHEROKEE	RUSK	62.80	97.44	127.34	151.39	168.13	184.21
CHEROKEE	RUSK RURAL WSC	37.82	59.02	77.46	92.19	102.32	112.10
CHEROKEE	SOUTHERN UTILITIES COMPANY	29.41	46.03	60.85	72.69	80.72	88.37
CHEROKEE	TROUP	0.77	1.21	1.59	1.91	2.09	2.29
CHEROKEE	WELLS	9.64	15.19	20.08	23.94	26.54	29.07
CHEROKEE	WRIGHT CITY WSC	5.98	9.19	11.87	14.04	15.59	17.08
HARDIN	COUNTY-OTHER, HARDIN	156.28	243.59	314.42	330.34	343.88	350.69
HARDIN	KOUNTZE	21.92	31.88	40.23	44.84	45.68	45.72
HARDIN	LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	1.40	1.70	1.85	1.96	2.05	2.12
HARDIN	LUMBERTON	140.78	221.53	280.09	318.30	338.70	351.29
HARDIN	LUMBERTON MUD	81.19	118.85	147.40	164.80	171.66	174.59
HARDIN	NORTH HARDIN WSC	78.76	102.81	107.39	110.78	113.43	115.42
HARDIN	SILSBEE	70.47	104.13	131.80	147.46	151.23	152.38
HARDIN	SOUR LAKE	19.93	29.92	37.88	42.57	44.14	44.81
HARDIN	WEST HARDIN WSC	36.31	36.49	36.63	36.73	36.81	36.87
HENDERSON	ATHENS	3.03	4.57	5.77	6.69	7.30	7.77
HENDERSON	BERRYVILLE	11.88	18.41	23.77	28.13	30.62	32.68
HENDERSON	BETHEL-ASH WSC	32.30	49.55	62.77	74.94	83.07	90.17
HENDERSON	BROWNSBORO	13.86	22.44	29.14	36.15	41.38	46.14
HENDERSON	BRUSHY CREEK WSC	8.13	12.49	16.25	19.15	20.61	21.71
HENDERSON	CHANDLER	39.60	65.15	85.47	106.27	121.32	135.15
HENDERSON	COUNTY-OTHER, HENDERSON	117.09	175.46	219.88	218.23	217.63	212.61
HENDERSON	FRANKSTON	0.48	1.04	1.64	2.33	2.84	3.29
HENDERSON	MURCHISON	6.12	8.88	11.22	12.52	12.78	12.82
HENDERSON	R-P-M WSC	7.68	12.45	16.16	19.85	22.48	24.86
HENDERSON	VIRGINIA HILL WSC	20.44	32.69	42.62	51.74	57.66	62.97

Appendix 5C-D
Volumetric Savings for Municipal WUGs by County (acre feet)

County	Entity Name	2020	2030	2040	2050	2060	2070
HOUSTON	COUNTY-OTHER, HOUSTON	11.18	15.74	18.04	18.46	18.91	18.91
HOUSTON	CROCKETT	74.55	108.08	135.69	150.02	152.57	152.57
HOUSTON	GRAPELAND	15.62	22.47	28.05	31.12	31.65	31.66
HOUSTON	LOVELADY	7.11	10.19	12.58	13.88	14.12	14.12
HOUSTON	THE CONSOLIDATED WSC	138.20	196.43	241.86	266.98	271.82	271.97
JASPER	COUNTY-OTHER, JASPER	233.04	338.41	418.10	460.87	469.22	469.22
JASPER	JASPER	83.59	123.04	153.56	169.87	172.66	172.66
JASPER	JASPER COUNTY WCID #1	34.89	52.99	58.54	58.54	58.54	58.54
JASPER	KIRBYVILLE	22.66	32.99	40.85	45.05	45.84	45.87
JASPER	MAURICEVILLE SUD	3.64	4.92	4.93	4.93	4.93	4.93
JEFFERSON	BEAUMONT	1,349.66	2,076.55	2,720.82	3,190.70	3,479.75	3,756.23
JEFFERSON	BEVIL OAKS	15.09	23.36	30.73	34.71	37.82	40.81
JEFFERSON	CHINA	13.28	20.44	26.81	31.42	34.27	37.00
JEFFERSON	COUNTY-OTHER, JEFFERSON	177.29	345.26	522.65	698.98	868.44	1,052.89
JEFFERSON	GROVES	167.99	245.75	311.58	336.89	342.68	342.68
JEFFERSON	JEFFERSON COUNTY WCID #10	52.29	79.30	102.88	120.38	131.40	141.90
JEFFERSON	MEEKER MUD	32.41	48.53	62.35	72.79	79.60	85.94
JEFFERSON	NEDERLAND	200.82	308.01	403.12	472.54	515.34	556.31
JEFFERSON	NOME	6.11	9.17	11.82	13.80	15.08	16.29
JEFFERSON	PORT ARTHUR	640.17	927.07	1,154.79	1,201.37	1,220.78	1,221.42
JEFFERSON	PORT NECHES	152.03	234.52	307.81	359.79	392.22	423.35
JEFFERSON	WEST JEFFERSON COUNTY MWD	83.46	125.55	161.97	189.25	206.81	223.38
NACOGDOCHES	APPLEBY WSC	38.31	60.38	79.67	94.95	106.19	116.86
NACOGDOCHES	COUNTY-OTHER, NACOGDOCHES	159.36	216.73	247.03	279.02	312.72	344.08
NACOGDOCHES	CUSHING	7.92	12.78	17.11	20.48	22.87	25.14
NACOGDOCHES	D&M WSC	53.04	82.12	106.33	126.31	141.97	156.45
NACOGDOCHES	GARRISON	11.30	18.27	24.41	29.21	32.62	35.86
NACOGDOCHES	LILLY GROVE SUD	29.45	45.77	59.73	71.01	79.66	87.66
NACOGDOCHES	MELROSE WSC	36.71	58.71	77.97	93.12	104.11	114.56
NACOGDOCHES	NACOGDOCHES	406.60	655.00	874.11	1,045.08	1,167.95	1,284.06
NACOGDOCHES	SWIFT WSC	32.47	52.55	70.40	83.15	92.81	102.06
NACOGDOCHES	WODEN WSC	29.75	47.66	63.46	75.80	84.73	93.16
NEWTON	COUNTY-OTHER, NEWTON	94.69	138.83	176.34	185.67	188.98	188.98
NEWTON	MAURICEVILLE SUD	3.31	4.37	4.37	4.37	4.37	4.37
NEWTON	NEWTON	23.59	33.25	41.11	45.47	46.38	46.38
NEWTON	SOUTH NEWTON WSC	-	-	-	-	-	-
ORANGE	BRIDGE CITY	92.46	140.31	179.51	190.14	196.09	198.40
ORANGE	COUNTY-OTHER, ORANGE	308.32	480.18	505.46	525.16	542.44	548.84
ORANGE	MAURICEVILLE SUD	77.33	106.64	109.90	112.10	113.77	114.99
ORANGE	ORANGE	215.77	325.43	414.64	457.96	472.18	477.72
ORANGE	ORANGEFIELD WSC	38.47	51.66	60.14	65.71	68.56	69.49
ORANGE	PINEHURST	25.41	38.89	47.78	49.61	51.18	51.79
ORANGE	PORT ARTHUR	0.06	0.08	0.10	0.10	0.11	0.11
ORANGE	ROSE CITY	5.94	9.01	11.53	12.16	12.55	12.69
ORANGE	SOUTH NEWTON WSC	-	-	-	-	-	-
ORANGE	VIDOR	124.01	187.63	239.66	258.20	266.26	269.38
ORANGE	WEST ORANGE	42.03	64.44	77.87	80.87	83.45	84.43
PANOLA	BECKVILLE	10.81	17.15	21.77	24.91	26.31	27.18
PANOLA	CARTHAGE	72.22	106.54	134.59	150.68	154.54	155.62
PANOLA	COUNTY-OTHER, PANOLA	171.32	259.16	327.43	369.51	383.72	390.65
PANOLA	GILL WSC	8.30	12.48	15.78	16.37	16.87	17.11
PANOLA	TATUM	3.64	6.19	8.12	9.50	10.20	10.67
POLK	CORRIGAN	21.85	34.85	45.46	49.72	52.95	55.11
POLK	COUNTY-OTHER, POLK	73.48	114.32	146.97	169.07	180.52	187.85

Volumetric Savings for Municipal WUGs by County (acre feet)

County	Entity Name	2020	2030	2040	2050	2060	2070
RUSK	CHALK HILL SUD	37.95	59.23	77.59	92.06	102.34	111.84
RUSK	COUNTY-OTHER, RUSK	302.11	487.65	651.20	768.56	852.78	931.38
RUSK	CROSS ROADS SUD	29.89	47.67	63.16	75.20	83.59	91.32
RUSK	EASTON	0.58	0.66	0.72	0.79	0.86	0.94
RUSK	ELDERVILLE WSC	-	-	-	-	-	-
RUSK	HENDERSON	157.91	250.02	329.85	392.38	435.93	476.34
RUSK	KILGORE	35.30	56.12	74.65	89.00	98.95	108.15
RUSK	NEW LONDON	12.67	20.28	27.00	32.16	35.67	38.97
RUSK	OVERTON	28.68	45.43	59.94	71.16	78.99	86.36
RUSK	TATUM	13.60	21.60	28.37	33.66	37.33	40.78
RUSK	WEST GREGG SUD	1.84	2.92	3.86	4.59	5.12	5.59
RUSK	WRIGHT CITY WSC	4.95	7.73	10.11	11.98	13.33	14.57
SABINE	COUNTY-OTHER, SABINE	19.10	28.18	34.43	35.07	35.75	35.75
SABINE	G M WSC	-	-	-	-	-	-
SABINE	HEMPHILL	14.07	19.78	24.31	26.80	27.24	27.26
SABINE	PINELAND	9.73	14.06	17.70	18.25	18.57	18.57
SAN AUGUSTINE	COUNTY-OTHER, SAN AUGUSTINE	58.31	82.50	102.26	113.16	115.41	115.41
SAN AUGUSTINE	G M WSC	-	-	-	-	-	-
SAN AUGUSTINE	SAN AUGUSTINE	23.05	33.93	42.50	43.29	44.05	44.05
SHELBY	CENTER	61.71	95.19	123.45	142.23	151.58	158.60
SHELBY	COUNTY-OTHER, SHELBY	193.43	294.98	379.43	436.30	465.49	486.97
SHELBY	JOAQUIN	10.23	15.95	20.84	22.49	23.98	25.07
SHELBY	TENAHA	13.31	20.54	26.56	30.59	32.63	34.14
SHELBY	TIMPSON	13.24	20.28	26.18	30.13	32.13	33.61
SMITH	ARP	10.43	15.67	20.13	23.16	24.67	25.88
SMITH	BULLARD	29.93	51.02	69.67	87.49	103.72	119.71
SMITH	COUNTY-OTHER, SMITH	69.33	121.60	171.76	217.67	256.54	294.08
SMITH	CRYSTAL SYSTEMS INC	11.45	18.40	23.13	28.26	33.52	38.65
SMITH	DEAN WSC	46.95	69.18	87.90	100.22	106.02	110.21
SMITH	JACKSON WSC	23.08	36.22	47.56	56.20	62.08	67.50
SMITH	LINDALE	20.15	35.26	49.22	62.39	74.10	85.61
SMITH	LINDALE RURAL WSC	26.51	40.77	52.53	61.35	67.30	72.64
SMITH	NEW CHAPEL HILL	6.11	9.03	11.50	13.19	14.05	14.72
SMITH	NOONDAY	9.48	15.55	20.91	25.66	29.57	33.35
SMITH	OVERTON	1.64	2.95	4.28	5.49	6.48	7.43
SMITH	R-P-M WSC	3.19	4.91	6.28	7.42	8.31	9.15
SMITH	SOUTHERN UTILITIES COMPANY	382.21	576.98	740.58	853.04	915.09	967.26
SMITH	TROUP	22.95	36.30	48.20	57.25	63.15	68.52
SMITH	TYLER	1,078.68	1,665.98	2,176.24	2,558.96	2,802.65	3,020.55
SMITH	WALNUT GROVE WSC	86.15	142.05	191.73	234.58	268.75	301.43
SMITH	WHITEHOUSE	93.56	152.62	204.86	250.00	286.23	320.77
SMITH	WRIGHT CITY WSC	23.71	37.22	49.04	58.55	65.38	71.65
TRINITY	COUNTY-OTHER, TRINITY	36.15	54.42	54.81	53.27	55.73	58.32
TRINITY	GROVETON	6.35	9.69	11.74	12.18	12.97	13.63
TYLER	COLMESNEIL	6.54	9.46	11.88	12.90	13.12	13.12
TYLER	COUNTY-OTHER, TYLER	121.27	175.36	219.53	243.75	247.87	248.01
TYLER	IVANHOE	7.31	9.76	11.48	12.51	12.83	12.83
TYLER	IVANHOE NORTH	4.67	6.44	7.76	8.51	8.71	8.71
TYLER	LAKE LIVINGSTON WATER SUPPLY & SEWER SERVICE COMPANY	0.68	0.73	0.73	0.73	0.73	0.73
TYLER	TYLER COUNTY WSC	59.15	84.76	105.68	117.13	119.18	119.18
TYLER	WOODVILLE	27.54	39.73	49.72	55.20	56.13	56.16
TOTAL		**12,052.89**	**18,375.33**	**23,459.88**	**26,785.91**	**28,833.34**	**30,588.65**

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Appendix 6-A

Title 31 Texas Administrative Code Chapters 357 and 358 Regulations Pertaining to the 2016 Plan

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This appendix includes a matrix highlighting each regulation pertinent to the 2016 Plan in Chapters 357 and 358 of the Texas Administrative Code, Title 31. The matrix is used as a checklist to demonstrate compliance with these regulations.

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Regulatory Citation	Summary of Requirement	2016 Plan Compliance (Yes/No)	Location(s) in the Regional Plan and/or Other Commentary
31 TAC §357.11			
(d)(1)-(12)	RWPGs shall maintain at least one representative of the following interest categories as voting members: public, counties, municipalities, industries, agricultural interests, environmental interests, small businesses, electric generating utilities, river authorities, water districts, water utilities, and groundwater management areas.	Yes	Chapters 1 and 10 provide a list of current voting members of the RWPG.
(e)(1)-(5)	Non-voting members will receive the same meeting notifications and information as voting members. Non voting members are to include: staff members from the Board, from Texas Parks and Wildlife, from the Texas Department of Agriculture, and from each adjacent RWPG; persons to represent entities which are located in another RWPA but which diverts, supplies, or receives 1,000 acre-feet a year or more in , to, or from the RWPA.	Yes	Chapter 1 provides a list of current non-voting members of the RWPG.
31 TAC §357.12			
(b)	A RWPG shall hold a public meeting to determine the process for identifying potentially feasible water management strategies. Input from the public meeting will be documented. All possible water management strategies that are potentially feasible for meeting needs in the region will be listed.	Yes	The process used to identify potentially feasible WMSs was addressed in two regularly scheduled meetings of the ETRWPG on February 1, 2012 and May 22, 2013. Appendix 5A-B lists all potentially feasible WMSs identified.
31 TAC §357.20			
	Development of RWPs shall be guided by the principles stated in Title 31 §358.3 (relating to Guidance Principles).	Yes	See 31 TAC §358.3 below.
31 TAC §357.21			
(b)	Public notice requirements for regular RWPG meetings and meetings where the following were considered: amendments to the RWP scope or budget, process for identification of potentially feasible water management strategies, member addition or replacement, and adoption of water plans.	Yes	Public notice requirements met and are addressed in Chapter 10.
(c)	Public notice requirements for meetings where the following items were considered: population projection and water demand projection revisions, substitution of alternative water management strategies, and minor amendments to the RWPs.	Yes	Public notice requirements met and are addressed in Chapter 10.

Regulatory Citation	Summary of Requirement	2016 Plan Compliance (Yes/No)	Location(s) in the Regional Plan and/or Other Commentary
(d)	Public notice requirements for holding a preplanning public meeting to obtain public input on development of the next RWP; major amendments to RWPs; holding hearings for IPPs; and requesting research and planning funds from the Board.	Yes	Public notice requirements met and are addressed in Chapter 10.
31 TAC §357.22			
(a)	RWPGs shall consider existing local, regional, and state water planning efforts, including water plans, information and relevant local, regional, state and federal programs and goals when developing the regional water plan. RWPGs must also consider:	Yes	Relevant State and federal programs and goals are addressed primarily in Chapter 1. As appropriate, water plans of specific WUGs have been considered in the evaluation of WMSs in Chapter 5B. Coordination with Regions D, C, and H (all adjacent to the ETRWPA) has occurred and planning efforts of these regions considered.
(a)(1)	water conservation plans;	Yes	Chapter 5C addresses water conservation efforts in the region and summarizes water conservation plans reviewed.
(a)(2)	drought management and drought contingency plans;	Yes	Chapter 7 addresses drought management and drought contingency within the region and summarizes drought management and drought contingency plans reviewed.
(a)(3)	information compiled by the Board from water loss audits performed by retail public utilities;	Yes	Chapter 1, Chapter 5C, and Appendix 1-B describe information on water loss audits.
(a)(4)	publicly available plans for major agricultural, municipal, manufacturing and commercial water users;	Yes	Publicly available plans for major agricultural, municipal, manufacturing, and commercial water users were not identified. However, Appendix 2-A contains a technical memorandum regarding rice production and water use in the region.
(a)(5)	local and regional water management plans;	Yes	Chapter 1 summarizes local and regional water management plans identified in the RWPA.
(a)(6)	water availability requirements;	Yes	Water availability is addressed primarily in Chapter 3.
(a)(7)	the Texas Clean Rivers Program;	Yes	Chapter 1 references the Texas Clean Rivers program. Where relevant, water quality data from the program were used.

Regulatory Citation	Summary of Requirement	2016 Plan Compliance (Yes/No)	Location(s) in the Regional Plan and/or Other Commentary
(a)(8)	the U.S. Clean Water Act;	Yes	Chapter 1 references the CWA; the CWA is a cornerstone of the water planning process and central to the planning process for the 2016 Plan.
(a)(9)	water management plans;	Yes	See above.
(a)(10)	other planning goals including regionalization of water and wastewater services where appropriate;	Yes	Regionalization of water and wastewater services has been considered where appropriate. Chapter 5B includes WMSs that may address regionalization.
(a)(11)	approved groundwater conservation district management plans and other plans submitted	Yes	Groundwater Conservation Districts have been included, where appropriate, in Chapters 1, 3, and 5B.
(a)(12)	approved groundwater regulatory plans; and	Yes	See above.
(a)(13)	any other information available from existing local or regional water planning studies.	Yes	See above.
(b)	The following sections from Title 31 should have a separate chapter in the RWP devoted to their contents: §§357.30, 357.31, 357.32, 357.33, 357.42, 357.43, 357.44, 357.45, 357.50, 357.34, 357.35, 357.40, and 357.41	Yes	The 2016 Plan contains chapters as required by the rules and TWDB Guidance.
31 TAC §357.30			
	The description of the RWP area must include a description of the following 12 criteria:		
(1)	social and economic aspects of a region such as information on current population, economic activity and economic sectors heavily dependent on water resources;	Yes	Chapter 1 describes the social and economic aspects of the region relative to water resources.
(2)	current water use and major water demand centers;	Yes	Chapters 1 and 2 include current water use and major water demand centers.
(3)	current groundwater, surface water, and reuse supplies including major springs that are important for water supply or protection of natural resources;	Yes	Chapter 1 generally describes groundwater, surface water, reuse, and springs. Chapter 3 includes more specific information on groundwater, surface water, and reuse sources that are, or may be, used for water supply.

Regulatory Citation	Summary of Requirement	2016 Plan Compliance (Yes/No)	Location(s) in the Regional Plan and/or Other Commentary
(4)	wholesale water providers;	Yes	Chapter 1 identifies the region's WWPs. Chapters 2 and 3 describe WWP demands and supply. Chapter 5B addresses WMSs for each WWP in the region.
(5)	agricultural and natural resources;	Yes	Chapter 1 provides a description of the agricultural and natural resources of the region; Chapter 6 describes protection of these resources.
(6)	identified water quality problems;	Yes	Chapter 1 provides a discussion of water quality problems that may be relevant to regional water planning. To the extent possible, water quality issues are considered in the evaluation of WMSs in Chapter 5B.
(7)	identified threats to agricultural and natural resources due to water quantity problems or water quality problems related to water supply;	Yes	Chapters 1 and 6 describe threats to agricultural and natural resources due to water quantity or quality issues.
(8)	summary of existing local and regional water plans;	Yes	Chapter 1 contains descriptions of relevant existing local and regional water plans.
(9)	the identified historic drought(s) of record within the planning area;	Yes	Chapters 7 contain a discussion of historic droughts of record within the RWPA.
(10)	current preparations for drought within the RWPA;	Yes	Chapters 1 and 7 describe current preparations for drought within the region.
(11)	information compiled by the Board from water loss audits performed by retail public utilities; and	Yes	Chapters 1 and 5C summarize water loss audits compiled by the TWDB; Appendix 1-B presents the data.
(12)	an identification of each threat to agricultural and natural resources and a discussion of how that threat will be addressed or affected by the water management strategies evaluated in the plan.	Yes	Chapters 1 and 6 describe threats to agricultural and natural resources due to water quantity or quality issues. Chapter 5B provides a discussion of how WMSs address threats.
31 TAC §357.31			
(a); (f)	RWPs shall present projected population and WUG water demands for each planning decade.	Yes	Chapter 2 provides projections of population and WUG water demands for the period 2020-2070.

Regulatory Citation	Summary of Requirement	2016 Plan Compliance (Yes/No)	Location(s) in the Regional Plan and/or Other Commentary
(b)	RWPs shall present projected water demands associated with WWPs by category of water use, including municipal, manufacturing, irrigation, steam electric power generation, mining, and livestock for each county or portion of a county in the RWPA.	Yes	Chapter 2 provides projections of WWP water demands for all categories of water use. Appendix 2-D contains a summary of WWP demands by category, county, and basin.
(c)	RWPs shall report the current contractual obligations of WUG and WWPs to supply water in addition to any demands projected for the WUG or WWP.	Yes	Chapter 2 reports current contractual obligations of WUGs and WWPs.
(d)	Municipal demands shall be adjusted to reflect water savings due to plumbing fixture requirements identified in the Texas Health and Safety Code, Chapter 372.	Yes	Municipal demands, addressed in Chapter 2, include water savings due to plumbing fixture requirements. Chapter 5C includes further discussion of required water conservation measures.
(e)(1)-(2)	RWPs are to use population and water demands developed by the EA for the next water plan or use population and water demands revisions (only if requested).	Yes	Population projections and municipal water demands developed by the EA were used in development of the RWP; projections are presented in Chapter 2.
31 TAC §357.32			
(a)(1)-(2)	RWPGs shall evaluate the source water availability and existing water supplies that are legally available to WUGs and wholesale water providers during drought conditions.	Yes	Water availability, addressed in Chapter 3, includes water legally available to WUGs and WWPs during drought conditions.
(b); (c); (d)	RWPG evaluations shall consider surface water (firm yield unless otherwise requested) and groundwater (modeled, Board-issued) data from the state water plan, existing water rights, contracts and option agreements relating to water rights, other planning and water supply studies, and analysis of water supplies existing in and available to the RWPA during drought of record conditions.	Yes	The availability of water addressed in Chapter 3 included consideration for the requirements of this section. WMS evaluations in Chapter 5B used Chapter 3 availability.
(e)-(f)	RWPGs shall evaluate the existing water supplies for each WUG and WWP; existing contractual agreements should be taken into account.	Yes	Contractual agreements were taken into account as appropriate in the development of existing water supplies presented in Chapter 3.

Regulatory Citation	Summary of Requirement	2016 Plan Compliance (Yes/No)	Location(s) in the Regional Plan and/or Other Commentary
31 TAC §357.33			
(a); (b); (d)	RWPs shall include, for each planning decade, comparisons of existing water supplies and projected water demands to determine whether WUGs will experience water surpluses or needs for additional supplies. Results will be reported for WUGs and for WWPs by use categories, county, and basin as described in §357.31 (b)	Yes	Chapter 4 provides a comparison of water demands to supplies to determine surplus or needs for each WUG and WWP. The WWP and WUG results are reported in Appendix 4-A.
(c)	Social and economic impacts of water shortages will be evaluated.	Yes	A socio-economic impact analysis prepared by the TWDB was provided to the RWPG after submittal of the IPP. The analysis report is presented in Appendix 4-E and summarized in Chapter 4.
(e)	RWPGs shall perform a secondary water needs analysis (calculating water needs remaining after all conservation and direct reuse strategies are implemented) for all WUGs and WWPs for which conservation water management strategies or direct reuse water management strategies are recommended.	Yes	Secondary water needs analyses have been performed for WUGs and WWPS for which conservation WMSs were recommended by the TWDB. The data is presented in Appendix 4-B and summarized in Chapter 4.
31 TAC §357.34			
(a) & (b)	RWPGs shall identify and evaluate potentially feasible water management strategies for all WUGs and WWPs with identified water needs. The strategies shall meet new water supply obligations necessary to implement recommended water management strategies of WWPs and WUGs. RWPGs shall plan for water supply during Drought of Record conditions. In developing RWPs, RWPGs shall provide WMSs to be used during a drought of record.	Yes	Chapters 5A and 5B identify and evaluate potentially feasible WMSs for WUGs and WWPs.
(c)	Potentially feasible WMSs may include expanded use of existing supplies; new supply development; conservation and drought management measures; reuse; interbasin transfers of surface water; emergency transfers of surface water.	Yes	Chapter 5A describes the types of WMSs used in the 2016 Plan.
(d)(1)	Evaluations of potentially feasible water management strategies shall use the Commission's most current Water Availability Model and shall include the following analyses:	Yes	Chapter 3 describes the use of the WAM in the 2016 Plan. Strategies evaluated in Chapter 5B utilize available water supplies identified in Chapter 3.
(d)(2)	An equitable comparison between and consistent evaluation and application of all water management strategies the RWPGs determine to be potentially feasible for each water supply need	Yes	Chapter 5B contains WMS evaluations.

Regulatory Citation	Summary of Requirement	2016 Plan Compliance (Yes/No)	Location(s) in the Regional Plan and/or Other Commentary
(d)(3)(A)-(C)&(d)(5)	A quantitative reporting of: the net quantity, reliability, and cost of water delivered and treated for the end user's requirements during drought of record conditions; all applicable environmental factors; and impacts to natural and agricultural resources (including threats).	Yes	Chapter 5B contains WMS evaluations.
(d)(4); (d)(7)	A discussion of this RWP's impact on other water resources of the state and on local third-party social and environmental impacts.	Yes	Chapters 5B and 6 contain discussion of impacts on other water resources of the state and on local third-party social and environmental impacts.
(d)(8)	A description of the major impacts of recommended water management strategies on key parameters of water quality, comparing current conditions to recommended strategies.	Yes	Chapter 1 addresses issues of key parameters of water quality. Where appropriate, water quality is considered in the evaluations of WMSs in Chapter 5B.
(d)(9)	Consideration of water pipelines and other facilities that are currently used for water conveyance.	Yes	Chapter 5B includes consideration of conveyance for WMSs.
(f)(1); (f)(2)(A)-(D)	Conservation, Drought Management Measures, and Drought Contingency Plans shall be considered by RWPGs when developing the regional plans. Water conservation practices shall be included for each WUG beyond minimum requirements. Any interbasin water transfers will also include a water conservation strategy. Any water loss audits shall be addressed.	Yes	Chapters 5C and 7 contain most of the required information regarding conservation and drought management measures for each WUG.
(g)	RWPs shall include a subchapter consolidating the RWPG's recommendations regarding water conservation.	Yes	Summaries of the RWPG's recommendations regarding water conservation are included in Chapter 5C.
31 TAC §357.35			
(a);(b);(c);(f)	RWPGs shall recommend water management strategies to be used during a drought of record. Potentially feasible water management strategies shall be specific, cost effective, environmentally sensitive, and consistent with the long-term protection of the state's water, agricultural, and natural resources. Strategies shall protect existing water rights, water contracts, and option agreements.	Yes	Chapter 5A contains a list of potentially feasible WMSs identified. Chapter 5B evaluations were performed using a drought of record as a basis for the 2016 Plan.
(d)	Water management strategies shall meet all water needs for drought conditions, except when no water management strategy is feasible or when a political subdivision that provides water explicitly does not participate.	Yes	Chapter 5B WMSs were designed to meet water needs for drought conditions.

Regulatory Citation	Summary of Requirement	2016 Plan Compliance (Yes/No)	Location(s) in the Regional Plan and/or Other Commentary
(g)(1)	RWPGs shall report recommended water management strategies and the associated results of all the potentially feasible water management strategy evaluations by WUG and WWP.	Yes	Chapter 5B and associated appendices report results by WUG and WWP.
(g)(2)	Calculated supply factors for each WUG and WWP, by entity and planning decade, shall be calculated based on the sum of the total existing water supplies, plus all water supplies from recommended water management strategies; divided by total projected water demand.	Yes	Supply factors were evaluated by the TWDB and presented in Appendix 5B-E.
(g)(3)	Fully evaluated Alternative Water Management Strategies included in the adopted RWP shall be presented together in one place in the RWP.	Yes	Chapter 5B presents a summary of Alternative WMSs evaluated.
31 TAC §357.40			
(a)	RWPs shall include a quantitative description of the socioeconomic impacts of not meeting the identified water needs.	Yes	Appendix 4-D contains a socio-economic impact analysis prepared by the TWDB.
(b)(1)-(6)	RWPs shall include a description of the impacts of the RWP regarding agricultural resources, other water resources of the state, threats to agricultural and natural resources, third-party social and economic impacts resulting from voluntary water redistributions, water quality, and effects on navigation.	Yes	Chapter 6 contains discussion of impacts on other water resources of the state and on local third-party social and environmental impacts.
(c)	RWPs shall include a summary of the identified water needs that remain unmet by the RWP.	Yes	Chapter 5B includes a summary of unmet needs.
31 TAC §357.41			
	RWPGs shall describe how RWPs are consistent with the long-term protection of the state's water resources, agricultural resources, and natural resources.	Yes	Chapter 6 provides a demonstration of how the 2016 Plan is consistent with the long-term protection of the state's water resources, agricultural resources, and natural resources
31 TAC §357.42			
(a)	RWPs shall consolidate and present information on current and planned preparations for, and responses to, drought conditions in the region including drought of record conditions based on the following subsections:		
(b);(c)	RWPGs shall conduct an overall assessment of current preparations for drought and develop drought response recommendations for groundwater and surface water sources.	Yes	Chapter 7 describes current preparations for drought within the region.

Regulatory Citation	Summary of Requirement	2016 Plan Compliance (Yes/No)	Location(s) in the Regional Plan and/or Other Commentary
(d);(e)	RWPGs will collect (in a closed meeting) and submit (separately to the EA) information on existing major water infrastructure facilities that may be used for interconnections in event of an emergency shortage of water and will provide descriptions of local drought contingency plans that involve making emergency connections.	Yes	Chapter 7 describes emergency interconnections. Information related to existing interconnections is considered confidential and was not presented in the 2016 Plan.
(g)	The RWPGs shall evaluate, for all applicable municipal WUGs, potential emergency responses to local drought conditions or loss of existing water supplies, including identification of potential alternative water sources that may be considered for temporary emergency use.	Yes	Chapter 7 describes potential emergency responses to drought within the region.
(h)	RWPGs shall consider any relevant recommendations from the Drought Preparedness Council.	Yes	Relevant recommendations from the Drought Preparedness Council have been considered in Chapter 7.
(i); (i)(1)-(4)	RWPGs shall make drought preparation and response recommendations regarding local drought contingency plans; current drought management preparations, including drought response triggers and responses to drought conditions; and The Drought Preparedness Council and the State Drought Preparedness Plan.	Yes	Chapter 7 contains recommendations regarding local drought contingency plans and preparations.
(j)	The RWPGs shall develop region-specific model drought contingency plans.	Yes	Appendix 7-A includes model drought contingency plans.
31 TAC §357.43			
(a); (d)	The RWPs shall contain any regulatory, administrative, or legislative recommendations developed by the RWPGs, including those that the RWPG believes are needed and desirable to facilitate the orderly development, management, and conservation of water resources and prepare for and respond to drought conditions.	Yes	Chapter 8 includes relevant regulatory, administrative, and legislative recommendations of the RWPG.
(b); (c)	If "Ecologically Unique River and Stream Segments" and "Unique Sites for Reservoir Construction" are designated by the RWPGs, the RWP should include relevant descriptions, value, and other relevant criteria, as described in this section.	Yes	Chapter 8 includes recommendations regarding ecologically unique river and stream segments and unique sites for reservoir construction.

Regulatory Citation	Summary of Requirement	2016 Plan Compliance (Yes/No)	Location(s) in the Regional Plan and/or Other Commentary
31 TAC §357.44			
	RWPGs shall assess and quantitatively report on how individual local governments, regional authorities, and other political subdivisions in their RWPA propose to finance recommended water management strategies.	Yes	Appendix 9-A contains the infrastructure financing report and Chapter 9 summarizes the proposed financing.
31 TAC §357.45			
(a)	RWPGs shall describe the level of implementation of previously recommended water management strategies, recommended in the previous RWP, including conservation and drought management water management strategies; and the implementation of projects that have affected progress in meeting the state's future water needs.	Yes	Appendix 11-A summarizes the survey results reporting implementation of the 2011 Plan WMSs.
(b)(1)-(4)	RWPGs shall provide a brief summary of how the RWP differs from the previously adopted RWP with regards to: water demand projections; drought of record and hydrologic and modeling assumptions used in planning for the region; groundwater and surface water availability, existing water supplies, and identified water needs for WUGs and WWPs; and recommended and alternative water management strategies.	Yes	Chapter 11 provides a summary of how the 2016 Plan and the 2011 Plan differ.
31 TAC §357.50			
(a)	The RWPGs shall submit their adopted RWPs to the Board every five years on a date to be disseminated by the EA.	Yes	The 2016 Plan has been adopted in accordance with a schedule provided by the EA.
(b)	Prior to the adoption of the RWP, the RWPGs shall submit concurrently to the EA and the public an IPP. The IPP shall be distributed in accordance with Title 31 §357.21(d)(5).	Yes	The 2016 IPP was submitted to the TWDB as required.
(d)(1)-(3)	When adopting a RWP the RWPGs shall solicit, and consider properly submitted written comments from the EA and from any federal or Texas state agency; and properly submitted written or oral comments from the public.	Yes	The RWPG has considered comments from the EA, federal and state agency comments, and public comments in finalization of the 2016 Plan. Comments are available in Appendix 10-C.
(e)(1)(A)-(C)	When submitted, RWP shall include: a technical report, an executive summary, and summaries of and responses to all comments (written and oral).	Yes	The 2016 Plan includes a required technical report and executive summary. Responses to comments are included as Table 10.2

Regulatory Citation	Summary of Requirement	2016 Plan Compliance (Yes/No)	Location(s) in the Regional Plan and/or Other Commentary
31 TAC §358.3			
(2)	The regional water plans and state water plan shall serve as water supply plans under drought of record conditions.	Yes	The supply availability and existing water supplies evaluated in Chapter 3 assume drought of record conditions. Chapters 3 and 7 describe this evaluation.
(4)	Regional water plans shall provide for the orderly development, management, and conservation of water resources and preparation for and response to drought conditions so that sufficient water will be available at a reasonable cost to satisfy a reasonable projected use of water to ensure public health, safety, and welfare; further economic development; and protect the agricultural and natural resources of the regional water planning area.	Yes	Chapter 5B presents WMS evaluations developed in response to projected demands and potential drought conditions.
(5)	Regional water plans shall include identification of those policies and action that may be needed to meet Texas' water supply needs and prepare for and respond to drought conditions.	Yes	The Chapter 5B WMS evaluations identify policies and action that may be required in drought conditions.
(6)	RWPG decision-making shall be open to and accountable to the public with decisions based on accurate, objective and reliable information with full dissemination of planning results except for those matters made confidential by law.	Yes	Chapter 10 summarizes public notice requirements and provides examples of how these requirements were met during the planning cycle.
(7)	The RWPG shall establish terms of participation in its water planning efforts that shall be equitable and shall not unduly hinder participation.	Yes	Chapter 10 summarizes how participation was encouraged as a part of water planning efforts in the RWPA.
(27)	RWPGs shall conduct their planning to achieve efficient use of existing water supplies, explore opportunities for and the benefits of developing regional water supply facilities or providing regional management of water facilities, coordinate the actions of local and regional water resource management agencies, provide substantial involvement by the public in the decision-making process, and provide full dissemination of planning results.	Yes	Chapter 3 discusses the evaluations of existing water supplies, Chapter 1 summarizes local and regional plans considered in the planning process, and Chapter 10 summarizes public involvement in the region.
(28)	RWPGs must consider existing regional water planning efforts when developing their plans.	Yes	Chapter 1 summarizes existing regional water plans that were considered in development of the 2016 Plan.

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Appendix 7-A

Model Drought Contingency Plans

This appendix includes a Model Drought Contingency Plan for Public Water Suppliers and for Irrigation Districts in the ETRWPA.

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Drought Contingency Plan for [Public Water Supplier]

Date

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APPENDICES

APPENDIX A List of References

APPENDIX B Texas Commission on Environmental Quality Rules on Drought Contingency Plans

Drought Contingency Plan for [Public Water Supplier]

1. Objectives

This drought contingency plan (the Plan) is intended for use by [municipal water supplier]. The plan includes all current TCEQ requirements for a drought contingency plan.

This drought contingency plan serves to:

- Conserve available water supplies during times of drought and emergency.
- Minimize adverse impacts of water supply shortages.
- Minimize the adverse impacts of emergency water supply conditions.
- Preserve public health, welfare, and safety.

2. Texas Commission on Environmental Quality Rules

The TCEQ rules governing development of drought contingency plans for public water suppliers are contained in Title 30, Part 1, Chapter 288, Subchapter B, Rule 288.20 of the Texas Administrative Code.

TCEQ's minimum requirements for drought contingency plans are addressed in the following subsections of this report:

- 288.20(a)(1)(A) – Provisions to Inform the Public and Provide Opportunity for Public Input – Section 3
- 288.20(a)(1)(B) – Provisions for Continuing Public Education and Information – Section 4
- 288.20(a)(1)(C) – Coordination with the Regional Water Planning Group – Section 5
- 288.20(a)(1)(D) – Criteria for Initiation and Termination of Drought Stages – Section 7
- 288.20(a)(1)(E) – Drought and Emergency Response Stages – Section 8
- 288.20(a)(1)(F) – Specific, Quantified Targets for Water Use Reductions – Section 7

- 288.20(a)(1)(G) – Water Supply and Demand Management Measures for Each Stage – Section 8
- 288.20(a)(1)(H) – Procedures for Initiation and Termination of Drought Stages – Section 6
- 288.20(a)(1)(I) - Procedures for Granting Variances – Section 9
- 288.20(a)(1)(J) - Procedures for Enforcement of Mandatory Restrictions – Section 10
- 288.20(a)(3) – Consultation with Wholesale Supplier – Not applicable
- 288.20(b) – Notification of Implementation of Mandatory Measures – Section 6
- 288.20(c) – Review and Update of Plan – Section 11

[If you receive water from a wholesale supplier, you must include in your plan appropriate provisions for responding to reductions in the wholesale water supply.]

3. Provisions to Inform the Public and Opportunity for Public Input

[Public water supplier] will give customers the opportunity to provide public input into the preparation of the plan by one of the following methods:

- Holding a public meeting.
- Providing written notice of the proposed plan and the opportunity to comment on the plan by newspaper or posted notice.

4. Public Education

[Public water supplier] will notify the public about the drought contingency plan, including changes in Stage and drought measures to be implemented, by one or more of the following methods:

- Prepare a description of the Plan and make it available to customers at appropriate locations.
- Include utility bill inserts that detail the Plan
- Provide radio announcements that inform customers of stages to be initiated or terminated and drought measures to be taken

- Include an ad in a newspaper of general circulation to inform customers of stages to be initiated or terminated and drought measures to be taken

5. Coordination with the East Texas Regional Water Planning Group

This drought contingency plan will be sent to the Chair of the East Texas Regional Water Planning Group in order to ensure consistency with the East Texas Regional Water Plan. If any changes are made to the drought contingency plan, a copy of the newly adopted plan will be sent to the Regional Water Planning Group.

6. Initiation and Termination of Drought Response Stages

The designated official will order the implementation of a drought response stage when one or more of the trigger conditions for that stage exist, as described in Section 7. Official designees may also order the termination of a drought response stage when the termination criteria, as described in Section 7, are met or at their own discretion.

If any mandatory provisions have been implemented or terminated, the water supplier is required to notify the Executive Director of the TCEQ within 5 business days.

7. Goals for Reduction in Water Use

TCEQ requires that each public water supplier develop quantifiable goals for water use reduction for each stage of the drought contingency plan. These goals are outlined below.

[To be developed by each supplier. An example is provided.]

- Stage 1, Mild
    - 0 to 2 percent reduction in use that would have occurred in the absence of drought contingency measures.
- Stage 2, Moderate
    - 2 to 6 percent reduction in use that would have occurred in the absence of drought contingency measures

- Stage 3, Severe
    - 6 to 10 percent reduction in use that would have occurred in the absence of drought contingency measures
- Stage 4, Emergency
    - 10 to 14 percent reduction in use that would have occurred in the absence of drought contingency measures

8. Drought and Emergency Response Stages

Stage 1, Mild

Trigger Conditions for Stage 1, Mild

- A wholesale water supplier that provides all or part of [public water supplier]'s supply has initiated Stage 1, Mild
- [To be otherwise completed by public water supplier]
    - Potential triggers are:
        - When [public water supplier]'s available water supply is equal or less than [amount in ac-ft, percent of storage, etc.].
        - When total daily demand equals [number] million gallons for [number] consecutive days or [number] million gallons on a single day.
        - When the water level in [public water supplier]'s well(s) is equal or less than [number] feet above/below mean sea level.
        - When flows in the [name of river or stream segment] are equal to or less than [number] cubic feet per second.

Stage 1 will end when the circumstances that caused the initiation of Stage 1 no longer exist.

Goals for Use Reduction and Actions Available Under Stage 1, Mild

[Public water supplier] will reduce water use by [goal]. [Public water supplier] may order the implementation of any of the strategies listed below in order to decrease water use:

- Request voluntary reductions in water use.
- Review the problems that caused the initiation of Stage 1.
- Intensify leak detection and repair efforts

Stage 2, Moderate

Trigger Conditions for Stage 2, Moderate

- A wholesale water supplier that provides all or part of [public water supplier]'s supply has initiated Stage 2, Moderate
- [To be otherwise completed by public water supplier]
    - Potential triggers are:
        - When [public water supplier]'s available water supply is equal or less than [amount in ac-ft, percent of storage, etc.].
        - When total daily demand equals [number] million gallons for [number] consecutive days or [number] million gallons on a single day.
        - When the water level in [public water supplier]'s well(s) is equal or less than [number] feet above/below mean sea level.
        - When flows in the [name of river or stream segment] are equal to or less than [number] cubic feet per second.

Stage 2 will end when the circumstances that caused the initiation of Stage 2 no longer exist.

Goals for Use Reduction and Actions Available Under Stage 2, Moderate

[Public water supplier] will reduce water use by [goal]. [Public water supplier] may order the implementation of any of the strategies listed below in order to decrease water use:

- Request voluntary reductions in water use.
- Halt non-essential city government use
- Review the problems that caused the initiation of Stage 2.
- Intensify leak detection and repair efforts
- Implement mandatory restrictions on time of day outdoor water use in the summer.

Stage 3, Severe

Trigger Conditions for Stage 3, Severe

- A wholesale water supplier that provides all or part of [public water supplier]'s supply has initiated Stage 3, Severe
- [To be otherwise completed by public water supplier]
    - Potential triggers are:
        - When [public water supplier]'s available water supply is equal or less than [amount in ac-ft, percent of storage, etc.].
        - When total daily demand equals [number] million gallons for [number] consecutive days or [number] million gallons on a single day.
        - When the water level in [public water supplier]'s well(s) is equal or less than [number] feet above/below mean sea level.
        - When flows in the [name of river or stream segment] are equal to or less than [number] cubic feet per second.

Stage 3 will end when the circumstances that caused the initiation of Stage 3 no longer exist.

Goals for Use Reduction and Actions Available Under Stage 3, Severe

[Public water supplier] will reduce water use by [goal]. [Public water supplier] may order the implementation of any of the strategies listed below in order to decrease water use:

- Request voluntary reductions in water use.
- Require mandatory reductions in water use
- Halt non-essential city government use
- Review the problems that caused the initiation of Stage 3.
- Intensify leak detection and repair efforts
- Implement mandatory restrictions on time of day outdoor water use in the summer.
- Limit outdoor watering to specific weekdays.
- Create and implement a landscape ordinance.

Stage 4, Emergency

Trigger Conditions for Stage 4, Emergency

- A wholesale water supplier that provides all or part of [public water supplier]'s supply has initiated Stage 4, Emergency
- [To be otherwise completed by public water supplier]
    - Potential triggers are:
        - When [public water supplier]'s demand exceeds the amount that can be delivered to customers.
        - When [public water supplier]'s source becomes contaminated

- [Public water supplier]'s system is unable to deliver water due to the failure or damage of major water system components.

Stage 4 will end when the circumstances that caused the initiation of Stage 4 no longer exist.

Goals for Use Reduction and Actions Available Under Stage 4, Emergency

[Public water supplier] will reduce water use by [goal]. [Public water supplier] may order the implementation of any of the strategies listed below in order to decrease water use:

- Require mandatory reductions in water use
- Halt non-essential city government use
- Review the problems that caused the initiation of Stage 4.
- Intensify leak detection and repair efforts
- Implement mandatory restrictions on time of day outdoor water use in the summer.
- Limit outdoor watering to specific weekdays.
- Create and implement a landscape ordinance.
- Prohibit washing of vehicles except as necessary for health, sanitation, or safety reasons.
- Prohibit commercial and residential landscape watering
- Prohibit golf course watering except for greens and tee boxes
- Prohibit filling of private pools.
- Initiate a rate surcharge for all water use over [amount in gallons per month].

9. Procedure for Granting Variances to the Plan

The designated official may grant temporary variances for existing water uses otherwise prohibited under this drought contingency plan if one or more of the following conditions is met:

- Failure to grant such a variance would cause an emergency condition adversely affecting health, sanitation, or fire safety for the public or the person requesting the variance.
- Compliance with this plan cannot be accomplished due to technical or other limitations.
- Alternative methods that achieve the same level of reduction in water use can be implemented.

Variances shall be granted or denied at the discretion of the designated official. All petitions for variances should be in writing and should include the following information:

- Name and address of the petitioner(s)
- Purpose of water use
- Specific provisions from which relief is requested
- Detailed statement of the adverse effect of the provision from which relief is requested
- Description of the relief requested
- Period of time for which the variance is sought
- Alternative measures that will be taken to reduce water use
- Other pertinent information.

10. Penalty for Violation of Water Use Restriction

Mandatory restrictions are required by TCEQ regulation to have a penalty. These restrictions will be strictly enforced with the following penalties:

- Potential penalties
    - Written warning that they have violated the mandatory water use

restriction.

- Issue a citation. Minimum and maximum fines are established by ordinance.
- Discontinue water service to the user.

11. Review and Update of Drought Contingency Plan

This drought contingency plan will be updated at least every 5 years as required by TCEQ regulations.

Appendix A

List of References

APPENDIX A

List of References

Title 30 of the Texas Administrative Code, Part 1, Chapter 288, Subchapter B, Rule 288.20, downloaded from http://www.sos.state.tx.us/tac, May 2014.

Appendix B

Texas Commission on Environmental Quality Rules on Drought Contingency Plans

APPENDIX B
Texas Commission on Environmental Quality Rules on Drought Contingency Plans

Texas Administrative Code

TITLE 30	ENVIRONMENTAL QUALITY
PART 1	TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
CHAPTER 288	WATER CONSERVATION PLANS, DROUGHT CONTINGENCY PLANS, GUIDELINES AND REQUIREMENTS
SUBCHAPTER B	DROUGHT CONTINGENCY PLANS
RULE §288.20	**Drought Contingency Plans for Municipal Uses by Public Water Suppliers**

(a) A drought contingency plan for a retail public water supplier, where applicable, must include the following minimum elements.

(1) Minimum requirements. Drought contingency plans must include the following minimum elements.

(A) Preparation of the plan shall include provisions to actively inform the public and affirmatively provide opportunity for public input. Such acts may include, but are not limited to, having a public meeting at a time and location convenient to the public and providing written notice to the public concerning the proposed plan and meeting.

(B) Provisions shall be made for a program of continuing public education and information regarding the drought contingency plan.

(C) The drought contingency plan must document coordination with the regional water planning groups for the service area of the retail public water supplier to ensure consistency with the appropriate approved regional water plans.

(D) The drought contingency plan must include a description of the information to be monitored by the water supplier, and specific criteria for the initiation and termination of drought response stages, accompanied by an explanation of the rationale or basis for such triggering criteria.

(E) The drought contingency plan must include drought or emergency response stages providing for the implementation of measures in response to at least the following situations:

(i) reduction in available water supply up to a repeat of the drought of record;

(ii) water production or distribution system limitations;

(iii)supply source contamination; or

(iv)system outage due to the failure or damage of major water system components (e.g., pumps).

(F) The drought contingency plan must include specific, quantified targets for water use reductions to be achieved during periods of water shortage and drought. The entity preparing the plan shall establish the targets. The goals established by the entity under this subparagraph are not enforceable.

(G) The drought contingency plan must include the specific water supply or water demand management measures to be implemented during each stage of the plan including, but not limited to, the following:

(i) curtailment of non-essential water uses; and

(ii) utilization of alternative water sources and/or alternative delivery mechanisms with the prior approval of the executive director as appropriate (e.g., interconnection with another water system, temporary use of a non-municipal water supply, use of reclaimed water for non-potable purposes, etc.).

(H) The drought contingency plan must include the procedures to be followed for the initiation or termination of each drought response stage, including procedures for notification of the public.

(I) The drought contingency plan must include procedures for granting variances to the plan.

(J) The drought contingency plan must include procedures for the enforcement of mandatory water use restrictions, including specification of penalties (e.g., fines, water rate surcharges, discontinuation of service) for violations of such restrictions.

(2) Privately-owned water utilities. Privately-owned water utilities shall prepare a drought contingency plan in accordance with this section and incorporate such plan into their tariff.

(3) Wholesale water customers. Any water supplier that receives all or a portion of its water supply from another water supplier shall consult with that supplier and shall include in the drought contingency plan appropriate provisions for responding to reductions in that water supply.

(b) A wholesale or retail water supplier shall notify the executive director within five business days of the implementation of any mandatory provisions of the drought contingency plan.

(c) The retail public water supplier shall review and update, as appropriate, the drought contingency plan, at least every five years, based on new or updated information, such as the adoption or revision of the regional water plan.

Source Note: The provisions of this §288.20 adopted to be effective February 21, 1999, 24 TexReg 949; amended to be effective April 27, 2000, 25 TexReg 3544; amended to be effective October 7, 2004, 29 TexReg 9384

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Model Drought Contingency Plan for [Irrigation District]

Date

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7. Drought and Emergency Response Stages
8. Procedures for Use Accounting
9. Procedures for the Transfer of Water Allocations Among Individual Users
10. Penalty for Violation of Water Use Restriction
11. Review and Update of Drought Contingency Plan

Drought Contingency Plan for [Irrigation District]

1. Introduction

[Include basic information about the Irrigation District and its operations, for example location; service area; water rights; water sources; service accounts; types of irrigation and irrigation practices; crop types; and diversion, storage, and conveyance infrastructure.]

2. Objectives

This drought contingency plan is intended for use by [irrigation district]. The plan includes all current TCEQ requirements for a drought contingency plan.

This drought contingency plan serves to:

- Conserve available water supplies during times of drought and emergency.
- Minimize adverse impacts of water supply shortages.
- Minimize the adverse impacts of emergency water supply conditions.

This model plan is a template for irrigation users to use as they develop their own drought contingency plans. This model plan includes all of the elements required by TCEQ. Each irrigation user should customize the details to match its unique situation. The final adopted version should be provided to the TCEQ.

3. Texas Commission on Environmental Quality Rules

The TCEQ rules governing development of drought contingency plans for irrigation districts are contained in Title 30, Part 1, Chapter 288, Subchapter B, Rule 288.21 of the Texas Administrative Code.

TCEQ's minimum requirements for drought contingency plans are addressed in the following subsections of this report:

TAC Reference	Subject	Plan Location
30 TAC §288.21(a)(1)(A)	Provisions to Inform the Public and Provide Opportunity for Public Input	Section 4
30 TAC §288.21(a)(1)(B)	Document Coordination with Regional Planning Group	Section 5
30 TAC §288.21(a)(1)(C)	Criteria for Initiation and Termination of Water Allocation	Sections 6 & 7
30 TAC §288.21(a)(1)(D)	Specific, Quantified Targets for Water Use Reduction	Section 8
30 TAC §288.21(a)(1)(E)	Procedures for Determining the Allocation of Irrigation Supplies to Individual Users	Section 8
30 TAC §288.21(a)(1)(F)	Procedures for Initiation and Termination of Water Allocation	Sections 6 & 7
30 TAC §288.21(a)(1)(G)	Procedures for Use Accounting During Water Allocation	Section 9
30 TAC §288.21(a)(1)(H)	Procedures for the Transfer of Water Allocations Among Individual Users	Section 10
30 TAC §288.21(a)(1)(I)	Procedures for Enforcement of Water Allocation Policies	Section 11
30 TAC §288.21(a)(2)	Consultation with Wholesale Supplier	Section 12
30 TAC §288.21(a)(3)	Protection of Public Water Supplies	Section 13
30 TAC §288.21(a)(3)(b)	Review and Update of Plan	Section 14

4. Provisions to Inform the Public and Opportunity for Public Input

[Irrigation district] will give customers the opportunity to provide public input into the preparation of the plan by one of the following methods:

- Holding a public meeting.
- Providing written notice of the proposed plan and the opportunity to comment on the plan by newspaper or posted notice.

5. Coordination with the East Texas Regional Water Planning Group

This drought contingency plan will be sent to the Chair of the East Texas Regional Water Planning Group in order to ensure consistency with the East Texas Regional Water Plan. If any changes are made to the drought contingency plan, a copy of the newly adopted plan will be sent to the Regional Water Planning Group.

6. Initiation of Water Allocation

The *[designated official]* shall monitor water supply conditions on a *[e.g. weekly, monthly]* basis and shall make recommendations to the Board regarding irrigation of

water allocation. Upon approval of the Board, water allocation will become effective when:

[Below are examples of the types of triggering criteria that might be used; singly or in combination, in an irrigation district's drought contingency plan:

- *A wholesale water supplier that provides all or part of an irrigation user's supply has initiated water allocation.*
- *When the district Board determines that there is insufficient water to complete the traditional crop year.*
- *When [irrigation district]'s available water supply is equal or less than [amount in ac-ft, amount in inches per acre, percent of storage, etc.].*
- *When total daily demand equals [number] million gallons for [number] consecutive days or [number] million gallons on a single day.*
- *When the water level in [irrigation district]'s well(s) is equal or less than [number] feet above/below mean sea level.*
- *When flows in the [name of river or stream segment] are equal to or less than [number] cubic feet per second.*

7. Termination of Water Allocation

The district's water allocation policies will remain in effect until the conditions defined in Section 6 no longer exist and the Board deems that the need to allocate water no longer exists.

8. Water Allocation

a) One allocation account will be associated with each parcel of land identified by ownership for flat rate assessment purposes as shown in the records of the District.

b) In identifying specific, quantified targets for water allocation to be achieved

during periods of water shortages and drought, each allocation account shall be allocated *[number]* irrigations or *[number]* acre-feet of water for each flat rate acre on which all taxes, fees, and charges have been paid. The water allotment in each allocation account will be expressed in acre-feet of water.

[Include explanation of water allocation procedure. For example, in the Lower Rio Grande Valley, an "irrigation" is typically considered to be equivalent to eight (8) inches of water per irrigation acre; consisting of six (6) inches of water per acre applied plus two (2) inches of water lost in transporting the water from the river to the land. Thus, three irrigations would be equal to 24 inches of water per acre or an allocation of 2.0 acre-feet of water measured at the diversion from the river.]

c) As additional water supplies become available to the District in an amount reasonably sufficient for allocation to the District's irrigation users, the additional water made available to the District will be equally distributed, on a pro rata basis, to those allocation accounts having _____.

[Example 1: An account balance of less than _____ irrigations for each flat rate acre (i.e. ____ acre-feet).

Example 2: An account balance of less than _____ acre-feet of water for each flat rate acre.

Example 3: An account balance of less than _____ acre-feet of water.]

d) The amount of water charged against an allocation account will be *[number, e.g., eight inches]* per irrigation unless water deliveries to the land are metered. Metered water deliveries will be charges based on actual measured use. In order to maintain parity in charging use against a water allocation between non-metered and metered deliveries, a loss factor of *[number]* percent of the water delivered in a metered situation will be added to the measured use and will be charged against the user's water allocation. Any metered use, with the loss factor applied, that is less than *[number]* inches per acre shall be credited back to the allocation unit and

will be available to the user. It shall be a violation of the Rules and Regulations for a water user to use water in excess of the amount of water contained in the users allocation account.

e) Acreage in an allocation account that has not been irrigated for any reason within the last two consecutive years will be considered inactive and will not be allocated water. Any landowner whose land has not been irrigated within the last two consecutive years, may, upon application to the District expressing intent to irrigate the land, receive future allocations. However, irrigation water allocated shall be applied only upon the acreage to which it was allocated and such water allotment cannot be transferred until there have been two consecutive years of use.

9. Procedures for Use Accounting During Water Allocation

For unmetered water use, the District will record the number of irrigations performed by each allocation account. As additional water becomes available for each allocation, additional irrigations are added to each allocation account. For metered water deliveries, actual measured use plus the conveyance loss factor is recorded and deducted from the user's allocation.

10. Procedures for the Transfer of Water Allocations Among Individual Users

A water allocation in an active irrigation account may be transferred within the boundaries of the District from one irrigation account to another. The transfer of water can only be made by the landowner's agent who is authorized in writing to act on behalf of the landowner in the transfer of all or part of the water allocation from the described land of the landowner covered by the irrigation account.

A water allocation may not be transferred to land owned by a landowner outside the District boundaries. *[OR: A water allocation may be transferred to land outside the District's boundaries by paying the current water charge as if the water was actually delivered by the District to the land covered by an irrigation account. The amount of water allowed to be transferred shall be stated in terms of acre-feet and deducted from*

the landowner's current allocation balance in the irrigation account. Transfers of water outside the District shall not affect the allocation of water under Section VII of these Rules and Regulations.]

Water from outside the District may not be transferred by a landowner for use within the District. *[OR: Water from outside the District may be transferred by a landowner for use within the District. The District will divert and deliver the water on the same basis as District water is delivered, except that a ___ percent conveyance loss will be charged against the amount of water transferred for use in the District as the water is delivered.]*

11. Enforcement of Water Allocation Policies

Any person who willfully opens, closes, changes or interferes with any headgate or uses water in violation of Section 11.083, Texas Water Code, may be assessed an administrative penalty up to $5,000 a day under Section 11.0842 of the Texas Water Code. Additionally, if the violator is also taking, diverting, or appropriating state water, the violator may be assessed a civil penalty in court of up to $5,000 a day. These penalties are provided by the laws of the State and may be enforced by complaints filed in the appropriate court jurisdiction in *[Name]* County, all in accordance with Section 11.083; and in addition, the District may pursue a civil remedy in the way of damages and/or injunction against the violation of any of the foregoing Policies.

12. Consultation with Wholesale Water Supplier

[Provide a description of consultations with the wholesale water supplier(s), if any.

Any irrigation water supplier that receives all or a portion of its water supply from another water supplier shall consult with that supplier and shall include in the drought contingency plan, appropriate provisions for responding to reductions in that water supply.]

13. Protection of Public Water Supplies

[Provide a description of provisions to protect public water supplies, if applicable.

Any irrigation water supplier that also provides or delivers water to a public water supplier(s) shall consult with that public water supplier(s) and shall include in the plan, mutually agreeable and appropriate provisions to ensure an uninterrupted supply of water necessary for essential uses relating to public health and safety. Nothing in this provision shall be construed as requiring the irrigation water supplier to transfer irrigation water supplies to non-irrigation use on a compulsory basis or without just compensation.]

14. Review and Update of Drought Contingency Plan

This drought contingency plan will be updated at least every 5 years as required by TCEQ regulations. The District will provide the updated plan to the TCEQ and the East Texas Region Water Planning Group.

15. References

The following references were used extensively in the development of this model plan, particularly in Sections 6 through 11:

1. Texas Commission on Environmental Quality: *Handbook for Drought Contingency Planning for Irrigation Districts*, April 2005.

2. Harlingen Irrigation District Cameron County #1: *Documents for Water Diversions and Deliveries*, Amended May 19, 2003.

3. Texas Commission on Environmental Quality: "Drought Contingency Plans for Irrigation Use," Texas Administrative Code Title 30 Part I Subchapter A §288.21, effective October 7, 2004.

Appendix 8-A

Proposed Reservoir Site Locations

Chapter 8 of the 2016 Plan provides a description of proposed reservoirs in the ETRWPA. This appendix includes maps showing the locations of these proposed reservoirs.

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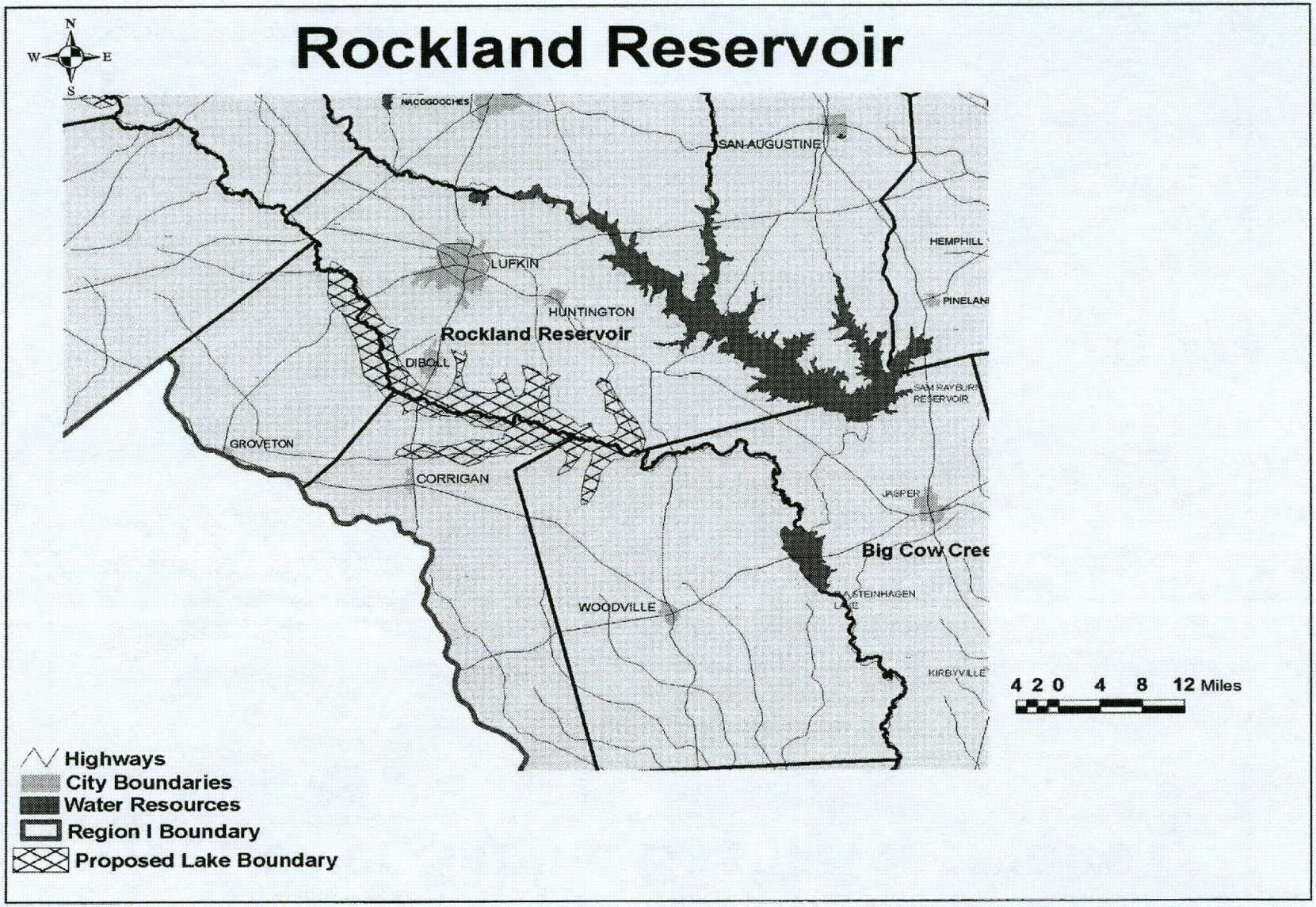
Rockland Reservoir
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SAN AUGUSTINE
HEMPHILL
LUFKIN
PINELAND
HUNTINGTON
Rockland Reservoir
DIBOLL
SAM RAYBURN RESERVOIR
GROVETON
CORRIGAN
JASPER
Big Cow Cree
WOODVILLE
KIRBYVILLE
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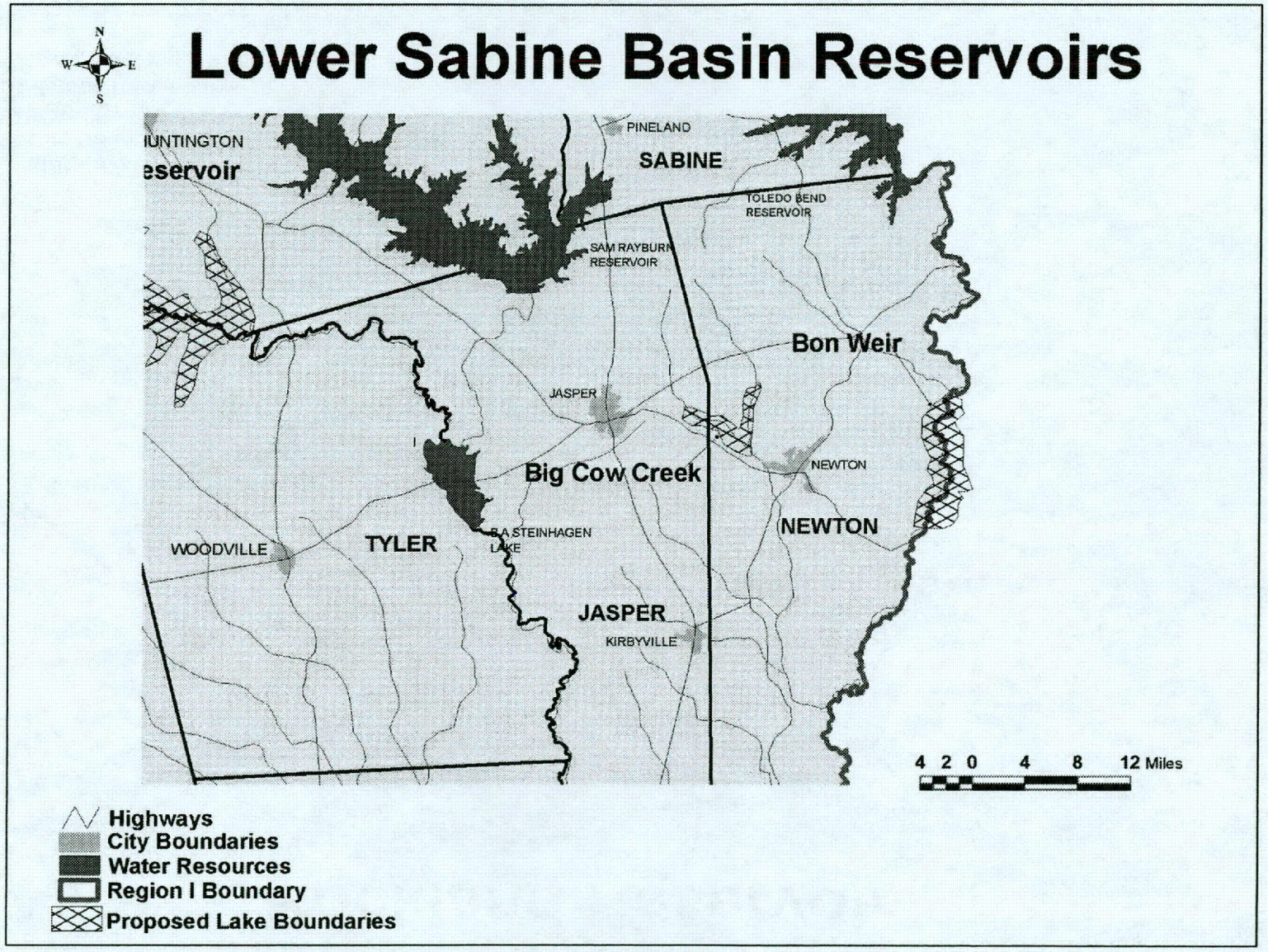
Highways
City Boundaries
Water Resources
Region I Boundary
Proposed Lake Boundary


Lower Sabine Basin Reservoirs
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RESERVOIR
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Bon Weir
JASPER
Big Cow Creek
NEWTON
NEWTON
B.A.STEINHAGEN
LAKE
WOODVILLE
TYLER
JASPER
KIRBYVILLE
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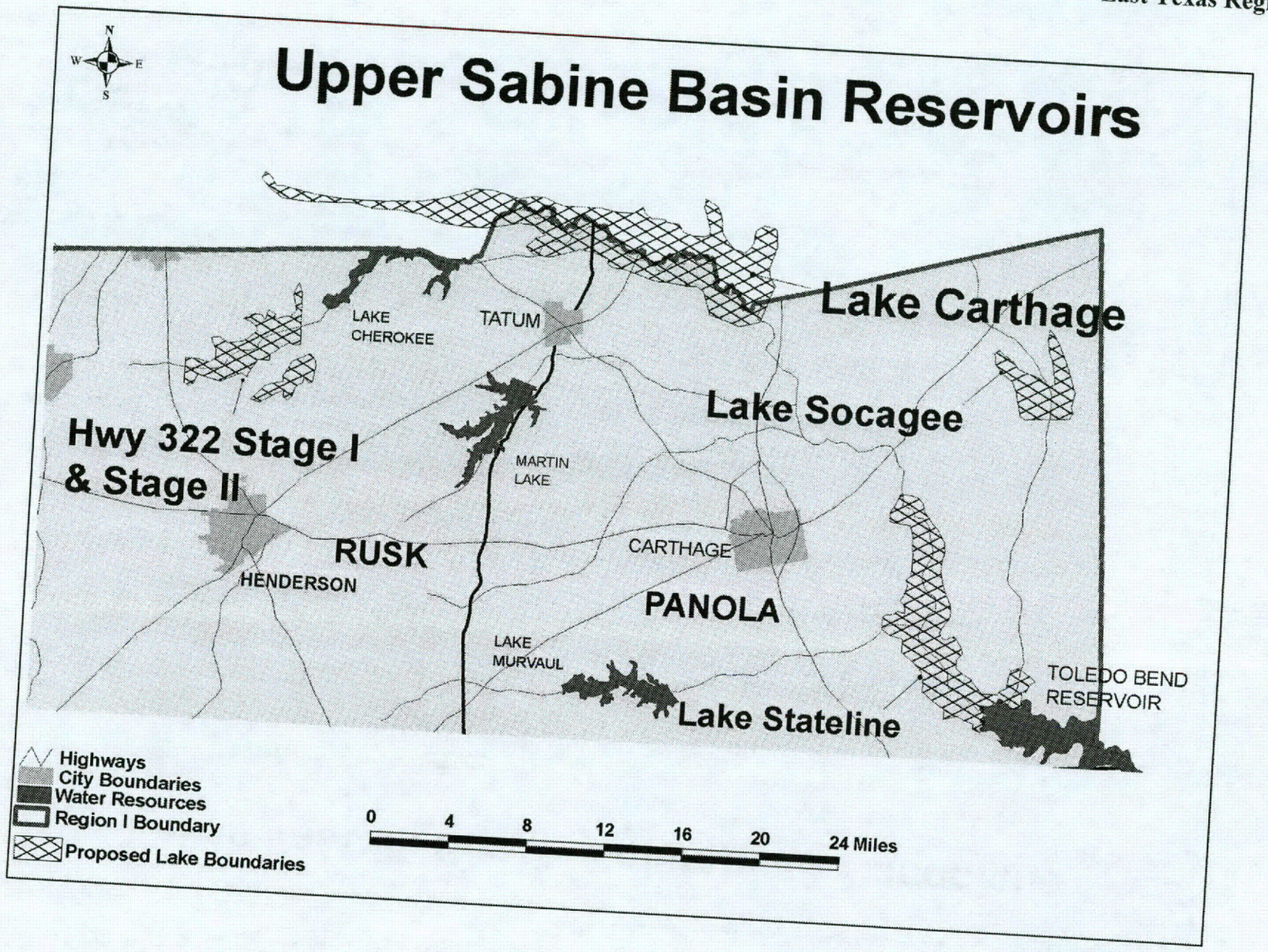
Highways
City Boundaries
Water Resources
Region I Boundary
Proposed Lake Boundaries


Upper Sabine Basin Reservoirs
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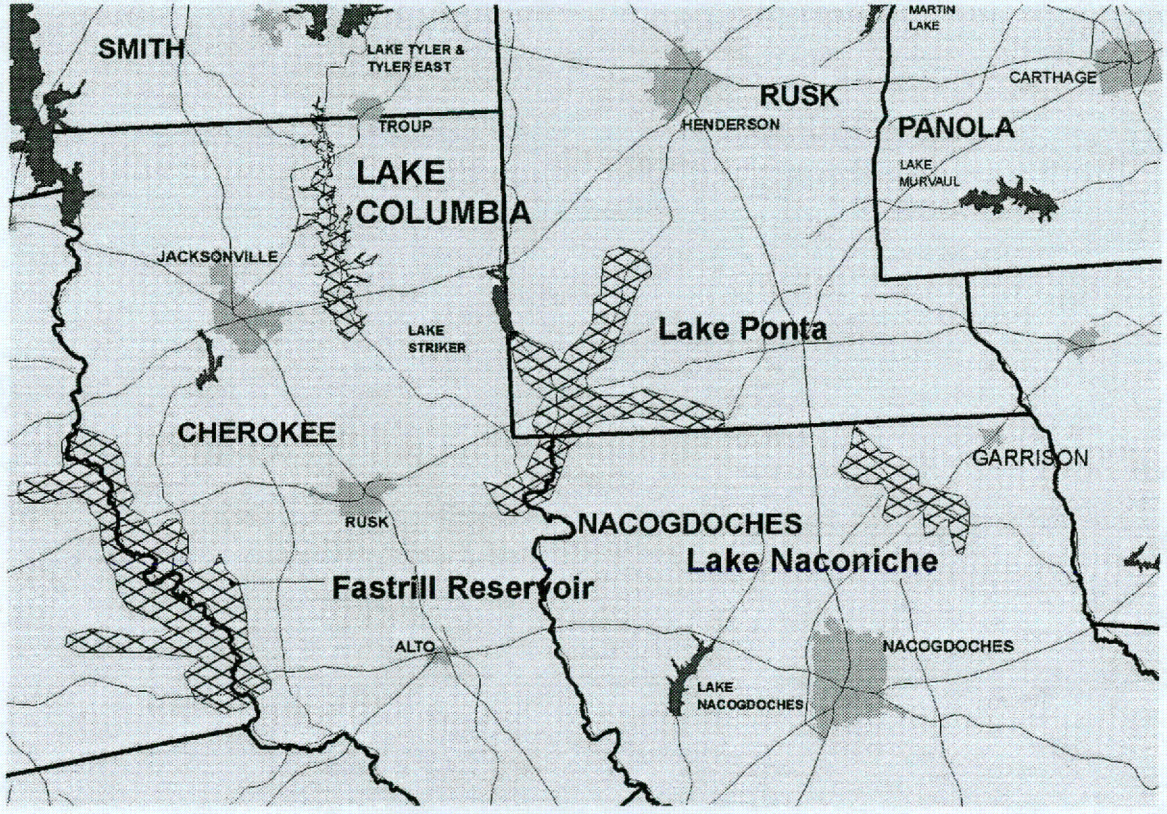
LAKE CHEROKEE
TATUM
Lake Carthage
Lake Socagee
Hwy 322 Stage I & Stage II
MARTIN LAKE
RUSK
HENDERSON
CARTHAGE
PANOLA
LAKE MURVAUL
Lake Stateline
TOLEDO BEND RESERVOIR
Highways
City Boundaries
Water Resources
Region I Boundary
Proposed Lake Boundaries
0 4 8 12 16 20 24 Miles

Lakes Fastrill, Ponta, Columbia & Naconiche



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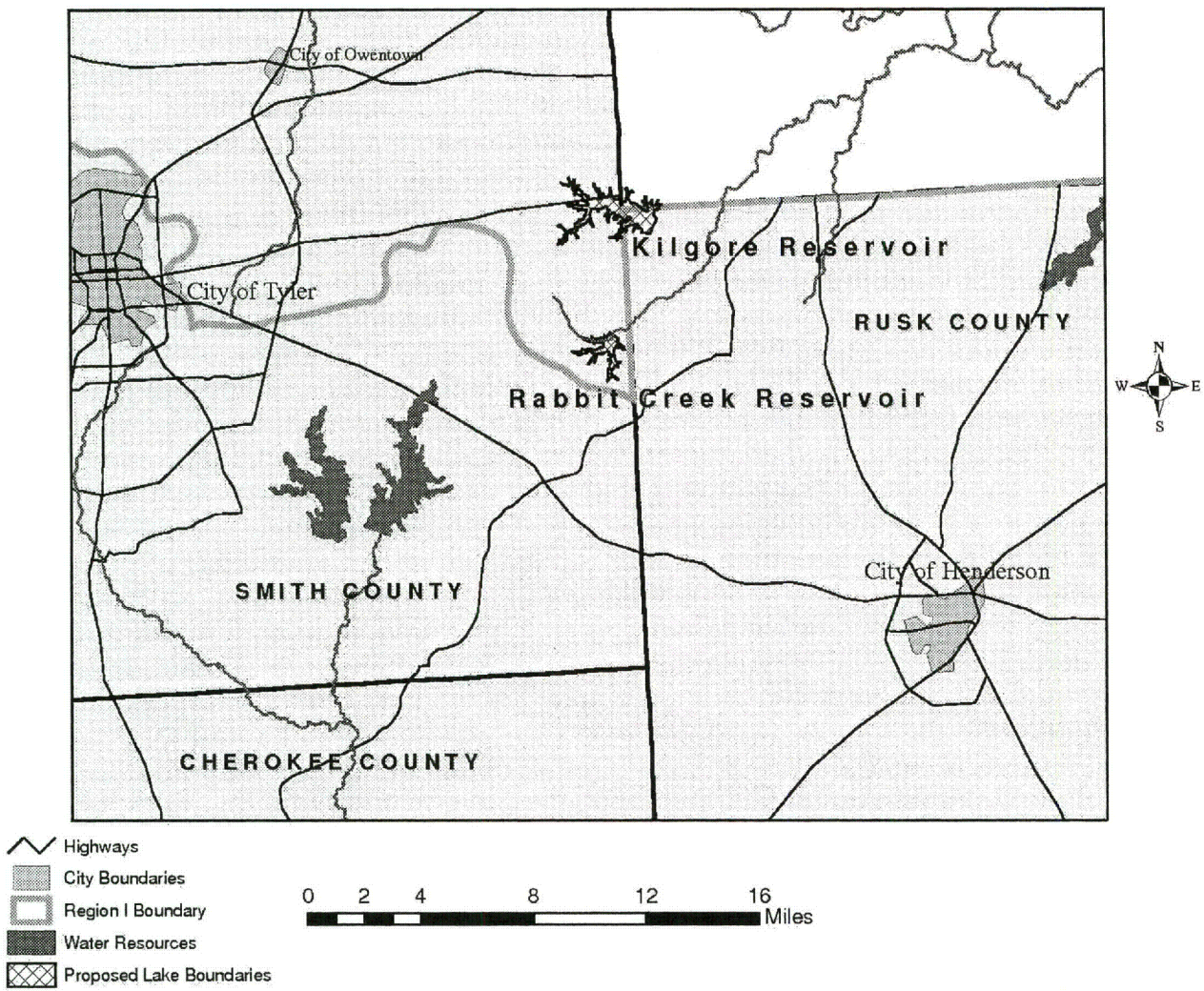

Appendix 8-B

2011 Prioritization Comments & Concerns Memorandum

This appendix includes a technical memorandum prepared by the Consultant Team as part of the 2011 Prioritization submittal from the ETRWPG to the TWDB. This document describes some of the primary concerns and observations of the Technical Committee for the ETRWPA regarding the 2011 Prioritization process.

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ALAN PLUMMER ASSOCIATES, INC.
ENVIRONMENTAL ENGINEERS • DESIGNERS • SCIENTISTS

MEMORANDUM

East Texas Regional Water Planning Area
Prioritization of Projects in the 2011 Regional Water Plan
Regional Water Planning Group Comments & Concerns

Project No: 1600-002-01

Date: August 29, 2014

Prepared For: East Texas Regional Water Planning Group

Prepared By: Rex H. Hunt, P.E., Alan Plummer Associates, Inc.
Cynthia A. Syvarth, E.I.T., Alan Plummer Associates, Inc.
Simone Kiel, P.E., Freese and Nichols, Inc.

The 83rd Texas Legislature, through House Bill 4 (2013), requires each of the 16 Regional Water Planning Groups (RWPG) to prioritize the recommended water management strategies (WMS) in each region's 2011 Regional Water Plan (2011 Plan). Each group provided recommended WMSs to the Texas Water Development Board (TWDB) through the 2012 state water plan database (DB12). To facilitate this task, the TWDB formed a HB4 Stakeholder Committee (SHC) comprised of the 16 RWPG Chairs; the SHC developed Uniform Standards to be used by each RWPG to prioritize projects. These Uniform Standards were adopted by the SHC November 14, 2013 and approved by the governing Board of TWDB December 5, 2013.

In a transmittal dated January 6, 2014, the TWDB provided an alphabetized region-sponsor-strategy prioritization template of projects that each region is responsible for prioritizing. The template includes scoring methodologies, scales, and weighting factors for each uniform standard as developed by the SHC.

This memorandum transmits comments and concerns of the East Texas Regional Water Planning Group (ETRWPG) regarding the prioritization process and Uniform Standards provided by the TWDB. The following comments and concerns were initially developed at the ETRWPG Technical Committee meeting held March 25, 2014, and have been adjusted as a result of further discussion in the ETRWPG meeting held May 21, 2014.

Prioritized Projects Using Information Available in 2011

The transmittal provided from the TWDB did not specify the information to be used in applying each uniform standard.

- Each uniform standard was applied according to information available at the time the 2011 Plan was adopted rather than considering the current status of each project.

- The information used was a compilation of data available in the 2011 Plan and the consultant's knowledge of each project at that time. Project updates were not solicited from Wholesale Water Providers (WWP) or Water User Groups (WUG) as a part of the prioritization process developed.

Further Descriptions Needed for Projects

The information in the DB12 has been found to be inaccurate or unclear in some cases, but this information drives much of the scoring in prioritization.

- Care should be taken in development of the DB17 to provide more clarity, resolve problems, and minimize risk of inappropriate scoring.
- There is concern on how the public will react to the prioritization rankings, and the ETRWPG believes adding commentary to the scoring template to provide more details for each project could help.
- All of the projects provided in the template from the TWDB were prioritized regardless of whether or not the project will seek state funding, is no longer being considered by the sponsor, or has already been completed.

Current Uniform Standards Result in Numerous Ties

The scoring criteria for the uniform standards do not allow enough variability to minimize ties in final scores at the regional level.

- Approximately 40% of the ETRWPG 2011 projects result in a prioritization final score equal to the final score of at least one other project.
- The ETRWPG is concerned with final score ties at both the regional and state level in regards to how the TWDB will allocate funds.
- One potential way of resolving ties could be to allow regions to add their own unique scoring criteria that would be used specifically for the purpose of breaking such ties. Would regions be allowed to develop and use additional criteria?

Uniform Standard 2A

This uniform standard reads as follows:
What supporting data is available to show that the quantity of water needed is available? [Models suggest insufficient quantities of water or no modeling performed = 0 points; models suggest sufficient quantity of water = 3; Field tests and measurements confirm sufficient quantities of water = 5]

- The scoring criteria do not allow a surface water source to receive the maximum score for this standard because field tests and measurements are not used to confirm sufficient quantities of surface water.

- The Technical Committee would like the SHC to consider revising Uniform Standard 2A to enable a new surface water source to receive a 5 for this standard if models suggest a sufficient quantity of water.

Uniform Standard 3C

This uniform standard reads as follows:
Is this project the only economically feasible source of new supply for the WUG, other than conservation? [No = 0 points; Yes = 5]

- An advantage is given to sponsors with only one recommended WMS, and there is a disadvantage to sponsors with several recommended WMSs, even if one of these projects is the most economically feasible source of new supply.

Uniform Standard 3D

This uniform standard reads as follows:
Does this project serve multiple WUGs? [No = 0 points; Yes = 5]

- The scoring criteria do not account for how many WUGs a recommended WMS serves. A more detailed scoring breakdown to distinguish between two WUGs served and numbers of WUGs greater than two would be helpful.

Projects Shared across Regions

Several strategies either provide water to or receive water from a strategy in another region. These projects have a cost that is either shared with or borne by one region or the other.

- The current prioritization instructions do not indicate if any of the Uniform Standards need to be evaluated differently for these types of projects.
- The TWDB has not disclosed to the regions how projects serving more than one region will be integrated into one list.

Water Type and Water Use Category

The Uniform Standards do not differentiate between raw water and treated water strategies or water use categories (Municipal, Manufacturing, Livestock, etc.).

- It is not appropriate to compare strategies with different water types or different water use categories against one another because certain uniform standards may benefit one water type or use over another. For example, raw water strategies tend to be less expensive than treated water strategies.

Agriculture / Conservation Projects

The prioritization template has the yellow "Rural / Agricultural Conservation?" and "Conservation Reuse?" columns protected and are therefore read-only even though the "read me" sheet indicates the RWPG should input data into yellow cells.

- The ETRWPG decided to leave these columns blank as the TWDB did not advise the group on how to mark the agriculture and conservation columns in the scoring sheet for the 2011 Prioritization.

Project Roll-Ups

The TWDB has given RWPGs the option to roll up projects that are linked via a funding relationship.

- The ETRWPG believes that the concept of scoring using rolled up projects is valid and helpful to WUGs. However, there is a concern that the definition of what constitutes a roll-up is not clear, making it difficult to identify some projects that may otherwise be eligible for scoring as a roll-up. Additional clarification should be considered.

Appendix 9-A

Infrastructure Financing Report – Survey Results

This appendix includes surveys from Water User Groups with identified needs conducted by the ETRWPG. The survey determined or confirmed infrastructure costs and potential funding sources for infrastructure projects.

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Sponsor Entity Name	Sponsor Entity Privacy Region	Project Name	WMS Project Sponsor Region	IFR Element Name	IFR Element Value	Year Of Need	IFR Project Data ID	Entity Rwp ID	WMS Project ID	IFR Project Elements ID
ALTO RURAL WSC	I	CHE-ALT - NEW WELLS IN CARRIZO WILCOX	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$480,000.00	2040		167	2089	1
ALTO RURAL WSC	I	CHE-ALT - NEW WELLS IN CARRIZO WILCOX	I	CONSTRUCTION FUNDING	$2,202,000.00	2040		167	2089	2
ALTO RURAL WSC	I	CHE-ALT - NEW WELLS IN CARRIZO WILCOX	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2040		167	2089	3
ANGELINA & NECHES RIVER AUTHORITY	I	ANRA-COL - LAKE COLUMBIA CONSTRUCTION	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$172,089,000.00	2020		3	1696	1
ANGELINA & NECHES RIVER AUTHORITY	I	ANRA-COL - LAKE COLUMBIA CONSTRUCTION	I	CONSTRUCTION FUNDING	$172,409,000.00	2020		3	1696	2
ANGELINA & NECHES RIVER AUTHORITY	I	ANRA-COL - LAKE COLUMBIA CONSTRUCTION	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2020		3	1696	3
ANGELINA & NECHES RIVER AUTHORITY	I	ANRA-GW-NEW GROUNDWATER WELLS INFRASTRUCTURE	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$3,752,000.00	2020		3	2051	1
ANGELINA & NECHES RIVER AUTHORITY	I	ANRA-GW-NEW GROUNDWATER WELLS INFRASTRUCTURE	I	CONSTRUCTION FUNDING	$22,271,000.00	2020		3	2051	2
ANGELINA & NECHES RIVER AUTHORITY	I	ANRA-GW-NEW GROUNDWATER WELLS INFRASTRUCTURE	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2020		3	2051	3
ANGELINA & NECHES RIVER AUTHORITY	I	ANRA-WTP-WTP CONSTRUCTION	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$19,746,157.00	2020		3	2136	1
ANGELINA & NECHES RIVER AUTHORITY	I	ANRA-WTP-WTP CONSTRUCTION	I	CONSTRUCTION FUNDING	$97,503,843.00	2020		3	2136	2
ANGELINA & NECHES RIVER AUTHORITY	I	ANRA-WTP-WTP CONSTRUCTION	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2020		3	2136	3
ANGELINA & NECHES RIVER AUTHORITY	I	CHER-MIN-INFRASTRUCTURE	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$1,598,000.00	2020		3	2052	1
ANGELINA & NECHES RIVER AUTHORITY	I	CHER-MIN-INFRASTRUCTURE	I	CONSTRUCTION FUNDING	$2,616,000.00	2020		3	2052	2
ANGELINA & NECHES RIVER AUTHORITY	I	CHER-MIN-INFRASTRUCTURE	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2020		3	2052	3
ANGELINA NACOGDOCHES WCID #1	I	LAKE-STRIKER-DREDGING	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$3,557,400.00	2040		4	2199	1
ANGELINA NACOGDOCHES WCID #1	I	LAKE-STRIKER-DREDGING	I	CONSTRUCTION FUNDING	$20,158,600.00	2040		4	2199	2
ANGELINA NACOGDOCHES WCID #1	I	LAKE-STRIKER-DREDGING	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2040		4	2199	3
ANGELINA NACOGDOCHES WCID #1	I	STRIKER-VOLUMETRIC SURVEY	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$25,000.00	2020		4	2198	1
ANGELINA NACOGDOCHES WCID #1	I	STRIKER-VOLUMETRIC SURVEY	I	CONSTRUCTION FUNDING	$0.00	2020		4	2198	2
ANGELINA NACOGDOCHES WCID #1	I	STRIKER-VOLUMETRIC SURVEY	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2020		4	2198	3
ATHENS MUNICIPAL WATER AUTHORITY	I	ATHENS MWA WTP INFRASTRUCTURE IMPROVEMENTS Q-145	C	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$380,500.00	2020		6	1075	1
ATHENS MUNICIPAL WATER AUTHORITY	I	ATHENS MWA WTP INFRASTRUCTURE IMPROVEMENTS Q-145	C	CONSTRUCTION FUNDING	$2,519,500.00	2020		6	1075	2
ATHENS MUNICIPAL WATER AUTHORITY	I	ATHENS MWA WTP INFRASTRUCTURE IMPROVEMENTS Q-145	C	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2020		6	1075	3
BEAUMONT	I	BEAU ENHANCED WATER LOSS CONTROL PROGRAM	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$6,072,000.00	2030		9	2042	1
BEAUMONT	I	BEAU ENHANCED WATER LOSS CONTROL PROGRAM	I	CONSTRUCTION FUNDING	$46,551,000.00	2030		9	2042	2
BEAUMONT	I	BEAU ENHANCED WATER LOSS CONTROL PROGRAM	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2030		9	2042	3
BETHEL-ASH WSC	I	CONSERVATION, WATER LOSS CONTROL - BETHEL-ASH WSC	C	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$0.00	2020		235	1300	1
BETHEL-ASH WSC	I	CONSERVATION, WATER LOSS CONTROL - BETHEL-ASH WSC	C	CONSTRUCTION FUNDING	$4,744.00	2020		235	1300	2
BETHEL-ASH WSC	I	CONSERVATION, WATER LOSS CONTROL - BETHEL-ASH WSC	C	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2020		235	1300	3
BULLARD	I	SMTH-BLD-INFRASTRUCTURE	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$1,660,500.00	2020		288	2046	1
BULLARD	I	SMTH-BLD-INFRASTRUCTURE	I	CONSTRUCTION FUNDING	$3,599,500.00	2020		288	2046	2
BULLARD	I	SMTH-BLD-INFRASTRUCTURE	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2020		288	2046	3
CENTER	I	CENT-REU-PIPELINE FROM WWTP TO LAKE CENTER	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$5,754,000.00	2020		25	2133	1
CENTER	I	CENT-REU-PIPELINE FROM WWTP TO LAKE CENTER	I	CONSTRUCTION FUNDING	$7,825,000.00	2020		25	2133	2
CENTER	I	CENT-REU-PIPELINE FROM WWTP TO LAKE CENTER	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2020		25	2133	3
CENTER	I	CENT-TOL-TOLEDO BEND TO CENTER	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$6,190,000.00	2030		25	2134	1
CENTER	I	CENT-TOL-TOLEDO BEND TO CENTER	I	CONSTRUCTION FUNDING	$21,585,000.00	2030		25	2134	2
CENTER	I	CENT-TOL-TOLEDO BEND TO CENTER	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2030		25	2134	3
CHANDLER	I	HDSN-CHN - PURCHASE FROM TYLER	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$259,500.00	2020		313	2141	1
CHANDLER	I	HDSN-CHN - PURCHASE FROM TYLER	I	CONSTRUCTION FUNDING	$1,626,500.00	2020		313	2141	2
CHANDLER	I	HDSN-CHN - PURCHASE FROM TYLER	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2020		313	2141	3
COUNTY-OTHER, HENDERSON	I	CONSERVATION, WATER LOSS CONTROL - HENDERSON COUNTY	C	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$0.00	2020		473	1556	1
COUNTY-OTHER, HENDERSON	I	CONSERVATION, WATER LOSS CONTROL - HENDERSON COUNTY	C	CONSTRUCTION FUNDING	$5,449.00	2020		473	1556	2
COUNTY-OTHER, HENDERSON	I	CONSERVATION, WATER LOSS CONTROL - HENDERSON COUNTY	C	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2020		473	1556	3
COUNTY-OTHER, HENDERSON	I	HENDERSON COUNTY SEP - TRANSMISSION FACILITIES FROM CEDAR CREEK LAKE Q-147	C	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$4,893,000.00	2030		473	1077	1
COUNTY-OTHER, HENDERSON	I	HENDERSON COUNTY SEP - TRANSMISSION FACILITIES FROM CEDAR CREEK LAKE Q-147	C	CONSTRUCTION FUNDING	$15,058,000.00	2030		473	1077	2
COUNTY-OTHER, HENDERSON	I	HENDERSON COUNTY SEP - TRANSMISSION FACILITIES FROM CEDAR CREEK LAKE Q-147	C	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2030		473	1077	3
COUNTY-OTHER, JEFFERSON	I	JEFF-CTR INFRASTRUCTURE	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$3,531,000.00	2050		489	1931	1
COUNTY-OTHER, JEFFERSON	I	JEFF-CTR INFRASTRUCTURE	I	CONSTRUCTION FUNDING	$10,705,000.00	2050		489	1931	2
COUNTY-OTHER, JEFFERSON	I	JEFF-CTR INFRASTRUCTURE	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2050		489	1931	3
COUNTY-OTHER, NACOGDOCHES	I	NACN-LK - LAKE NACONICHE INFRASTRUCTURE	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$8,809,000.00	2030		540	2125	1
COUNTY-OTHER, NACOGDOCHES	I	NACN-LK - LAKE NACONICHE INFRASTRUCTURE	I	CONSTRUCTION FUNDING	$25,683,000.00	2030		540	2125	2
COUNTY-OTHER, NACOGDOCHES	I	NACN-LK - LAKE NACONICHE INFRASTRUCTURE	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2030		540	2125	3
COUNTY-OTHER, TRINITY	I	WATER LOSS REDUCTION, COUNTY-OTHER - TRINITY COUNTY	H	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$106,677.00	2020		594	382	1
COUNTY-OTHER, TRINITY	I	WATER LOSS REDUCTION, COUNTY-OTHER - TRINITY COUNTY	H	CONSTRUCTION FUNDING	$604,503.00	2020		594	382	2
COUNTY-OTHER, TRINITY	I	WATER LOSS REDUCTION, COUNTY-OTHER - TRINITY COUNTY	H	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2020		594	382	3

Sponsor Entity Name	Sponsor Entity Privacy Region	Project Name	WMS Project Sponsor Region	IFR Element Name	IFR Element Value	Year Of Need	IFR Project Data ID	Entity Rwp ID	WMS Project ID	IFR Project Elements ID
CRYSTAL SYSTEMS INC	I	SMTH-CYS INFRASTRUCTURE	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$303,150.00	2020		2505	2088	1
CRYSTAL SYSTEMS INC	I	SMTH-CYS INFRASTRUCTURE	I	CONSTRUCTION FUNDING	$1,717,850.00	2020		2505	2088	2
CRYSTAL SYSTEMS INC	I	SMTH-CYS INFRASTRUCTURE	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2020		2505	2088	3
D&M WSC	I	NACW-DMW - NEW WELLS IN CARRIZO AQUIFER	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$866,000.00	2020		2505	2088	1
D&M WSC	I	NACW-DMW - NEW WELLS IN CARRIZO AQUIFER	I	CONSTRUCTION FUNDING	$2,618,000.00	2020		2505	2088	2
D&M WSC	I	NACW-DMW - NEW WELLS IN CARRIZO AQUIFER	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2020		2505	2088	3
G M WSC	I	GM-WSC-ELEVATED TANK	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$87,000.00	2020		2784	2197	1
G M WSC	I	GM-WSC-ELEVATED TANK	I	CONSTRUCTION FUNDING	$658,500.00	2020		2784	2197	2
G M WSC	I	GM-WSC-ELEVATED TANK	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2020		2784	2197	3
G M WSC	I	GM-WSC-SURFACE WATER PLANT IMPROVEMENTS	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$286,500.00	2020		2784	2196	1
G M WSC	I	GM-WSC-SURFACE WATER PLANT IMPROVEMENTS	I	CONSTRUCTION FUNDING	$2,196,500.00	2020		2784	2196	2
G M WSC	I	GM-WSC-SURFACE WATER PLANT IMPROVEMENTS	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2020		2784	2196	3
G M WSC	I	GM-WSC-WATER SYSTEM EXPANSION	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$230,500.00	2020		2784	2195	1
G M WSC	I	GM-WSC-WATER SYSTEM EXPANSION	I	CONSTRUCTION FUNDING	$1,759,990.00	2020		2784	2195	2
G M WSC	I	GM-WSC-WATER SYSTEM EXPANSION	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2020		2784	2195	3
G M WSC	I	GM-WSC-WATERLINE IMPROVEMENTS	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$332,000.00	2020		2784	2194	1
G M WSC	I	GM-WSC-WATERLINE IMPROVEMENTS	I	CONSTRUCTION FUNDING	$2,348,400.00	2020		2784	2194	2
G M WSC	I	GM-WSC-WATERLINE IMPROVEMENTS	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2020		2784	2194	3
IRRIGATION, HOUSTON	I	HOUS-IRR INFRASTRUCTURE	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$1,941,500.00	2020		987	1916	1
IRRIGATION, HOUSTON	I	HOUS-IRR INFRASTRUCTURE	I	CONSTRUCTION FUNDING	$10,984,500.00	2020		987	1916	2
IRRIGATION, HOUSTON	I	HOUS-IRR INFRASTRUCTURE	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2020		987	1916	3
IRRIGATION, ORANGE	I	ORAN-IRR-INFRASTRUCTURE	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$3,588,000.00	2020		1049	2057	1
IRRIGATION, ORANGE	I	ORAN-IRR-INFRASTRUCTURE	I	CONSTRUCTION FUNDING	$9,693,000.00	2020		1049	2057	2
IRRIGATION, ORANGE	I	ORAN-IRR-INFRASTRUCTURE	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2020		1049	2057	3
JACKSONVILLE	I	JACK-COL	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$3,120,000.00	2020		77	2099	1
JACKSONVILLE	I	JACK-COL	I	CONSTRUCTION FUNDING	$17,525,000.00	2020		77	2099	2
JACKSONVILLE	I	JACK-COL	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2020		77	2099	3
LINDALE	I	SMTH-LDL INFRASTRUCTURE	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$870,450.00	2020		1394	2084	1
LINDALE	I	SMTH-LDL INFRASTRUCTURE	I	CONSTRUCTION FUNDING	$4,932,550.00	2020		1394	2084	2
LINDALE	I	SMTH-LDL INFRASTRUCTURE	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2020		1394	2084	3
LIVESTOCK, NACOGDOCHES	I	NACW-LTK - NEW WELLS IN CARRIZO WILCOX	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$3,948,500.00	2020		1394	2084	1
LIVESTOCK, NACOGDOCHES	I	NACW-LTK - NEW WELLS IN CARRIZO WILCOX	I	CONSTRUCTION FUNDING	$19,821,500.00	2020		1394	2084	2
LIVESTOCK, NACOGDOCHES	I	NACW-LTK - NEW WELLS IN CARRIZO WILCOX	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2020		1394	2084	3
LIVESTOCK, SHELBY	I	SHEL-LTK INFRASTRUCTURE	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$4,909,000.00	2020		1430	2050	1
LIVESTOCK, SHELBY	I	SHEL-LTK INFRASTRUCTURE	I	CONSTRUCTION FUNDING	$20,329,000.00	2020		1430	2050	2
LIVESTOCK, SHELBY	I	SHEL-LTK INFRASTRUCTURE	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2020		1430	2050	3
LOWER NECHES VALLEY AUTHORITY	I	LNVA-JEFF CONSTRUCTED LEVY	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$5,248,350.00	2040		86	1943	1
LOWER NECHES VALLEY AUTHORITY	I	LNVA-JEFF CONSTRUCTED LEVY	I	CONSTRUCTION FUNDING	$29,740,650.00	2040		86	1943	2
LOWER NECHES VALLEY AUTHORITY	I	LNVA-JEFF CONSTRUCTED LEVY	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2040		86	1943	3
LOWER NECHES VALLEY AUTHORITY	I	LNVA-SRA INFRASTRUCTURE	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$47,060,500.00	2040		86	1943	1
LOWER NECHES VALLEY AUTHORITY	I	LNVA-SRA INFRASTRUCTURE	I	CONSTRUCTION FUNDING	$352,894,500.00	2040		86	1943	2
LOWER NECHES VALLEY AUTHORITY	I	LNVA-SRA INFRASTRUCTURE	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2040		86	1943	3
LUFKIN	I	LUFK-RAY PHASE 1	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$7,695,500.00	2030		89	2010	1
LUFKIN	I	LUFK-RAY PHASE 1	I	CONSTRUCTION FUNDING	$41,672,500.00	2030		89	2010	2
LUFKIN	I	LUFK-RAY PHASE 1	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2030		89	2010	3
LUFKIN	I	LUFK-RAY PHASE 2	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$4,900,500.00	2040		89	2011	1
LUFKIN	I	LUFK-RAY PHASE 2	I	CONSTRUCTION FUNDING	$32,962,500.00	2040		89	2011	2
LUFKIN	I	LUFK-RAY PHASE 2	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2040		89	2011	3
LUFKIN	I	LUFK-RAY PHASE 3	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$621,500.00	2050		89	2012	1
LUFKIN	I	LUFK-RAY PHASE 3	I	CONSTRUCTION FUNDING	$2,138,500.00	2050		89	2012	2
LUFKIN	I	LUFK-RAY PHASE 3	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2050		89	2012	3
MANUFACTURING, JASPER	I	JASP-MFG INFRASTRUCTURE	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$7,275,500.00	2030		1591	1926	1
MANUFACTURING, JASPER	I	JASP-MFG INFRASTRUCTURE	I	CONSTRUCTION FUNDING	$26,221,500.00	2030		1591	1926	2
MANUFACTURING, JASPER	I	JASP-MFG INFRASTRUCTURE	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2030		1591	1926	3
MANUFACTURING, JEFFERSON	I	JEFF-MFG INFRASTRUCTURE	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$37,564,000.00	2020		1592	1932	1
MANUFACTURING, JEFFERSON	I	JEFF-MFG INFRASTRUCTURE	I	CONSTRUCTION FUNDING	$274,691,000.00	2020		1592	1932	2
MANUFACTURING, JEFFERSON	I	JEFF-MFG INFRASTRUCTURE	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2020		1592	1932	3

Sponsor Entity Name	Sponsor Entity Privacy Region	Project Name	WMS Project Sponsor Region	IFR Element Name	IFR Element Value	Year Of Need	IFR Project Data ID	Entity Rwp ID	WMS Project ID	IFR Project Elements ID
MANUFACTURING, ORANGE	I	ORAN-MFG	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$6,960,000.00	2020		1631	2058	1
MANUFACTURING, ORANGE	I	ORAN-MFG	I	CONSTRUCTION FUNDING	$35,661,000.00	2020		1631	2058	2
MANUFACTURING, ORANGE	I	ORAN-MFG	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2020		1631	2058	3
MANUFACTURING, SMITH	I	SMTH-MFG-INFRASTRUCTURE	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$1,687,500.00	2020		1653	2048	1
MANUFACTURING, SMITH	I	SMTH-MFG-INFRASTRUCTURE	I	CONSTRUCTION FUNDING	$5,516,500.00	2020		1653	2048	2
MANUFACTURING, SMITH	I	SMTH-MFG-INFRASTRUCTURE	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2020		1653	2048	3
MINING, ANGELINA	I	ANGL-MIN-INFRASTRUCTURE	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$1,316,000.00	2020		1728	2053	1
MINING, ANGELINA	I	ANGL-MIN-INFRASTRUCTURE	I	CONSTRUCTION FUNDING	$2,689,000.00	2020		1728	2053	2
MINING, ANGELINA	I	ANGL-MIN-INFRASTRUCTURE	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2020		1728	2053	3
MINING, NACOGDOCHES	I	NACW-MIN-INFRASTRUCTURE	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$2,930,000.00	2020		1879	2054	1
MINING, NACOGDOCHES	I	NACW-MIN-INFRASTRUCTURE	I	CONSTRUCTION FUNDING	$9,535,000.00	2020		1879	2054	2
MINING, NACOGDOCHES	I	NACW-MIN-INFRASTRUCTURE	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2020		1879	2054	3
MINING, RUSK	I	RUSK-MIN	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$4,150,000.00	2020		1903	2056	1
MINING, RUSK	I	RUSK-MIN	I	CONSTRUCTION FUNDING	$10,008,000.00	2020		1903	2056	2
MINING, RUSK	I	RUSK-MIN	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2020		1903	2056	3
MINING, SAN AUGUSTINE	I	SAUG-MIN-INFRASTRUCTURE	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$5,484,000.00	2020		2773	2055	1
MINING, SAN AUGUSTINE	I	SAUG-MIN-INFRASTRUCTURE	I	CONSTRUCTION FUNDING	$15,580,000.00	2020		2773	2055	2
MINING, SAN AUGUSTINE	I	SAUG-MIN-INFRASTRUCTURE	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2020		2773	2055	3
MINING, SMITH	I	SMTH-MIN INFRASTRUCTURE	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$465,450.00	2020		1926	590	1
MINING, SMITH	I	SMTH-MIN INFRASTRUCTURE	I	CONSTRUCTION FUNDING	$2,637,550.00	2020		1926	590	2
MINING, SMITH	I	SMTH-MIN INFRASTRUCTURE	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2020		1926	590	3
MINING, TRINITY	I	WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, TRINITY COUNTY (T)	H	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$162,145.00	2020		1926	590	1
MINING, TRINITY	I	WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, TRINITY COUNTY (T)	H	CONSTRUCTION FUNDING	$918,821.00	2020		1926	590	2
MINING, TRINITY	I	WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - MINING, TRINITY COUNTY (T)	H	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2020		1926	590	3
NACOGDOCHES	I	NACP-COL	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$4,684,500.00	2030		97	2101	1
NACOGDOCHES	I	NACP-COL	I	CONSTRUCTION FUNDING	$31,144,500.00	2030		97	2101	2
NACOGDOCHES	I	NACP-COL	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2030		97	2101	3
OVERTON	I	OVER ENHANCED WATER LOSS CONTROL PROGRAM	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$243,000.00	2040		2035	2043	1
OVERTON	I	OVER ENHANCED WATER LOSS CONTROL PROGRAM	I	CONSTRUCTION FUNDING	$1,862,000.00	2040		2035	2043	2
OVERTON	I	OVER ENHANCED WATER LOSS CONTROL PROGRAM	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2040		2035	2043	3
PORT ARTHUR	I	PORT ENHANCED WATER LOSS CONTROL PROGRAM	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$5,778,000.00	2020		111	2044	1
PORT ARTHUR	I	PORT ENHANCED WATER LOSS CONTROL PROGRAM	I	CONSTRUCTION FUNDING	$44,297,000.00	2020		111	2044	2
PORT ARTHUR	I	PORT ENHANCED WATER LOSS CONTROL PROGRAM	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2020		111	2044	3
SABINE RIVER AUTHORITY	I	SRA-INF - PUMPSTATION FOR SRA	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$10,924,901.00	2020		115	2193	1
SABINE RIVER AUTHORITY	I	SRA-INF - PUMPSTATION FOR SRA	I	CONSTRUCTION FUNDING	$61,907,774.00	2020		115	2193	2
SABINE RIVER AUTHORITY	I	SRA-INF - PUMPSTATION FOR SRA	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2020		115	2193	3
STEAM ELECTRIC POWER, ANDERSON	I	AND-SEP1 - PIPELINE FROM LAKE PALESTINE - CONTRACT WITH CITY OF PALESTINE	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$7,467,500.00	2020		2250	2121	1
STEAM ELECTRIC POWER, ANDERSON	I	AND-SEP1 - PIPELINE FROM LAKE PALESTINE - CONTRACT WITH CITY OF PALESTINE	I	CONSTRUCTION FUNDING	$37,108,500.00	2020		2250	2121	2
STEAM ELECTRIC POWER, ANDERSON	I	AND-SEP1 - PIPELINE FROM LAKE PALESTINE - CONTRACT WITH CITY OF PALESTINE	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2020		2250	2121	3
STEAM ELECTRIC POWER, CHEROKEE	I	CHER-SEP INFRASTRUCTURE	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$2,510,250.00	2020		2259	2139	1
STEAM ELECTRIC POWER, CHEROKEE	I	CHER-SEP INFRASTRUCTURE	I	CONSTRUCTION FUNDING	$14,224,750.00	2020		2259	2139	2
STEAM ELECTRIC POWER, CHEROKEE	I	CHER-SEP INFRASTRUCTURE	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2020		2259	2139	3
STEAM ELECTRIC POWER, JEFFERSON	I	JEFF-SEP INFRASTRUCTURE	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$8,713,000.00	2020		2288	1933	1
STEAM ELECTRIC POWER, JEFFERSON	I	JEFF-SEP INFRASTRUCTURE	I	CONSTRUCTION FUNDING	$45,805,000.00	2020		2288	1933	2
STEAM ELECTRIC POWER, JEFFERSON	I	JEFF-SEP INFRASTRUCTURE	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2020		2288	1933	3
STEAM ELECTRIC POWER, NACOGDOCHES	I	NACW-SEP1 - LAKE COLUMBIA INFRASTRUCTURE	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$4,411,000.00	2020		2306	2085	1
STEAM ELECTRIC POWER, NACOGDOCHES	I	NACW-SEP1 - LAKE COLUMBIA INFRASTRUCTURE	I	CONSTRUCTION FUNDING	$21,394,000.00	2020		2306	2085	2
STEAM ELECTRIC POWER, NACOGDOCHES	I	NACW-SEP1 - LAKE COLUMBIA INFRASTRUCTURE	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2020		2306	2085	3
STEAM ELECTRIC POWER, NACOGDOCHES	I	NACW-SEP2 - NEW WELLS IN CARRIZO WILCOX	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$2,943,000.00	2060		2306	2086	1
STEAM ELECTRIC POWER, NACOGDOCHES	I	NACW-SEP2 - NEW WELLS IN CARRIZO WILCOX	I	CONSTRUCTION FUNDING	$13,078,000.00	2060		2306	2086	2
STEAM ELECTRIC POWER, NACOGDOCHES	I	NACW-SEP2 - NEW WELLS IN CARRIZO WILCOX	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2060		2306	2086	3
STEAM ELECTRIC POWER, NEWTON	I	NEWT-SEP INFRASTRUCTURE	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$6,744,500.00	2020		2307	1935	1
STEAM ELECTRIC POWER, NEWTON	I	NEWT-SEP INFRASTRUCTURE	I	CONSTRUCTION FUNDING	$31,425,500.00	2020		2307	1935	2
STEAM ELECTRIC POWER, NEWTON	I	NEWT-SEP INFRASTRUCTURE	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2020		2307	1935	3
STEAM ELECTRIC POWER, ORANGE	I	ORAN-SEP	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$3,894,000.00	2020		2310	2059	1
STEAM ELECTRIC POWER, ORANGE	I	ORAN-SEP	I	CONSTRUCTION FUNDING	$11,953,000.00	2020		2310	2059	2
STEAM ELECTRIC POWER, ORANGE	I	ORAN-SEP	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2020		2310	2059	3

Sponsor Entity Name	Sponsor Entity Privacy Region	Project Name	WMS Project Sponsor Region	IFR Element Name	IFR Element Value	Year Of Need	IFR Project Data ID	Entity Rwp ID	WMS Project ID	IFR Project Elements ID
STEAM ELECTRIC POWER, RUSK	I	RUSK-SEP INFRASTRUCTURE	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$10,474,000.00	2050		2316	1936	1
STEAM ELECTRIC POWER, RUSK	I	RUSK-SEP INFRASTRUCTURE	I	CONSTRUCTION FUNDING	$47,244,000.00	2050		2316	1936	2
STEAM ELECTRIC POWER, RUSK	I	RUSK-SEP INFRASTRUCTURE	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2050		2316	1936	3
THE CONSOLIDATED WSC	I	WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - THE CONSOLIDATED WSC	H	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$162,145.00	2020		2968	589	1
THE CONSOLIDATED WSC	I	WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - THE CONSOLIDATED WSC	H	CONSTRUCTION FUNDING	$918,821.00	2020		2968	589	2
THE CONSOLIDATED WSC	I	WUG INFRASTRUCTURE EXPANSION (GROUNDWATER) - THE CONSOLIDATED WSC	H	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2020		2968	589	3
TYLER	I	TYL-PAL - PALESTINE INFRASTRUCTURE	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$12,721,228.00	2020		135	2123	1
TYLER	I	TYL-PAL - PALESTINE INFRASTRUCTURE	I	CONSTRUCTION FUNDING	$80,328,772.00	2020		135	2123	2
TYLER	I	TYL-PAL - PALESTINE INFRASTRUCTURE	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2020		135	2123	3
UPPER NECHES RIVER MUNICIPAL WATER AUTHORITY	I	UNM-ROR-NECHES RUN OF RIVER INFRASTRUCTURE	I	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$99,055,000.00	2020		140	2149	1
UPPER NECHES RIVER MUNICIPAL WATER AUTHORITY	I	UNM-ROR-NECHES RUN OF RIVER INFRASTRUCTURE	I	CONSTRUCTION FUNDING	$345,030,000.00	2020		140	2149	2
UPPER NECHES RIVER MUNICIPAL WATER AUTHORITY	I	UNM-ROR-NECHES RUN OF RIVER INFRASTRUCTURE	I	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2020		140	2149	3
WEST HARDIN WSC	I	WATER LOSS REDUCTION, WEST HARDIN WSC	H	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	$29,163.00	2020		2434	383	1
WEST HARDIN WSC	I	WATER LOSS REDUCTION, WEST HARDIN WSC	H	CONSTRUCTION FUNDING	$165,257.00	2020		2434	383	2
WEST HARDIN WSC	I	WATER LOSS REDUCTION, WEST HARDIN WSC	H	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0.00	2020		2434	383	3

Appendix 9-B

Infrastructure Financing Report – Contact Information

A part of the survey presented in Appendix 9-A was obtaining and recording relevant and up-to-date contact information for each Water User Group in the East Texas Regional Water Planning Area. The following appendix contains the contact information obtaining from the survey results.

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Entity Name	Entity Planning Region	Respondent Contact Name	Area Code	Phone	Extension	Email	Comment	Entity RWP ID
ALTO RURAL WSC	I	TOMMY DILL	936	858-4648				167
ANGELINA & NECHES RIVER AUTHORITY	I	KELLEY HOLCOMB	936	632-7795		kholcomb@anra.org		3
ANGELINA NACOGDOCHES WCID #1	I	DAVID MASON	903	854-4559		davidmasoon@lakestriker.com		4
ATHENS MUNICIPAL WATER AUTHORITY	I	DAVID M STOVER	903	677-1735		gherriage@athenstexas.us		6
BEAUMONT	I	MOLLY VILLAREAL	409	785-3016				9
BETHEL-ASH WSC	I	DONNIE BARFIELD	903	675-8466				235
BULLARD	I	LARRY MORGAN	903	894-7223		citymanager@bullardtexas.net		288
CENTER	I	MICHAEL BOYD	936	598-5241				25
CHANDLER	I	JON HALL	903	849-6853		jhall@chandlertx.com		313
COUNTY-OTHER, HENDERSON	I	HONORABLE RICHARD SANDERS	903	675-6120				473
COUNTY-OTHER, JEFFERSON	I	HONORABLE JEFF BRANICK	409	727-2191		jbranick@co.jefferson.tx.us		489
COUNTY-OTHER, NACOGDOCHES	I	HONORABLE MIKE PERRY	936	560-7755		cojudge@co.nacogdoches.tx.us		540
COUNTY-OTHER, TRINITY	I	HONORABLE STEVEN PAGE	936	642-1746		tcj@co.trinity.tx.us		594
CRYSTAL SYSTEMS INC	I	ALLEN W FAIR	903	881-8000		awfair@crystalsystemstx.com		637
D&M WSC	I	ROBERT SHUMATE	936	559-9900		dmwater.org@gmail.com		2505
G M WSC	I	JERRY PICKARD	409	787-2755		gmwater@valornet.com		2784
HOUSTON COUNTY WCID #1	I	THOMAS ACKER	936	544-3985		hchd08@windstream.net		75
IRRIGATION, HOUSTON	I	LEAH ADAMS	903	690-0143		ladamspcgcd@att.net		987
IRRIGATION, ORANGE	I	HONORABLE STEPHEN CARLTON	409	882-7070		hwheeler@co.orange.tx.us		1049
IRRIGATION, TRINITY	I	HONORABLE STEVEN PAGE	936	642-1746		tcj@co.trinity.tx.us		1092
JACKSONVILLE	I	DAVID BROCK	903	589-3510		david.brock@jacksonvilletx.org		77
LINDALE	I	CRAIG LINDHOM	903	882-3422		craigl@lindaletx.gov		1213
LIVESTOCK, NACOGDOCHES	I	LEAH ADAMS	903	690-0143		ladamspcgcd@att.net		1394
LIVESTOCK, SHELBY	I	HONORABLE ALLISON HARBISON	936	598-3863				1430
LOWER NECHES VALLEY AUTHORITY	I	SCOTT HALL	409	892-4011		scott.hall@lnva.dst.tx.us		86
LUFKIN	I	KEITH WRIGHT	936	633-0414		kwright@cityoflufkin.com		89
MANUFACTURING, JASPER	I	HONORABLE MARK ALLEN	409	384-2612				1591
MANUFACTURING, JEFFERSON	I	HONORABLE JEFF BRANICK	409	727-2191		jbranick@co.jefferson.tx.us		1592
MANUFACTURING, ORANGE	I	HONORABLE STEPHEN CARLTON	409	882-7070		hwheeler@co.orange.tx.us		1631
MANUFACTURING, SMITH	I	HONORABLE JOEL BAKER	903	590-2600		jbaker@smith-county.com		1653
MINING, ANGELINA	I	HONORABLE WES SUITER	936	634-5413		wsuiter@angelinacounty.net		1728
MINING, NACOGDOCHES	I	HONORABLE MIKE PERRY	936	560-7755		cojudge@co.nacogdoches.tx.us		1879
MINING, RUSK	I	HONORABLE JOEL HALE	903	657-0302		joel.hale@co.rusk.tx.us		1903
MINING, SAN AUGUSTINE	I	HONORABLE SAMYE JOHNSON	936	275-2762		countyjudge@co.san-augustine.tx.us		2773
MINING, SMITH	I	HONORABLE JOEL BAKER	903	590-2600		jbaker@smith-county.com		5755
MINING, TRINITY	I	LEAH ADAMS	903	690-0143		ladamspcgcd@att.net		1926
NACOGDOCHES	I	RUSSELL GRUBBS	936	564-5046		grubbsr@ci.nacogdoches.tx.us		97
OVERTON	I	CHARLES CUNNINGHAM	903	834-3171		ccunningham@ci.overton.tx.us		2035
PORT ARTHUR	I	JOHN TOMPLAIT	409	983-8552		jtomplait@portarthur.net		111
SABINE RIVER AUTHORITY	I	JIM BROWN	409	746-2192		jbrown@sratx.org		115

Appendix 9-B
Infrastructure Financing Report - Contact Information

Entity Name	Entity Planning Region	Respondent Contact Name	Area Code	Phone	Extension	Email	Comment	Entity RWP ID
STEAM ELECTRIC POWER, ANDERSON	I	HONORABLE ROBERT JOHNSTON	903	723-7406		rjohnston@co.anderson.tx.us		2250
STEAM ELECTRIC POWER, CHEROKEE	I	HONORABLE CHRIS DAVIS	903	683-2324		cojudge@cocherokee.org		2259
STEAM ELECTRIC POWER, JEFFERSON	I	HONORABLE JEFF BRANICK	409	727-2191		jbranick@co.jefferson.tx.us		2288
STEAM ELECTRIC POWER, NACOGDOCHES	I	HONORABLE MIKE PERRY	936	560-7755		cojudge@co.nacogdoches.tx.us		2306
STEAM ELECTRIC POWER, NEWTON	I	HONORABLE TRUMAN DOUGHARTY	409	379-5691		truman.dougharty@co.newton.tx.us		2307
STEAM ELECTRIC POWER, ORANGE	I	HONORABLE STEPHEN CARLTON	409	882-7070		hwheeler@co.orange.tx.us		2310
STEAM ELECTRIC POWER, RUSK	I	HONORABLE JOEL HALE	903	657-0302		joel.hale@co.rusk.tx.us		2316
THE CONSOLIDATED WSC	I	JOHNNY BABB	936	544-2986				2968
TYLER	I	GREGORY MORGAN	903	531-1234		gmorgan@tylertexas.com		135
UPPER NECHES RIVER MUNICIPAL WATER	I	MONTY SHANK	903	876-2237		mdsunra@gmail.com		140
WEST HARDIN WSC	I	THOMAS ANDERSON	936	274-5011				2434

Appendix 10-A

Media and Public Outreach

The ETRWPG utilized various media outlets to keep the public informed of the Regional Water Planning Process in the ETRWPA. Included in this appendix is a public notice for the Grant Application submitted by the ETRWPG to the TWDB for the 4th Round of Regional Water Planning. Comments were received on the application during the ETRWPG's regular meeting on June 22, 2011. After submittal of the 2016 Initially Prepared Plan, this appendix will include copies of the following media and public outreach used to collect comments during the review process:

- Newspaper Articles
- Press Releases
- Newsletters

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Classifieds 564-SALE

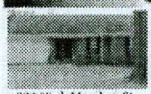
Office Hours: Monday - Friday 8:00-5:00 • 4920 Colonial Drive • Place an ad or search classifieds at dailysentinel.com anytime!

REAL ESTATE

HOMES 010

New House 3/2/2 1865 H/C 1 ac lot $154,900 936-675-4099

HOMES 010



323 High Meadow St. 1726sq/ft. 2BR/large/2BA. $139,500. Serious buyers only.936-414-0597

3230 Pearl St. 2BR/2.5BA, fireplace, carport patio & Ceramic Tile $66,500 936-569-0868.

4BR/3BA Newly Remodled Home in Center, Nice Neighborhood, pick carpert & finishing touches. $215,000 936-488-0246 or 936-598-7292

ALAMO REALTY
564-1818
3227 NORTH
www.alamonac.com

Beautiful 3/2, on 2 acres, 1600 sqft, $153,000, NE Nac. 936-715-9055

CARNEY REAL ESTATE
Sheila Carney, Broker
936-569-4097

*10 Acres for $160,000
20 Acres for $320,000
NW Loop 224 Visability

* Woods Edge-4/2/2. All Appliances included $173,500

*Brush Praire, 3/2/2. 2014SF, $98,900

* Tudor Dr.-3/2.5/4 2 LivingAreas/Double Sided WBFP. $198,500
www.carneyrealty.com

CHARLES POOL REAL ESTATE
"We Open Doors For You"
3505 NORTH ST.
564-2522
realestate@cpre.com
MLS

SIMPSON Real Estate
FARMS • HOMES
COMMERCIAL
www.tsimpson.com
936-564-6418

Wellington Point Subdivision off CR 215. Immaculate 4BR/2.5BA w/granite coun. tops & wood firs. Multi-level wood deck. Beautifully landscaped on 1 acr. lot. 936-679-9815

LOTS/ACREAGE 030

2) 1.767 ac. tracts of land on W side of Nac. Street frontage, great location, country setting close to town. Priced to sell! Call today! 936-254-9727 or 936-332-4824.

40 Acres of land for sale on 343 in Lilbert. Two fresh water springs and a half mineral rights. For a month. 936-326-4789

Barham Properties
3 acres Carrizo Creek
$24,000
936-559-7304

Wanted: Land from 30 to 100+ acres, in Nac & Angelina counties, prefer non-developed tracs, & access to water a plus. Local buyer & all cash sells. 936-588-3533 or send deeds/maps to PO Box 630911, Nac. 75962

MOBILE HOMES 050

2001 Palm Harbor 25 x 46 doublewide for sale. To be moved. $28,900. 936-553-2675.

Mobile Homes for sale w/ owner financing. Low down payment. Affordable monthly payments. 3 & 2 BR's avail. Call now! 936-585-4183. Ask about 1st mo. special!

SINGLE PARENT PROGRAM
3 or 5 BR home in your county! 936-569-0375

RENTALS

FURNISHED HOUSES 130

2/1 Newer brick home near SFA. All appliances. $725 per month. Call Andrew @ 558-8711

UNFURNISHED HOUSES 140

1BR, Living room, dining room, & kitchen. $300/mo + $300 deposit. 936.564.5031

221 N Sanders 3/2, WD, CHA, $900mo+$900dep no HUD, no pets. 936-554-8319

2BR/2BA 3020 Liles CHA, Nice, big yard, no HUD $725/mo + $500 dep + 1 yr. lease 936-560-2497

2BR/2BA Brick, 2 Car Garage, No HUD, Fenced Yard, @ 3635 Old Tyler Rd. $1,100mo+$600dep 936-554-8488

3/2 New home 5426 E. Main. $1,300/mo+dep 936-462-3127

3BR/2BA CHA, appl. $850/mo. ref req. 936-554-6715 or 936-554-3269

4023 East Starr 2 or 3 Br 1/BA Covered Garage, WD, Nice Yard $750/mo & $750 Deposit Call 936-554-7766

BARHAM PROPERTIES
936-559-7304

- 205 W. California Near SFA 3/2 Newley remodeled $1,200/mo. Available May 1st
- 712 Townsend 3bd/2ba $700.00/mo
- CR 8231 3/2 Mobile Home $650/mo.
- 226 Muller #8 2/1.5 $450/mo
- 460 CR 3031 3/2/2 on 1 acre $900.00/mo.

UNFURNISHED HOUSES 140

Sm. Log Cabin. All elec - tric. W/D, Stove, Refrig., DW. 15 min from Caddo Electric Plant. Nat Area. No smoking, No pets, No HUD, $400 deposit + $400/mo. 936-569-9731

Small 2BR on FM 1275. No smoking & no pets. CHA $500/mo. + deposit. 936-552-7886

WANT TO RENT 150

Want to rent 10-40 Acres w/house and some pasture. 580-876-3505

CONDO/TOWNHOMES 160

2/1.5 Condo W/D, Exc Cond. $550, Ref Req. 936-569-7276

3239 Pearl St., 2BR/2.5BA, fireplace, ceramic tile, full size W/D, water paid, carport, patio. $725 mo. + $725 dep. 936-569-0868.

Nice 2BR in University Park. Appl. WBFP. $650/dep/lease 564-6609

NICE 2BR/2BA. Appli, FP. $685-$750 mo. No HUD 903-690-9271

UNFURNISHED APARTMENTS 180

★★★★
1 BR
$479
2 BR
$579
WALK TO SFA
2POOLS
FITNESS CTR.
PETS WELCOME
NO ELEC. DEP.
UNIVERSITY CLUB
936-569-9413
★★★★

1-2-3 Bedroom
Great Value
Call Now
936-569-9414

1222 Raguet St. Lg. 1BR Apartments. Hardwood Floors & walking distance to SFA, CHA & Applia.

UNFURNISHED APARTMENTS 180

1BR/1BA 600sqft. two story loft Duplex Apt New Construction, Dome Shaped Arch., Secluded Street in town. Energy Efficient, W/D Hook Ups, No Pets $575/Mo. $575/Deposit 1 Year Lease. 333 Mackechney Street 936-552-4393

2 BRs + Patio Style Ground Level Units
Dogwood Village
5109 Northway Dr.
Call 936-371-3349

2BR/1BA Four-Plex @ 120 W California, CHA, Appl, carpet & tile, $475mo + utilities + $375dep 936-569-0268

Arbor Pines
Come lease with us
2 BR/2B
For Only $800/Mo!
Ask About
Our Spring Special
Arbor Pines Apartments
936-564-8870

Banita Creek Properties
Banita Creek Apartments
Walk to campus
1, 2, Bedroom
Ponderosa Pines
Town Homes
2BR/2.5 BA
Covered parking
Residential area off University DR
936-560-4768

CAMBRIDGE COURT
Affordable, Spacious
Clean apts. Off North
Loop close to
Wal-Mart/Medical
Center.
1 & 2 BR Apartments
$222 Northway
936-569-6026

Capri Apartments
1 Bedroom
*Newly remodeled.
*Washeteria.
936-564-8266

COUNTRY GARDEN
APTS -No Pets.
Hwy. 59 (Appleby).
1 & 2 BR apts. $350-$450 plus elec. Call 615-1688

★★★★★★
2BR
$510

UNFURNISHED APARTMENTS 180

Nacogdoches Senior Village Apartments
Vacancies, Taking Applications
936-462-8688

WHISPER OAKS
Spacious Apartments
1 & 2BR Apts
Full-size W/D
4721 University Dr.
936-560-2080

MOBILE HOME RENTALS 210

2BD/2BA in Southside location. Storage Bldg. CHA, Water Pd. No Pets. References Req. $900mo+dep. 936-564-2212 after 4pm

MOBILE HOME LOTS 220

Lake Nacogdoches RV Park
Electric,Water,Septic, Wireless WiFi
$350.00/month includes Dry Storage Area - Call Phil at 936-645-8895 or Chris at 936-371-1949

Secluded space on large tract in Douglass. $300/mo. Ref. Required 936-566-2862

Spring Special
We will pay your mobile home moving cost to move into our park!
Call 936-585-4183

TIMESHARE/ VACATION 223

Lake Nacogdoches Vacation Rental
400+ ft. of waterfront
3300 sq ft house
3+ Acres Week or Weekend Rentals Call (936) 569-4310

COMMERCIAL PROPERTY 230

3200 sqft warehouse w/ office, water & alarm is pd, near downtown area, $1000 mo. 936-564-0308

OFFICE SPACE 240

1100 sq.ft. approx. Professional Office Space, great location, ample parking. Available now. Rent below market. **560-2222 ext. 1110**

1800 Sq Ft Office Space 1407 North University Drive 936-564-2307

OFFICE SPACE 240

5 Offices for Lease. Utilities included. Conference room. Internet and network available.$550 per office. Call (936) 569-4310.

OFFICE BLDGS FOR LEASE

1000 sq. ft.
212 South Street

1500 sq. ft.
111 W. Pilar Street

Smart-wired. Next to county courthouse.

936-564-2333

STORAGE FACILITIES 260

10x10 Storage units for rent in Douglass area. $35 mo. 936-564-9076

Action Storage. Cardinal St., near SFA Liebrum Realty.564-8160

ANNOUNCEMENTS

LEGAL NOTICES 270

NOTICE OF PUBLIC MEETING
REGIONAL WATER PLANNING

Notice is hereby given that the East Texas Regional Water Planning Group Region I is seeking input from the public on the scope of planning activities to be considered during the Fourth Cycle of Regional Water Planning.

Input will be received at a Public Meeting, which will be conducted in conjunction with the upcoming regular Region I Planning Group Meeting, to be held at the Nacogdoches Recreation Center, 1112 North Street, Nacogdoches, TX 75961 on June 22, 2011 at 10:00 a.m. Written and oral comments, not to exceed five (5) minutes per speaker, regarding the scope of activities to be conducted during the Fourth Cycle of Regional Water Planning will be accepted at the meeting. Written comments will also be accepted through June 22, 2011 and may be emailed to rhunt@apaienv.com or mailed to the address below:

Rex H. Hunt, P.E.
Alan Plummer Associates, Inc.
6300 La Calma, Suite 400
Austin, Texas 78752

The East Texas Regional Water Planning Group (Region I) includes all or part of the following counties: Anderson, Angelina, Cherokee, Hardin, Henderson, Houston, Jasper, Jefferson, Nacogdoches, Newton, Orange, Panola, Polk, Rusk, Sabine, San Augustine, Shelby, Smith, Trinity and Tyler counties.

Copies of the grant application may be obtained from City of Nacogdoches when it becomes available or online at www.etxwaterplan.org. Written comments from the public regarding the grant application must be submitted to the East Texas Regional Water Planning Group and TWDB prior to TWDB Board action on this application (date stated above). Comments may be submitted to any of the following:

Rex Hunt, P.E.
Consulting Engineer for Region I
Alan Plummer Associates, Inc
6300 La Calma, Suite 400
Austin, TX 78752
Email: rhunt@apaienv.com

Executive Administrator
Texas Water Development Board
P.O. Box 13231
Austin, Texas 78711-3231

Lila Fuller
City Secretary
City of Nacogdoches
P.O. Box 635030
Nacogdoches, TX 75963

For additional information, please contact Lila Fuller, Region I Administrative Contact, c/o City of Nacogdoches, P.O. Box 635030, Nacogdoches, TX 75963-5030 936-559-2504 or email to lfuller@nacogdoches.tx.us

LEGAL NOTICES 270

Tri-County Community Action in Center, Texas is seeking a Fiscal Consultant who can provide a comprehensive assessment of the agency's Finance Department in preparation for an annual audit.

Please contact Lenola Wyatt-Tutt, CEO at 936-598-6315 ext. 12 or lenolatutt@sbcglobal.net or visit our website at www.tricountycommunity-action.com

Proposals must be received by Tri-County Community Action no later than Friday, April 15, 2011, by 4:30 p.m.

NOTICE TO PUBLIC
REGIONAL WATER PLANNING

Notice is hereby given that the City of Nacogdoches will submit by April 8, 2011 a grant application for financial assistance to the Texas Water Development Board (TWDB) on behalf of Region I, to carry out planning activities to develop the 2016 Region I Regional Water Plan as part of the state's Fourth Cycle (2012 – 2016) of Regional Water Planning. It is anticipated that the application will be considered by the Texas Water Development Board at its June 22, 2011 meeting.

The East Texas Regional Water Planning Group (Region I) includes all or part of the following counties: Anderson, Angelina, Cherokee, Hardin, Henderson, Houston, Jasper, Jefferson, Nacogdoches, Newton, Orange, Panola, Polk, Rusk, Sabine, San Augustine, Shelby, Smith, Trinity and Tyler counties.

Copies of the grant application may be obtained from City of Nacogdoches when it becomes available or online at www.etxwaterplan.org. Written comments from the public regarding the grant application must be submitted to the East Texas Regional Water Planning Group and TWDB prior to TWDB Board action on this application (date stated above). Comments may be submitted to any of the following:

Rex Hunt, P.E.
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Alan Plummer Associates, Inc
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Nacogdoches, TX 75963

For additional information, please contact Lila Fuller, Region I Administrative Contact, c/o City of Nacogdoches, P.O. Box 635030, Nacogdoches, TX 75963-5030
936-559-2504 or email to lfuller@nacogdoches.tx.us

LOST & FOUND 290

Found male black lab. on 3/30. Call to identify. 936.556.8414

Lost Male Miniature Schnauzer. Last seen 3/17 @ CR 823. Reward-- No questions asked. 936-645-2486

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NOTICE OF PUBLIC HEARING FOR THE EAST TEXAS REGIONAL WATER PLANNING GROUP 2016 INITIALLY PREPARED REGIONAL WATER PLAN

Notice is hereby given that the East Texas Regional Water Planning Group (ETRWPG) is taking comment on and holding a public hearing for the East Texas Regional Water Planning Area (ETRWPA) 2016 Initially Prepared Plan (IPP). The public hearing for the IPP will include a public comment period and will be held at **5:30 p.m.** as follows:

Thursday, June 25, 2015 – Nacogdoches County Courthouse Annex,
203 W. Main, **Nacogdoches, TX**

The ETRWPG was established under provisions of Texas Senate Bill 1 (7th Texas Legislature) to develop a regional water plan for the ETRWPA which includes the following counties: Angelina, Anderson, Cherokee, Hardin, Henderson, Houston, Jasper, Jefferson, Nacogdoches, Newton, Orange, Panola, Polk, Rusk, Sabine, San Augustine, Shelby, Smith, Trinity, and Tyler.

Copies of the IPP are available for review at the following County Clerk offices:
Angelina County, 215 E. Lufkin Avenue, 1st Floor, Lufkin, TX 75901
Anderson County, 500 N. Church Street # 10, Palestine, TX 75801
Cherokee County Clerk, 135 S. Main Street, Rusk, TX 75785
Hardin County, 300 W. Monroe, Kountze, TX 77625
Henderson County, 125 N. Prairieville Street, # 101, Athens, TX 75751
Houston County, 401 E. Houston, 1st Floor Crockett, TX 75835
Jasper County, 121 N. Austin, # 202, Jasper, TX 75951
Jefferson County, 1001 Pearl Street, # 203, Beaumont, TX 77701
Nacogdoches County, 101 W. Main Street, Ste # 110, Nacogdoches, TX 75961
Newton County, 115 Court Street, Newton, TX 75966
Orange County, 801 W. Division Street, Orange, TX 77630
Panola County, 110 S. Sycamore Street #201, Carthage, TX 75633
Polk County, 101 W. Church Street, #100, Livingston, TX 77351
Rusk County, 115 N. Main Street, #206, Henderson, TX 75652
Sabine County, 280 W. Main Street, Hemphill, TX 75948
San Augustine County, 223 N. Harrison, San Augustine, TX 75972
Shelby County, 124 Austin Street, Center, TX 75935
Smith County, 200 E. Ferguson, Suite 300, Tyler, TX 75702
Trinity County, 223 W. First Street, Groveton, TX 75845
Tyler County, 116 S. Charlton, Woodville, TX 75979

Copies of the IPP are also available for review at the following public libraries:
Kurth Memorial Library, 706 S. Raguet, Lufkin, TX 75904
Palestine Public Library, 2000 S. Loop 256, Ste # 42 Palestine TX 75801
Singleton Memorial Library, 207 E. 6th Street, Rusk, TX 75785
Kountze Public Library, 800 Redwood, Kountze, TX 77625
Henderson County Library - Clint W. Murchison Memorial Library, 121 S. Prairieville St, Athens, TX 75751
J.H. Wooters Crockett Public Library, 709 E. Houston, Crockett, TX 75835
Jasper Public Library, 175 E Water Street, Jasper, TX 75951
Beaumont Public Library, 801 Pearl Street, Beaumont, TX 77701
Nacogdoches Public Library, 1112 North Street, Nacogdoches, TX 75961
Newton County Library, 212 High Street, Newton, TX 75966
Orange Public Library, 220 N. 5th St, Orange, TX 77630
Sammy Brown Public Library, 319 S. Market St, Carthage, TX 75633
Livingston Municipal Library, 707 N. Tyler Avenue, Livingston, TX 77351
Rusk County Library, 106 E. Main St, Henderson, TX 75652
J.R. Huffman Public Library, 375 Sabine Street, Hemphill, TX 75948
San Augustine Public Library, 413 E. Columbia, San Augustine, TX 75972
Fannie Brown Booth Memorial Library, 619 Tenaha St, Center, TX 75935
Tyler Public Library, 201 S. College Ave, Tyler, TX 75702
Groveton Public Library, 126 W. First Street, Groveton, TX 75845
Allan Shivers Library, 302 N. Charlton, Woodville, TX 75979

Copies of the IPP are available for review at the Texas Water Development Website at http://www.twdb.texas.gov/waterplanning/rwp/plans/2016/IPP.asp; on the East Texas Regional Water Planning Group website at www.etexwaterplan.org, and at the City of Nacogdoches, Office of the City Secretary, 202 E. Pilar Street, Room 315, Nacogdoches, TX 75961. Written and oral comments will be accepted at the public hearing. The ETRWPG will also accept written comments from the date of this notice through August 24, 2015 and may be emailed or mailed to the address below:

QUESTIONS AND COMMENTS MAY BE SUBMITTED TO:

Rex H. Hunt, P.E. • Alan Plummer Associates, Inc. • 6300 La Calma, Suite 400 • Austin, Texas 78752
Phone: 512.452.5905 or rhunt@apaienv.com

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Lita Gonzalez
General Counsel
Comptroller of Public Accounts
Filed: February 25, 2015

♦ ♦ ♦

Office of the Consumer Credit Commissioner

Notice of Rate Ceilings

The Consumer Credit Commissioner of Texas has ascertained the following rate ceilings by use of the formulas and methods described in §§303.003, 303.005, 303.008, 303.009, 304.003, and 346.101, Texas Finance Code.

The weekly ceiling as prescribed by §303.003 and §303.009 for the period of 03/02/15 - 03/08/15 is 18% for Consumer[1]/Agricultural/Commercial[2] credit through $250,000.

The weekly ceiling as prescribed by §303.003 and §303.009 for the period of 03/02/15 - 03/08/15 is 18% for Commercial over $250,000.

The monthly ceiling as prescribed by §303.005 and §303.009[3] for the period of 02/01/15 - 02/28/15 is 18% for Consumer/Agricultural/Commercial credit through $250,000.

The monthly ceiling as prescribed by §303.005 and §303.009 for the period of 02/01/15 - 02/28/15 is 18% for Commercial over $250,000.

The standard quarterly rate as prescribed by §303.008 and §303.009 for the period of 04/01/15 - 06/30/15 is 18% for Consumer/Agricultural/Commercial credit through $250,000.

The standard quarterly rate as prescribed by §303.008 and §303.009 for the period of 04/01/15 - 06/30/15 is 18% for Commercial over $250,000.

The retail credit card quarterly rate as prescribed by §303.009[1] for the period of 04/01/15 - 06/30/15 is 18% for Consumer/Agricultural/Commercial credit through $250,000.

The lender credit card quarterly rate as prescribed by §346.101, Texas Finance Code[1] for the period of 04/01/15 - 06/30/15 is 18% for Consumer/Agricultural/Commercial credit through $250,000.

The standard annual rate as prescribed by §303.008 and §303.009[4] for the period of 04/01/15 - 06/30/15 is 18% for Consumer/Agricultural/Commercial credit through $250,000.

The standard annual rate as prescribed by §303.008 and §303.009 for the period of 04/01/15 - 06/30/15 is 18% for Commercial over $250,000.

The retail credit card annual rate as prescribed by §303.009[1] for the period of 04/01/15 - 06/30/15 is 18% for Consumer/Agricultural/Commercial credit through $250,000.

The judgment ceiling as prescribed by §304.003 for the period of 03/01/15 - 03/31/15 is 5.00% for Consumer/Agricultural/Commercial credit through $250,000.

The judgment ceiling as prescribed §304.003 for the period of 03/01/15 - 03/31/15 is 5.00% for Commercial over $250,000.

[1] Credit for personal, family or household use.

[2] Credit for business, commercial, investment or other similar purpose.

[3] For variable rate commercial transactions only.

[4] Only for open-end credit as defined in §301.002(14), Texas Finance Code.

TRD-201500633
Leslie L. Pettijohn
Commissioner
Office of Consumer Credit Commissioner
Filed: February 24, 2015

♦ ♦ ♦

East Texas Regional Water Planning Group (Region I)

City of Nacogdoches Notice of Application 5th Cycle Regional Water Planning

Notice is hereby given that the City of Nacogdoches will submit by 12:00 p.m. March 3, 2015, a grant application for financial assistance to the Texas Water Development Board (TWDB) on behalf of Region I, to carry out planning activities to develop the 2021 (Region I) East Texas Regional Water Plan as part of the state's Fifth Cycle (2017-2021) of Regional Water Planning.

The East Texas Regional Water Planning Group (Region I) includes the following counties: Anderson, Angelina, Cherokee, Hardin, Henderson, Houston, Jasper, Jefferson, Nacogdoches, Newton, Orange, Panola, Polk, Rusk, Sabine, San Augustine, Shelby, Smith, Trinity and Tyler counties.

Notice is hereby given that written comments from the public regarding the grant application must be submitted to City of Nacogdoches and TWDB by no later than April 6, 2015. Copies of the grant application may be obtained from City of Nacogdoches or online at *www.etexwaterplan.org*. Comments can be submitted to the City of Nacogdoches and the TWDB as follows:

Lila Fuller, Administrative Agent for Region I

City of Nacogdoches

202 E. Pilar, RM 315

Nacogdoches TX 75961

Kevin Patteson, Executive Administrator

Texas Water Development Board

P.O. Box 13231

Austin TX 78711-3231

For additional information, please contact Region I c/o Lila Fuller, City of Nacogdoches, 202 E Pilar, RM 315, Nacogdoches TX 75961, (936) 559-2504, lfuller@ci.nacogdoches.tx.us, *or* David Carter, Texas Water Development Board, P.O. Box 13231, Austin, Texas 78711, (512) 463-7847.

TRD-201500562
Lila Fuller
Administrative Agent
East Texas Regional Water Planning Group (Region I)
Filed: February 20, 2015

♦ ♦ ♦

Texas Commission on Environmental Quality

Agreed Orders

The Texas Commission on Environmental Quality (TCEQ, agency or commission) staff is providing an opportunity for written public comment on the listed Agreed Orders (AOs) in accordance with Texas Water Code (TWC), §7.075. TWC, §7.075 requires that before the commission may approve the AOs, the commission shall allow the public an opportunity to submit written comments on the proposed AOs.

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NOTICE OF PUBLIC HEARING FOR THE EAST TEXAS REGIONAL WATER PLANNING GROUP 2016 INITIALLY PREPARED REGIONAL WATER PLAN

Notice is hereby given that the East Texas Regional Water Planning Group (ETRWPG) is taking comment on and holding a public hearing for the East Texas Regional Water Planning Area (ETRWPA) 2016 Initially Prepared Plan (IPP). The public hearing for the IPP will include a public comment period and will be held at 5:30 p.m. as follows:

Thursday, June 25, 2015 – Nacogdoches County Courthouse Annex, 203 W. Main, Nacogdoches, TX

The ETRWPG was established under provisions of Texas Senate Bill 1 (7th Texas Legislature) to develop a regional water plan for the ETRWPA which includes the following counties: Angelina, Anderson, Cherokee, Hardin, Henderson, Houston, Jasper, Jefferson, Nacogdoches, Newton, Orange, Panola, Polk, Rusk, Sabine, San Augustine, Shelby, Smith, Trinity, and Tyler.

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Henderson County, 125 N. Prairieville Street, # 101, Athens, TX 75751
Houston County, 401 E. Houston, 1st Floor Crockett, TX 75835
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Jefferson County, 1001 Pearl Street, # 203, Beaumont, TX 77701
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Newton County, 115 Court Street, Newton, TX 75966
Orange County, 801 W. Division Street, Orange, TX 77630
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Polk County, 101 W. Church Street, #100, Livingston, TX 77351
Rusk County, 115 N. Main Street, #206, Henderson, TX 75652
Sabine County, 280 W. Main Street, Hemphill, TX 75948
San Augustine County, 223 N. Harrison, San Augustine, TX 75972
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Copies of the IPP are available for review at the Texas Water Development Website at http://www.twdb.texas.gov/waterplanning/rwp/plans/2016/IPP.asp; on the East Texas Regional Water Planning Group website at www.etexwaterplan.org, and at the City of Nacogdoches, Office of the City Secretary, 202 E. Pilar Street, Room 315, Nacogdoches, TX 75961. Written and oral comments will be accepted at the public hearing. The ETRWPG will also accept written comments from the date of this notice through August 24, 2015 and may be emailed or mailed to the address below:

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Alan Plummer Associates, Inc.
6300 La Calma, Suite 400
Austin, Texas 78752

Phone: 512.452.5905 or rhunt@apaienv.com

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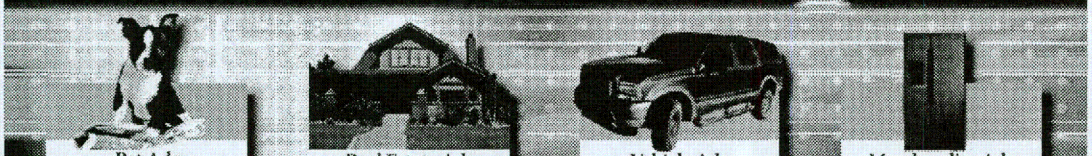
The Daily Sentinel

Classified

Call to Place Your AD Monday – Friday 8am – 5pm
936-564-SALE
logon to dailysentinel.com
Fax 936-560-4267
Email classifieds@dailysentinel.com

Deadlines:
Tuesday – Friday .....2:30 p.m. Day Prior
Saturday .....12:00 p.m. Friday
Sunday .....2:30 p.m. Friday
Monday .....3:30 p.m. Friday
call 936-558-7217 for details on display and legal advertising



Pet Ads Starting at $11.24 a day for 3 days

Real Estate Ads Starting at $33.40 for 3 lines • for 30 days

Vehicle Ads Starting at $27.00 for 2 months

Merchandise Ads Starting at $19.00 for 28 days

PUBLICATION GUIDELINES: Please check your ad on the first day of publication. Notify us immediately of any errors. The Publisher assumes no financial responsibility for errors or omissions of copy. We reserve the right to adjust in full an error by publishing a corrected insertion. Liability shall not exceed the cost of that portion occupied by the error on the first insertion only. The advertiser, and not the newspaper, is responsible for the truthful content of the ad. The newspaper reserves the right to request charges, reject or properly classify an ad, and must approve all copy. All advertising is subject to credit approval. Some classifications require prepayment.

REAL ESTATE

HOMES 010

*5 Unit 2BR 1BA Apt. 1702 E. Main. $30K. *418 Hasley Barn w/lot $16,500 936-564-9808

DUPLEX FOR SALE 1105 Lock St. Spacious 2BR 1BA &1BR 1BA. Residential Setting on Lg. Lot. HW Floors. **Excellent Cash Flow!** Must See to Appreciate! $68,500. 936-554-5569

NEW!

3-4 Bedrooms, 2 full baths. Attractive kitchen! Spacious living room. Open floor plans! Systems Built custom homes. Your choice of locations. Call for details or directions (903) 331-0981

3901 Old Lufkin Rd 3BR 1BA Frame home w/sun room. On 2ac. Recently Renovated. 1300sq ft. $77,200 936-560-3871

ALAMO REALTY 564-1818 3227 NORTH

615 E Parker Rd.3BR 2BA, 2 car garage on quiet 3/4 acre lot. Open floor plan. 936-371-3589

Choice Properties 936-564-3800 nacogdochesrealty.com

CHARLES POOL REAL ESTATE 564-2622

CHISD 4/2 on 2acs. 1mi from school. Above ground pool. Comes w/ Large upgraded portable building. A MUST SEE for families! $150K. 936-645-4181

FSBO 3BR 2BA w/17 acres in Chireno ISD. Workshop, carport& storage $145K 936-288-0295

FSBO: 3BR 3BA Frame Home on 6.2 Fenced acs. 2 Barns & pens. WISD. 936-564-2834

FSBO: NE Nac. 4BR 2BA, 2car gar. WBFP,1900sq.ft $145K. 3520 Pebble Creek 936-564-6951 615-7250

★★★★★
SHEILA CARNEY REAL ESTATE BROKER "Best of Nacogdoches" Awards-2004 & 2006 An MLS Top Producer
569-0193
Visit our WEB PAGE
www.carneyrealty.com
★★★★★

MIKE LIEBRUM REALTY
936-564-8180
Visit us online at:
nacogdochesrealestate.com

CIMARRON
Subdivision in CHISD
936-564-8180

TO BE MOVED: 3BR 2BA home in Martinsville Area $3,500 Call 936-552-4043 Between 5pm & 8pm

WE BUY HOUSES, MOBILE HOMES, AND/OR LAND. We will make you an offer for your property in Nacogdoches, Shelby and Panola Counties. We are NOT brokers we are investors. Southern Timberland Advisors, LLC. 832-594-4232

SIMPSON Real Estate HOMES + HOMES COMMERCIAL
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936-564-6418

University Club APARTMENTS
2BR's STARTING AT $599 PER MONTH
- $99 Deposit Special
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- Completely Remodeled Units*

*Select units

Northeast Hills
NOW LEASING
1 Bedrooms starting at $430/month.
Quiet Location with pool on site.
Pets Ok.
Northeasthills.net
936-564-4120

OPEN HOUSE
SUNDAY, MARCH 8TH 1-3PM

430 Blue Lake in Central Heights
Newconstruction,4Bedroom2.5Bath,2800sqft.,76acre
MLS 21405494 $309,900

DIRECTIONS: From Nacogdoches - go out Hwy 259, Turn left at FM 698 West (just before school),1st left onto CR 826 which leads into subdivision. Stay right, home on right.

Tim Brookshire Realtor 675-2719 AMERICAN REAL ESTATE
www.facebook.com/TimBrookshireRealtor

HOMES 010

FOR SALE BY OWNER 3BR 2BA HOME IN GARRISON ISD - Over 2000 s.f. home on over 2.8 acres, spring fed pond, huge metal shop, large bedrooms, open living/dining area, sunroom located off master. Home is located 1 minute from the school and right off of Highway 59. $162,500 Please call for appointment. 936-569-4751

FSBO: 3BR 2.5BA on 11ac in the Appleby area. Workshop and shed. Call for more information 936-564-8298

LOTS/ACREAGE 030

Beautiful wooded lot in Central Heights. 1.86 acres.936-615-0350

LAKE ACRES ADDITION 3 Contiguous lots with Lake View! Near boat ramp. Corner of Cash @ Cartwright San Augustine Tx 555KJ 281-748-3673

One 4ac. lot in CHISD. Utilities Avail. For more info call 936-645-0360

MOBILE HOMES 050

1998 Patriot 24x76 DW 20x12 Front Deck. Fireplace. Remodeled inside. 5BR 2BA. $78K By Appt. only 936-552-1767

BARGAIN PRICES

Fairfield Affordable Homes. 100's of floor plans. Your choice of locations. (903) 331-0977

FARMS/RANCHES 055

Timpson, Tx 35.5 Wooded acs +/- w/Lg. pond & Nice 3BR 2BA MH. Would make a good weekend place. $195,000 **Double TT Realty 936-254-3369**

COMMERCIAL REAL ESTATE 070

Commercial Space For Lease 623 North Street in Nacogdoches. Approx 800 sq. Feet, $850/mo $600/dep. 936-635-0856 or 936-676-2473

RENTALS

UNFURNISHED HOUSES 140

*VERY NICE 2BR Fenced yard. No Smokers/HUD $725mo 936-569-6383

1218 & 1210 Spring Valley Dr. $950mo to $1050mo. 936-558-3508

1918 South Fredonia. 3BR 1BA. W/D, $650mo, $650dep 936-554-7766

1BR 1BA New 600sqft 2story loft Wood Floors Secluded/Energy Eff. W/D conn. No Pets 333 Mackechney $525Mo $525Dep 936-552-1197

1BR 1BA. 217 South Church. Caddo Reserve. $375MO. 1st monthrent & deposit in advance. 936-559-7304

2BR 1BA brick. Appli. included, W&D. Lawn care$520+Dep. 936-569-0777 leave msg.

2BR 1BA, Porches, Carport, 259N 6 miles out $695/mo, $600 dep. Applia. 936-569-6347

2BR 1BA. Stove & Fridge , W&D incl. Walk to SFA. NO Pets. 214 Blount St. 936-564-5508

2BR 1BA. W&D. $525mo + Dep. Yard care paid. 936-645-5434

3 bedroom unfurnished home In Appleby area References. 936-569-7618 Available 3/8/15

3/2 with carport & Shop. Newly Remodeled. CH/A. On Dead end street. 307 Pitman. NO HUD $950mo 936-556-0546 569-7328

3/2/2. 3812 Appleby Sand Very Clean $1,250mo No HUD. 512-413-2067

3723 FM 1878. 3BR 1BA. W/D, $650mo, $650dep 936-554-7766

3BR 1BA 525 E Hospital, CHA, Appl., W/D hookups. $900mo+D.936-553-1858

3BR 1BA CHA. By Central Heights School. $800mo. + Dep. 936-569-0377

3BR 1BA in Garrison $650mo + $400dep.

UNFURNISHED HOUSES 140

3BR 1BA Sm. fenced back yard. $800mo+$400dep. Plus Water & Elec. 936-564-5338 564-6099

3BR 2BA Brick Home CH/A, Appliances. Good Neighborhood. $850mo+Dep. 936-554-3269

3BR 2BA Brick, 2car garage.CHA. Fenced back yard. Good location. Call Burl at 936-560-1448

3BR 2BA Home on Lake Nac. $1,600mo, No pets 936-564-2411

3BR 2BA Lg. Fenced back yard. $900mo. NO HUD 936-615-0350 564-8180

4BR 2BA Garrison. $750mo + $500dep. 936-615-8582

821 Oakview 3BR 2BA Double garage. W&D. $1200mo. NO HUD 936-569-0742or554-1899

Available Now. Lg 4BR 3BA. CHA & Appli. 936-615-7060

Barham Properties: Apartments/ Homes for Rent from $450-$1,200. Call for more information. **View Rentals Barhamproperties.com (936)559-7304**

CHISD 3BR1BA. Hwy 259 CH/A. Pasture/Barn Avail.$835mo +$835dep 936-564-6973

Country Living in town. 1BR Duplex. 3118 Liles $550mo 936-560-2497

Secluded 3BR 2BA on 7ac w/gated entrance. Hardwood floors. CHA. Live in the country in town. Ref's, No HUD. $1,295mo Avail. Feb. 1st 936-564-8630

CONDOS/TOWNHOMES 160

2/1.5 Attractive Condo w/ W/D. $565mo. NO HUD Refs. Req. 936-569-7276

2/2/2 on Post Oak. Call Craig at 936-554-4234

2BR 1.5BA 2-Story Condo. In great family neighborhood at Woodland Hills Golf Course. $600mo, $600dep. No HUD, 936-552-1101

2BR Duplex on N.side w/ 2 car Carport. Water pd. & Yard Kept. No HUD Call for details 936-569-3266

3/2/2 on Post Oak. Call Craig at 936-554-4234

Banita Creek Mgt. Ponderosa Pines Town Homes 2BR 2.5BA Covered parking In the Tangelwood Residential area off University DR *$750mo with1yr. lease* **936-560-4768**

Nice Townhome in University Park, appli.wbfp. 936-564-9609 569-3576

Oak Trace Condo 2BR 2.5BA Houston St. $750mo + $750dep 936-371-1883

UNFURNISHED APARTMENTS 180

1 & 2 Bedroom available w/WD, close to SFA 936-564-5180

1/1 Close to SFA. CHA. $390mo.Heat& Water pd. Laundry 936-569-7276

1BR 1BA Duplex near SFA New Appli. Completely remodeled. W&D hookup Garage. $450mo +$350dep 936-569-0269

1BR 1BA,NEAR SFA.All bills pd.$575mo+Dep. No pets, 936-556-2684

1BR Duplex. Applia, Good Area. Ref's. Req. $350mo 936-554-3269

1BR Nice quiet country setting Water, trash & tv pd. CH/A $450mo 936-569-7402

2BR 1BA 4plex. Near Sfa 1,050sqft. New paint. Appli., W&D Conn. Garage $500mo+$375dep 936-569-0269

Anna Raguet Apts. 901 Raguet
(2 blocks South of SFA)
★★★★★★★★★
Large 1BR's
Pool & Washeteria
Newly re-modeled
All bills pd. No Pets
★★★★★★★★★
936-564-8266
936-554-6346

UNFURNISHED APARTMENTS 180

Austin Place Apts.
3220 North Street
Nacogdoches,TX 75961
Check out our new move in specials!
1 BR's starting @ $600
2 BR's starting @ $750
FREE Electric, water and cable.
Call 936-559-9180

★★★★★★★★★★
Banita Creek Mgt. Banita Creek Apartments
1BR 1BA @ $525/mo
2 BR 2BA $675/Mo with 1yr lease.
2 blocks from SFA
327 W. College
936-560-4768
★★★★★★★★★★

Capri Apartments
4401 North St
Next to Hobby Lobby
Great Location
★★★★★★★★
Large 1 Bedroom's
On site Washeteria
Gas & Water pd.
★★★★★★★★
936-564-8266
936-554-6346

DOGWOOD VILLAGE APARTMENTS
Patio Style Ground Floor
2Bed 1Bath
936-553-2044
www.dogwoodvillapts.com

Efficiency Apt. Close to Town. $295mo 936-564-1588

Historical Luxury Loft. Dtwn Nac. 2BR 1BA. $1200mo 936-371-9101

Lease Takeover! Woods of SFA Nacogdoches, Texas. 3BR 3.5BA Duplex. 2 car garage and fenced backyard. Utility room with washer and dryer. $485 per bedroom each month. Can negotiate. 936-645-0412

MOVE-IN Special
Look no further for your place to call Home! Exceptionally Spacious 1BR & 2BR Townhomes
STONE FORT APTS
Rent starting at $400
936-564-0629
133 Old Line Dr.

Northview Condos
1BR 1BA
Startingat $595mo
2BR 2BA Remodeled Flats Starting at $679mo
2BR 2BA Townhouse Starting @ $665mo
Includes: *Water/Trash & W/D Hookups.*
On North St Between SFA & Wal-Mart
$15 application fee
CALL NOW!
936-250-2667

WHISPER OAKS
Spacious Apartments
1 & 2BR Apts
Starting at $575 & $675
Full-size W/D
4721 University Dr.
936-560-2080

MOBILE HOME RENTALS 210

1.5BR 1BA. W&D Douglass area Call White Fence Ind. 936-564-9076.

2BR 1BA, Off 343 $500mo+$300dep. No pets. 936-569-9339

3BR 2BA at Village RV Park 11945 N Hwy 59. All electric. Water pd. $800 mo+$400dep. Great for SFA Students! Hud Ok 936-564-5338 564-6099

3BR 2BA In Douglass Call White Fence Ind. 936-564-9076.

3BR/2BA W/D . $500mo, $500dep. 915 Ridgewood 936-552-4264

New MH Park in CHISD. 5 very nice MH's on 25 acs. New covered decks, Lg. yards. All tenants will be screened 3/2 & 2/2 avail. $650mo+$500dep. 936-585-3431

Nice 3BR 2BA Oblwide Home In Small Community In Timpson. $650mo. $650dep NO SMOKING!! Tile Floors, Stove, Frig, DW, Microwave. City Utilities. Contact: Ms. Joey 281-827-2009

COMMERCIAL PROPERTY 230

1302 North Street. Formerly Fish Place. Retail or Resturaunt. Avail. Now 936-552-1101

OFFICE SPACE 240

***805 SE Stalling. Loop frontage $700mo Busy Location. 936-560-2497**

2 office's for lease. 800sq.ft. ea. 4room & 3room. $0.77 per Sq. ft. 1329 N. University Dr. 936-564-2307

3600 sqft bldg for lease Office or Retail .1336 N Univ. Dr. 936-564-2307

Commercial Office Spaces. Overlook Dtwn Nac. Internet provided. 203 E. Main. Call for appt. 936-462-3679

Dtwn Hist. Office-1400 sq.ft. 104 Pecan **Newly remodeled.** $1100/mo 936-371-9101

Office Space. 403 E.Hospital St. 1,200+ sq.ft. $1000MO. $1000Dep. 936-564-4922 554-6034

STORAGE FACILITIES 260

10x10 Storage units for rent In Douglass area. $35/mo. 936-564-9076

Action Storage. Cardinal St., near SFA Liebrum Realty,564-8180

LEGAL NOTICES 270

NOTICE TO CREDITORS

Notice is hereby given that original Letters Testamentary for the Estate of Jenarie J. Alexander, Deceased were issued on February 25, 2015, in Cause No. PB15-12323, pending in the County Court of Nacogdoches County, Texas, to: Christina Sue Center, Jonathan Merritt Alexander, Jr. and Lucy Helen Kuntz.

Claims may be presented in care of the attorney for the estate, addressed as follows:

Representatives, Estate of Jenarie J. Alexander, Deceased

c/o: W. Wade Flasowski Fairchild, Price, Haley & Smith, L.L.P. P.O. Drawer 631668 Nacogdoches, Texas 75963

All persons having claims against this Estate which is currently being administered are required to present them to the undersigned within the time and in the manner prescribed by law.

DATED the 25th day of February, 2015

W. WADE FLASOWSKI, TBA#24055482
FAIRCHILD, PRICE, HALEY & SMITH, L.L.P.
P. O. Drawer 631668
Nacogdoches, Texas 75963-1668
(936)569-2327
FAX: (936)569-7932

ATTORNEYS FOR APPLICANTS

The Nacogdoches County Hospital District dba Nacogdoches Memorial Hospital is accepting sealed bids on labor and materials to install Armstrong timberline rejuvenations sheet vinyl flooring in geri/psyche patient rooms and hallways. Measurements will need to be taken. For more information contact Andy Johnston, Director of Facilities (936) 568-8548. Sealed bids must be turned in to Andy Johnston, 1204 Mound Street, Nacogdoches, Tx. 75961 by 2:00 p.m. March 20th. Nacogdoches Memorial Hospital reserves the right to accept or reject any or all bids.

LOST & FOUND 290

Have you lost your pet? Contact the Nacogdoches Animal Shelter at 936-560-5011 to see if your pet is there.

AUTOMOTIVE SERVICES 361

Vavoline Express Care is hiring for FT Lube Tech. Apply at 2601 North St.

HEALTHCARE 374

DENTAL ASSISTANT Family dental practice seeking full-time chair-side assistant. Applicant should be professional, self-motivated, organized. We focus on warm care and complete treatment for our family of patients. Experience is preferred. Send resume to: familydds@att.net

Willowbrook Nursing Center is currently accepting applications
- **House Keeping Supervisor**
- **Healthcare Marketer**

Experience Preferred. Applicant must be dependable! To join our team please apply in person at: 227 Russell Blvd Nacogdoches, TX 75965 **EEOC**

MAINTENANCE/INSTALLATION 383

Maintenance Technician needed for 180+ Unit Apartment Community in Nacogdoches. Must be HVAC Certified. Benefits include Health Insurance, 401K & Vacation. Qualified applicants fax resume to 936-569-1883 or apply in person at **Cambridge Court Apartments located at 5222 Northway Dr. Nacogdoches, TX**

WOODLAND TRAILS APARTMENTS
Maintenance man needed for small property in Nacodoches. Must be EPA certified. Please fax resume to 936-560-2112 or call 936-560-3119. E-mail: manager.wta@mlgproperty.com

RESTAURANT/FOOD SERVICE 400

Cheddar's Casual Cafe
now accepting applications. Apply within 3901 South Medford Drive

TRANSPORTATION/LOGISTICS 410

Company Drivers Wanted $3000 Sign-On Bonus Local Fuel Delivery- Home Every Day Great Benefit package. Apply Online WWW.TTEDELIVER.COM

Elite Cab Company is seeking a Driver for Combo day & night shifts. Prefer 55+, Great Public Communication Skills & Customer Service, Must Have Good Driving Record 936-645-1185

OTHER 412

Excel Car Wash is Hiring for PART TIME CASHIER Apply at 4101 North St.

Experienced Delivery Driver/ Warehouse Worker wanted. Must have current, valid driver's license with clean record. Employee must regularly lift and/or move more than 100 pounds. Good customer service and teamwork skills are a must. Benefits and competitive compensation. Apply at Dixon Furniture 301 E. Laurel Avenue Lufkin, TX.

Pit Stop Oil & Lube is hiring for PT CASHIER Apply at 1213 North University Drive

SITUATIONS WANTED

ELDERLY CARE PROVIDERS 435

CAREGIVER POSITION WANTED. Excellent Ref's Night preferred. 936-634-6424

WORK WANTED 438

House Cleaning 936-564-7907 Cell 214-707-9378

I do Raking,Yard clean up, Tree trimming & Hauling . Jose 936-553-8022

FINANCIAL

BUSINESS OPPORTUNITY 440

WARNING!! INVESTIGATE BEFORE YOU INVEST!
The Daily Sentinel does everything possible to keep these columns free of misleading, unscrupulous or fraudulent advertising. We encourage our readers to check THOROUGHLY any propositions requiring an investment, requiring that money be sent through the mail or that ask for personally identifying information to be revealed.

LOANS 480

Loans- Bad Credit, No Credit, (936) 347-2656.

EDUCATION

ANNOUNCEMENTS

EMPLOYMENT

LEGAL NOTICES 270

NOTICE OF APPLICATION ← PUBLIC NOTICE
5TH CYCLE REGIONAL WATER PLANNING

Notice is hereby given that the City of Nacogdoches will submit by 12:00 p.m. March 6, 2015, a grant application for financial assistance to the Texas Water Development Board (TWDB) on behalf of Region I, to carry out planning activities to develop the 2021(Region I) East Texas Regional Water Plan as part of the state's Fifth Cycle (2017-2021) of Regional Water Planning.

The East Texas Regional Water Planning Group (Region I) includes the following counties: Anderson, Angelina, Cherokee, Hardin, Henderson, Houston, Jasper, Jefferson, Nacogdoches, Newton, Orange, Panola, Polk, Rusk, Sabine, San Augustine, Shelby, Smith, Trinity and Tyler counties.

Notice is hereby given that written comments from the public regarding the grant application must be submitted to City of Nacogdoches and TWDB by no later than April 6, 2015. Copies of the grant application may be obtained from City of Nacogdoches or online at www.ctxregion.org. Comments can be submitted to the City of Nacogdoches and the TWDB as follows:

Lila Fuller, Administrative Agent for Region I
City of Nacogdoches
202 E Pilar, FM 315
Nacogdoches TX 75961

Kevin Patteson, Executive Administrator
Texas Water Development Board
PO Box 13231
Austin TX 78711-3231

For additional information, please contact Region I c/o Lila Fuller, City of Nacogdoches, 202 E Pilar, FM 315, Nacogdoches TX 75961 936-559-2584, lfuller@ci.nacogdoches.tx.us, or David Carter, Texas Water Development Board, P.O. Box 13231, Austin, Texas 78711, (512) 463-7847.

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Order Number	:	24264400	Ad Number	:	24349000
PO Number	:	S.CORLEY	Ad Key	:	
Customer	:	23752881 CITY OF NACOGDOCHES	Salesperson	:	0630 - Cynthia Torrence
Contact	:	Stacy Corley	Publication	:	Beaumont Enterprise
Address1	:	PO BOX 635030	Section	:	Classifieds Section
Address2	:		Sub Section	:	Classifieds Section
City St Zip	:	NACOGDOCHES TX 759635030	Category	:	4 Legal Notices
Phone	:	(936) 559-2567	Dates Run	:	05/22/2015-05/22/2015
Fax	:	(936) 559-2915	Days	:	1
Credit Card	:		Size	:	1 x 17.95, 162 lines
Printed By	:	Cynthia Torrence	Words	:	680
Entered By	:	Cynthia Torrence	Ad Rate	:	LE
			Ad Price	:	405.21
			Amount Paid	:	0.00
			Amount Due	:	405.21
Keywords	:				
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Zones	:				

NOTICE OF PUBLIC HEARING FOR THE EAST TEXAS REGIONAL WATER PLANNING GROUP 2016 INITIALLY PREPARED REGIONAL WATER PLAN

Notice is hereby given that the East Texas Regional Water Planning Group (ETRWPG) is taking comment on and holding a public hearing for the East Texas Regional Water Planning Area (ETRWPA) 2016 Initially Prepared Plan (IPP). The public hearing for the IPP will include a public comment period and will be held at 5:30 p.m. as follows:

Thursday, June 25, 2015 - Nacogdoches County Courthouse Annex, 203 W. Main, **Nacogdoches, TX**

The ETRWPG was established under provisions of Texas Senate Bill 1 (7th Texas Legislature) to develop a regional water plan for the ETRWPA which includes the following counties: Angelina, Anderson, Cherokee, Hardin, Henderson, Houston, Jasper, Jefferson, Nacogdoches, Newton, Orange, Panola, Polk, Rusk, Sabine, San Augustine, Shelby, Smith, Trinity, and Tyler.

Copies of the IPP are available for review at the following County Clerk offices:
Angelina County,
215 E. Lufkin Avenue,
1st Floor, Lufkin, TX 75901
Anderson County,
500 N. Church Street # 10
Palestine, TX 75801
Cherokee County Clerk, 135 S Main Street, Rusk, TX 75785
Hardin County, 300 W. Monroe, Kountze, TX 77625
Henderson County,
125 N. Prairieville Street,
101, Athens, TX 75751
Houston County,
401 E. Houston, 1st Floor
Crockett, TX 75835
Jasper County, 121 N. Austin

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City St Zip	:	NACOGDOCHES TX 759635030	Category	:	4 Legal Notices
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Zones	:				

202, Jasper, TX 75951
Jefferson County,
1001 Pearl Street, # 203,
Beaumont, TX 77701
Nacogdoches County,
101 W. Main Street, Ste # 110,
Nacogdoches, TX 75961
Newton County, 115 Court
Street, Newton, TX 75966
Orange County,
801 W. Division Street,
Orange, TX 77630
Panola County,
110 S. Sycamore Street #201
Carthage, TX 75633
Polk County,
101 W. Church Street, #100
Livingston, TX 77351
Rusk County,
115 N. Main Street, #206
Henderson, TX 75652
Sabine County, 280 W. Main
Street, Hemphill, TX 75948
San Augustine County
223 N. Harrison,
San Augustine, TX 75972
Shelby County, 124 Austin
Street, Center, TX 75935
Smith County
200 E. Ferguson, Suite 300
Tyler, TX 75702
Trinity County, 223 W. First
Street, Groveton, TX 75845
Tyler County, 116 S. Charlton,
Woodville, TX 75979

**Copies of the IPP are also a-
vailable for review at the fol-
lowing public libraries:**
Kurth Memorial Library, 706 S.
Raguet, Lufkin, TX 75904
Palestine Public Library
2000 S. Loop 256, Ste # 42
Palestine TX 75801
Singleton Memorial Library
207 E. 6th Street
Rusk, TX 75785
Kountze Public Library, 800
Redwood, Kountze, TX 77625
Henderson County Library -
Clint W. Murchison Memorial
Library, 121 S. Prairieville St,
Athens, TX 75751
J.H. Wooters Crockett Public
Library, 709 E. Houston,
Crockett, TX 75835
Jasper Public Library
175 E Water Street
Jasper, TX 75951
Beaumont Public Library
801 Pearl Street

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Publication	:	Beaumont Enterprise
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Beaumont, TX 77701
Nacogdoches Public Library
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Nacogdoches, TX 75961
Newton County Library, 212 High Street, Newton, TX 75966
Orange Public Library, 220 N. 5th St, Orange, TX 77630
Sammy Brown Public Library, 319 S. Market St, Carthage, TX 75633
Livingston Municipal Library, 707 N. Tyler Avenue
Livingston, TX 77351
Rusk County Library, 106 E. Main St, Henderson, TX 75652
J.R. Huffman Public Library
375 Sabine Street,
Hemphill, TX 75948
San Augustine Public Library
413 E. Columbia
San Augustine, TX 75972
Fannie Brown Booth Memorial Library, 619 Tenaha St,
Center, TX 75935
Tyler Public Library, 201 S. College Ave, Tyler, TX 75702
Groveton Public Library
126 W. First Street
Groveton, TX 75845
Allan Shivers Library, 302 N. Charlton, Woodville, TX 75979

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QUESTIONS AND COMMENTS MAY BE SUBMITTED TO:
Rex H. Hunt, P.E.
Alan Plummer Associates, Inc.
6300 La Calma, Suite 400
Austin, Texas 78752

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Phone: 512.452.5905
or rhunt@apaienv.com

Appendix 10-B

Transcripts, Presentations, and Minutes from Public Hearings

A fundamental element of the planning process is input from the public. One public hearing was scheduled in June 25, 2015 to provide the public with forums to comment on the 2016 Initially Prepared Plan. The public hearing was held at the public library in Nacogdoches Texas. Provided in this appendix are the transcripts, presentations, and minutes from the public hearing.

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NOTICE OF PUBLIC HEARING FOR THE EAST TEXAS REGIONAL WATER PLANNING GROUP 2016 INITIALLY PREPARED REGIONAL WATER PLAN

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Henderson County, 125 N. Prairieville Street, # 101, Athens, TX 75751
Houston County, 401 E. Houston, 1st Floor Crockett, TX 75835
Jasper County, 121 N. Austin, # 202, Jasper, TX 75951
Jefferson County, 1001 Pearl Street, # 203, Beaumont, TX 77701
Nacogdoches County, 101 W. Main Street, Ste # 110, Nacogdoches, TX 75961
Newton County, 115 Court Street, Newton, TX 75966
Orange County, 801 W. Division Street, Orange, TX 77630
Panola County, 110 S. Sycamore Street #201, Carthage, TX 75633
Polk County, 101 W. Church Street, #100, Livingston, TX 77351
Rusk County, 115 N. Main Street, #206, Henderson, TX 75652
Sabine County, 280 W. Main Street, Hemphill, TX 75948
San Augustine County, 223 N. Harrison, San Augustine, TX 75972
Shelby County, 124 Austin Street, Center, TX 75935
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Tyler County, 116 S. Charlton, Woodville, TX 75979

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Palestine Public Library, 2000 S. Loop 256, Ste # 42 Palestine TX 75801
Singleton Memorial Library, 207 E. 6th Street, Rusk, TX 75785
Kountze Public Library, 800 Redwood, Kountze, TX 77625
Henderson County Library - Clint W. Murchison Memorial Library, 121 S. Prairieville St, Athens, TX 75751
J.H. Wooters Crockett Public Library, 709 E. Houston, Crockett, TX 75835
Jasper Public Library, 175 E Water Street, Jasper, TX 75951
Beaumont Public Library, 801 Pearl Street, Beaumont, TX 77701
Nacogdoches Public Library, 1112 North Street, Nacogdoches, TX 75961
Newton County Library, 212 High Street, Newton, TX 75966
Orange Public Library, 220 N. 5th St, Orange, TX 77630
Sammy Brown Public Library, 319 S. Market St, Carthage, TX 75633
Livingston Municipal Library, 707 N. Tyler Avenue, Livingston, TX 77351
Rusk County Library, 106 E. Main St, Henderson, TX 75652
J.R. Huffman Public Library, 375 Sabine Street, Hemphill, TX 75948
San Augustine Public Library, 413 E. Columbia, San Augustine, TX 75972
Fannie Brown Booth Memorial Library, 619 Tenaha St, Center, TX 75935
Tyler Public Library, 201 S. College Ave, Tyler, TX 75702
Groveton Public Library, 126 W. First Street, Groveton, TX 75845
Allan Shivers Library, 302 N. Charlton, Woodville, TX 75979

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Rex H. Hunt, P.E.
Alan Plummer Associates, Inc.
6300 La Calma, Suite 400
Austin, Texas 78752

Phone: 512.452.5905 or rhunt@apaienv.com

MINUTES OF THE PUBLIC MEETING
to receive comments on the
Initially Prepared Plan (IPP)
of the
REGIONAL WATER PLANNING GROUP "I"
Thursday – June 25, 2015– 5:30 p.m.
Nacogdoches County Courthouse Annex
208 W. Main Street, Nacogdoches, Texas

Kelley Holcomb, Chair, called the meeting to order at 5:31 p.m. Chair Holcomb made introductions for consultants, administrative staff and ETRWPG board members in attendance.

Those that signed the sign-in sheet were: Lila Fuller, Lann Bookout, Stacy Corley, John W. Stine, Alvin V. Newton, Ben A. Stephenson, John Martin, Bill Adams, Terry D. Stelly, Kelley Holcomb, Cynthia Syvarth, David Coburn, Mark Stephenson, Mary Vann, Greg Morgan, Manuel Martinez and Spandana Tummuri.

Cynthia Syvarth with Alan Plummer Associates, Inc. (APAI) gave a brief review of each chapter contained in the IPP and how the information was gathered.

Kelley Holcomb opened the floor for public comments.

John W. Stine appeared and gave the following comment:

"As a resident of San Augustine County and spokesperson for signatories below [John W. Stine and Alvin V. Newton] we do not support any future water impoundment projects for Groundwater Management Area 11 as proposed in the East Texas Regional Water Planning Group 2016 Initially Prepared Regional Water Plan.

Proposed water impoundments as incorporated in the above Regional Water Plan will continue to erode our East Texas land base used for Agriculture and Recreational Hunting—cattle production, forestry production and wildlife habitat. In addition it erodes the private property tax base and therefore will escalate private property taxes.

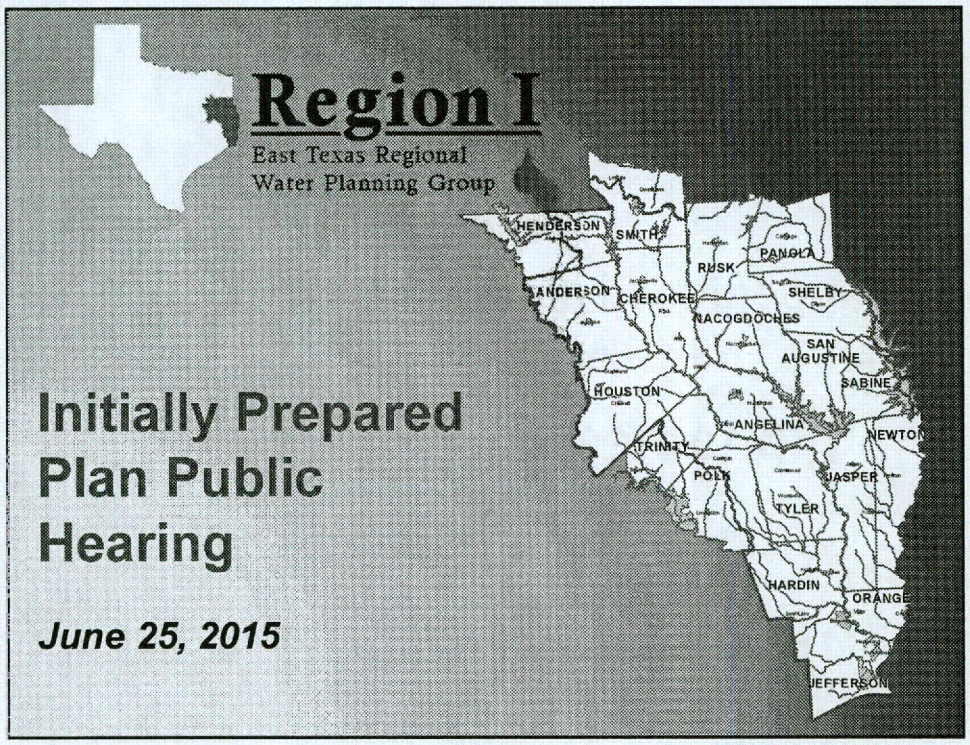
In November of 2013, the voters of Sabine, San Augustine and Shelby Counties soundly defeated the formation of a proposed Groundwater District by 5,720 Against and 489 For the proposal. This voter response further validated the inviolability of private property rights from government overreach and infringement. The grass roots electorate is resolute in its opposition to further water impoundment by the State of Texas that infringes on private property rights of Texans.

Enclosed is a letter from the Sabine River Authority in October 16, 2013 in which 'the Sabine River Authority of Texas has a Texas water right for over 244 billion gallons per year, of which 96% is available to be sold under contract'. Toledo Bend Reservoir is nearly 50 years old since impoundment in the late 1960's. This untapped source of surface water from Toledo Bend Reservoir is just one of many existing water impoundments in East Texas that precludes future water impoundment projects in East Texas and specifically in Groundwater Management Area 11."

No one else appeared to speak.

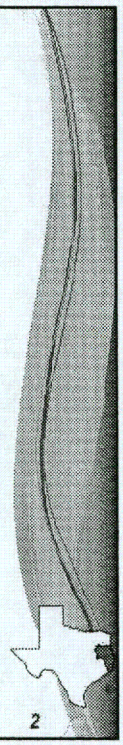
Chair Holcomb opened the floor for questions.

Chair Holcomb adjourned the meeting at 6:01 p.m.



Consultant Team Report Agenda

1. General overview of the ETRWPA 2016 Initially Prepared Plan
2. Questions and Answers



Your 2016 ETRWPA Water Plan

1 Executive Summary

11 chapters

35 appendices (including 16 DB17 Reports)

146 tables and figures

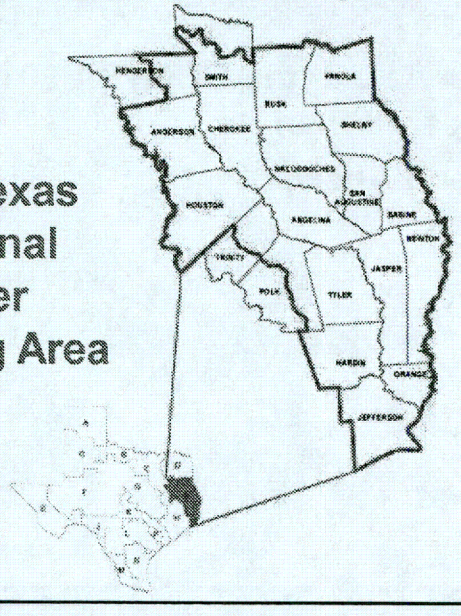
~1,200 pages

Final Regional Water Plan due December 2015

3

Executive Summary: Regional Description

East Texas Regional Water Planning Area



4

Executive Summary: Regional Water Planning Application (DB17)

Texas Water Development Board

Regional Water Plan Data Entry

Home | Logout | Agency Policies | Contact Webmast

Home | User Access | Sources | Entities | WMS | Data Checks | Reports | Help | APM Home

Entity Listing | Planning Year: 20

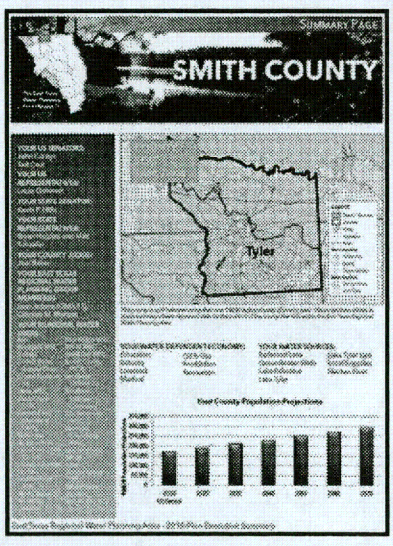
Entity Listing | Apply Filter | Reset Filter

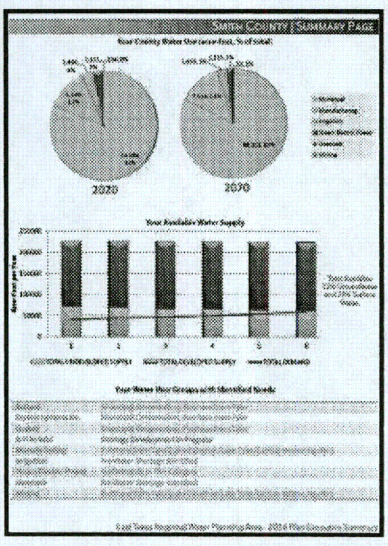
Records: 127 | Page: 1 of 3 | Show records on page: 10 20 30 50 100 25

Entity Name	Region	Entity Type	Entity WUG Type	Entity WUG Sub Type	Entity
Entity Name	I	Select a value	MUNICIPAL	Select a value	Entity
ALTO	I	WUG/Seller	MUNICIPAL	CITY	166
ALTO RURAL WSC	I	WUG/Seller	MUNICIPAL	UTILITY	167
ANGELINA WSC	I	WUG/Seller	MUNICIPAL	UTILITY	2503
APPLEBY WSC	I	WUG/Seller	MUNICIPAL	UTILITY	183
ARP	I	WUG/Seller	MUNICIPAL	CITY	191
BEAUMONT	I	WUG/WWP	MUNICIPAL	CITY	9
BECKVILLE	I	WUG/Seller	MUNICIPAL	CITY	220
BERRYVILLE	I	WUG/Seller	MUNICIPAL	CITY	232
BETHEL-ASH WSC	I	WUG/Seller	MUNICIPAL	UTILITY	235
BEVIL OAKS	I	WUG/Seller	MUNICIPAL	CITY	238
BRIDGE CITY	I	WUG/Seller	MUNICIPAL	CITY	271
BROWNSBORO	I	WUG/Seller	MUNICIPAL	CITY	277
BRUSHY CREEK WSC	I	WUG/Seller	MUNICIPAL	UTILITY	282
BULLARD	I	WUG/Seller	MUNICIPAL	CITY	288

5

Executive Summary: County Summary Sheets





6

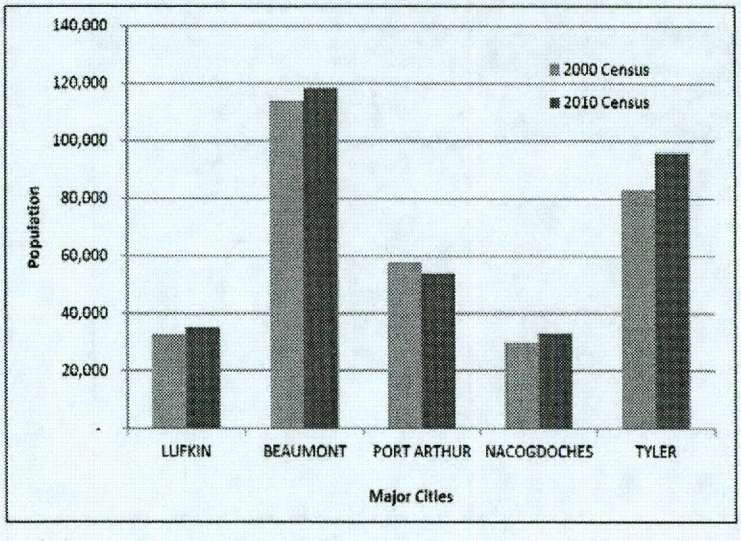
Chapter 1: Description of the Region

- **General discussion of the ETRWPA, e.g.:**
  - Climate, population, economic drivers
  - Water sources, Water User Groups, Wholesale Water Providers
  - Regional resources and threats to resources

7

Chapter 1: Population

Figure 1.6 Historical Populations of Major Cities

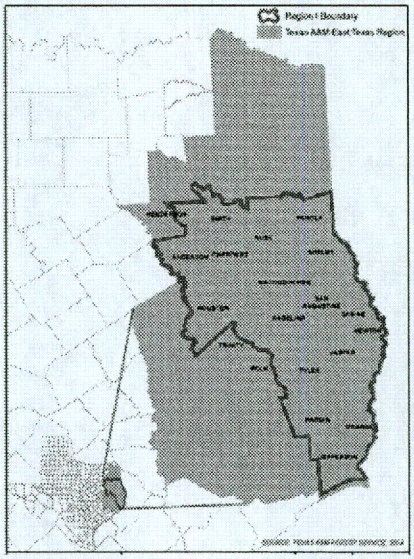


8

Chapter 1: Regional Resources

Timber, Pulpwood, and Forest Fiber

Texas A&M Forest Service East Texas Region



9

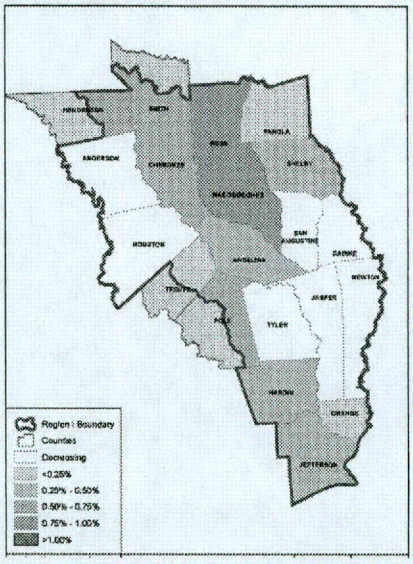
Chapter 2: Current and Projected Population and Water Demands

- **2020 to 2070 projections of population and water demands**
- **Six categories of water use**
  - Municipal
  - Irrigation
  - Manufacturing
  - Steam Electric Power
  - Mining
  - Livestock

10

Chapter 2: Current and Projected Population and Water Demands

Annual Growth Rate of Municipal Demand 2020-2070



11

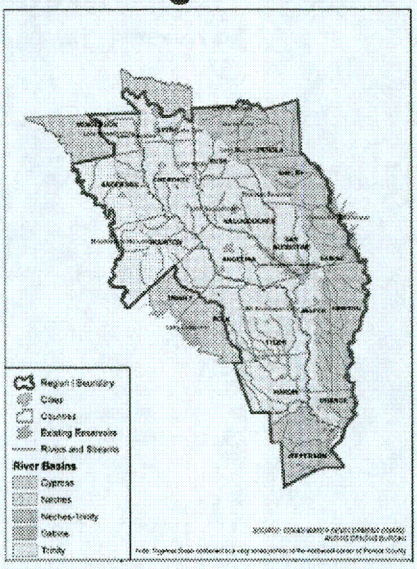
Chapter 3: Evaluation of Current Water Supplies in the Region

- **Current surface water supplies: rivers, lakes, brackish (near coast)**
- **Current groundwater supplies (freshwater and brackish aquifers)**

12

Chapter 3: Evaluation of Current Water Supplies in the Region

Surface Water Sources



13

Chapter 4: Comparison of Water Supplies with Water Demands to Determine Need

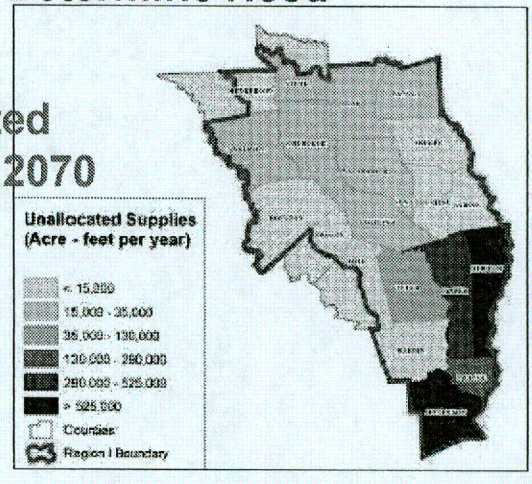
- **Brings together Chapters 2 and 3 to establish regional needs:**

Supply – Demand = Surplus/Shortage

14

Chapter 4: Comparison of Water Supplies with Water Demands to Determine Need

Unallocated Supplies in 2070



15

Chapter 5A: Identification of Potentially Feasible Water Management Strategies

- **Explains the process for evaluating WMSs and identifies strategies that may be feasible**
- **Strategy Types**
  - Water Conservation
  - Water Reuse
  - Expanded Use of Existing Supplies
  - New Supply Development
  - Interbasin Transfer
  - Drought Management

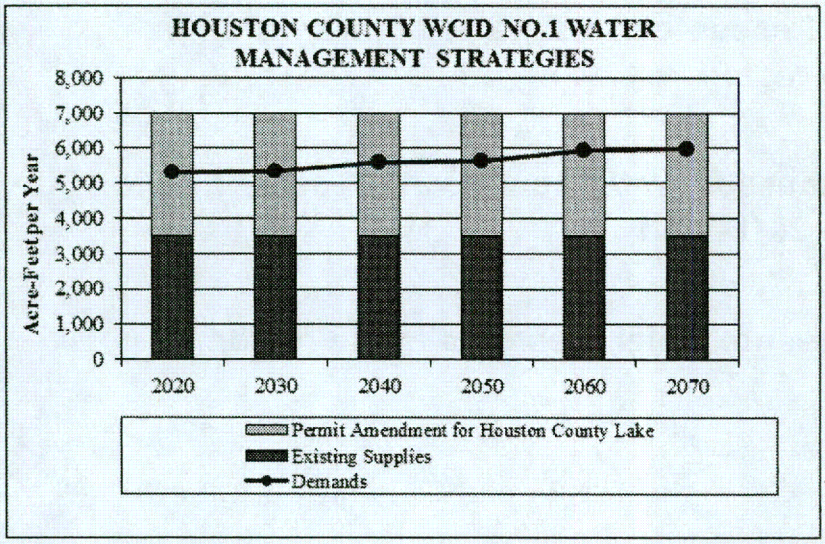
16

Chapter 5B: Evaluation of Potentially Feasible, Recommended, and Alternative Water Management Strategies

- **The central objective of the regional water plan**
- **Approximately 80 WMSs Evaluated**
- **Identify WMSs to be Prioritized**
  - SWIFT Funding

17

Chapter 5B: Permit Amendment for Houston County Lake (Recommended)



18

Chapter 5B: WMS Prioritization (SWIFT Funding)

SWIFT Application Timeline

Texas Water Development Board

2014

November 2014
Nov. 6 – Application period opens.

2015

February
Feb. 3 – Abridged Applications due.

Spring
- Board considers prioritization of Abridged Applications.
- Board identifies amount of funds available by category.
- Invitations extended to submit full financial applications.
- Entities submit complete applications.

Summer
- Board considers and approves applications.
- Board authorizes TWDB bond sale.

Fall
- TWDB bond sale.
- TWDB bond closing.
- Borrowers close loans.

19

Chapter 5C: Water Conservation Recommendations

- **Addresses current water conservation in the region**
- **Discusses water conservation as a WMS in the 2016 Plan**
- **Presents water loss data in the region**

20

Chapter 5C: Reported 2010 Water Loss Accounting in the ETRWPA

Table 5C.2 Reported 2010 Water Loss Accounting in the ETRWPA

System Input Volume 49.3 Billion Gallons 100.0%	Authorized Consumption 40.8 Billion Gallons 82.7%	Billed Consumption 39.7 Billion Gallons 80.6%	Revenue Water 39.7 Billion Gallons 80.6%
		Unbilled Consumption 1.0 Billion Gallons 2.1%	Non-Revenue Water 9.6 Billion Gallons 19.4%
	Water Loss 8.5 Billion Gallons 17.3%	Apparent Loss 1.3 Billion Gallons 2.6%	
		Real Loss 7.2 Billion Gallons 14.6%	

21

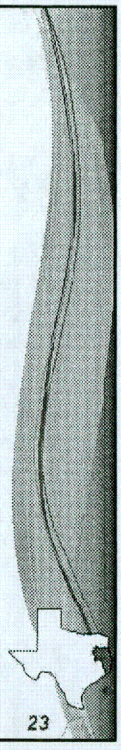
Chapter 6: Impacts of Plan and Consistency with Protection of Resources

- **Describes potential impacts of the plan and threats to the region's resources**
- **Addresses consistency of the plan with protection of resources**
- **Addresses consistency of the plan with water planning requirements**
  - TAC Chapters 357 and 358

22

Chapter 7: Drought Response Information, Activities, and Recommendations

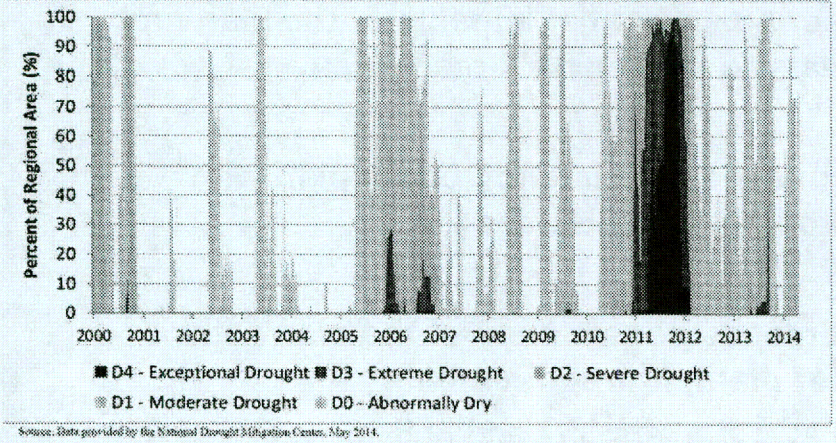
- **Describes the current status of drought response in the region**
- **Discusses the drought of record for the region**



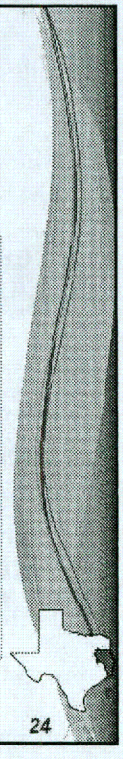
23

Chapter 7: Drought Response Information, Activities, and Recommendations

Figure 7.1 Composite Drought Monitor Index for Counties in the ETRWPA



Source: Data provided by the National Drought Mitigation Center, May 2014.



24

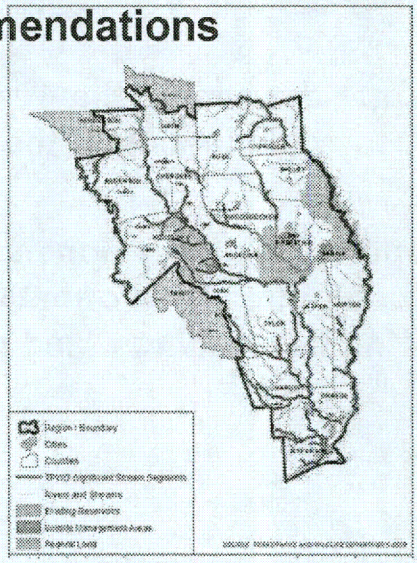
Chapter 8: Unique Stream Segments, Unique Reservoir Sites, and Legislative Recommendations

- Addresses the ETRWPG's desires with respect to unique stream segments and unique reservoir sites
- Addresses legislative and regulatory recommendations of the ETRWPG relative to water planning.

25

Chapter 8: Unique Stream Segments, Unique Reservoir Sites, and Legislative Recommendations

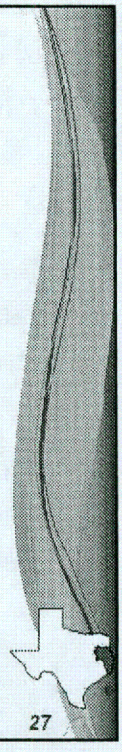
TPWD Ecologically Significant Stream Segments



26

Chapter 9: Infrastructure Financing Report

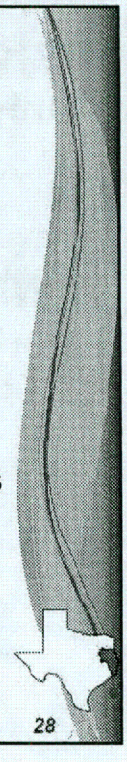
- Report on how WUGs intend to finance recommended WMSs
- The ETRWPG will send out and collect this information and forward it to the TWDB.
- TWDB will provide the report to be included in the plan



27

Chapter 10: Public Participation and Adoption of Plan

- Chapter describing the 4th round planning process culminating in the 2016 Plan
- Supported by three appendices that will include outreach information, public hearing proceedings, and public comments



28

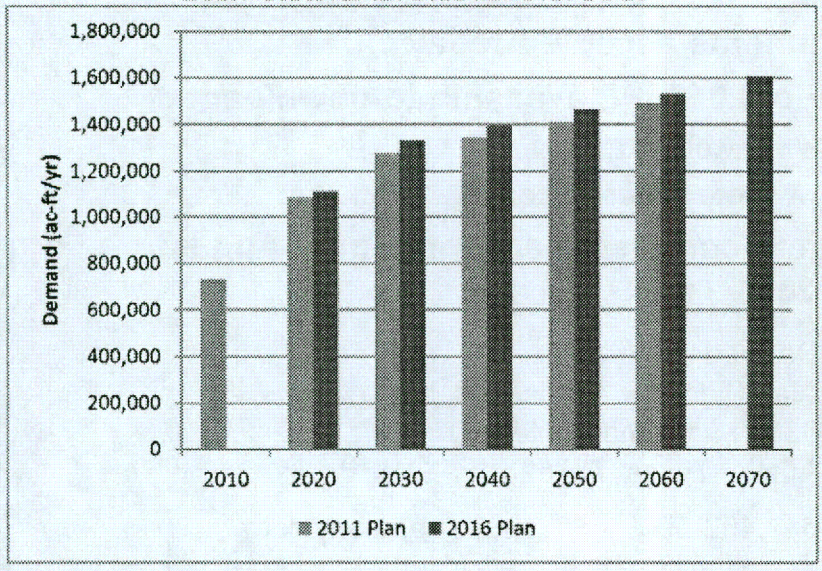
Chapter 11: Implementation and Comparison to the Previous Regional Water Plan

- New chapter in this plan
- Review implementation success since the previous plan
- Compares the 2011 and 2016 Plans

29

Chapter 11

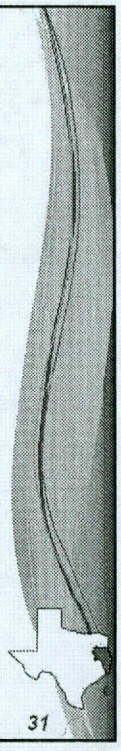
Figure 11.1 Total Projected Demand for the ETRWPA from the 2011 and 2016 Plans



30

Next Steps in the Regional Water Planning Process

- **August 2015**
  - Accept public comments
  - Incorporate TWDB comments received
- **September 2015**
  - Update Chapter 10 – Public Participation
  - Prioritize 2016 WMSs
- **October 2015**
  - Adopt Final 2016 Prioritization
  - Adopt Final Regional Water Plan
- **December 2015**
  - Submit Final Regional Water Plan to TWDB



31

ETRWPA 2016 Initially Prepared Plan Comments

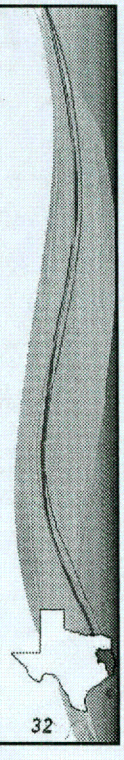
- **Comments accepted today**
- **PDF of 2016 IPP available to download:**

  www.twdb.texas.gov

  www.etexwaterplan.org
- **Written comments accepted until August 24, 2015**

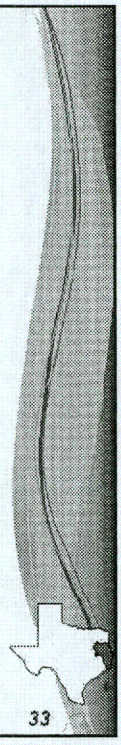
Rex H. Hunt, P.E.
Alan Plummer Associates, Inc.
6300 La Calma, Suite 400
Austin, Texas 78752

512.452-5905 rhunt@apaienv.com



32

QUESTIONS?



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Appendix 10-C

Initially Prepared Plan Public Comments

Opportunities for public comment are provided through the regional water planning process. The public are invited to provide comments at regularly scheduled meetings of the ETRWPG. Comments may be received in person, as well as in the form of letters, emails, or by telephone. During an official comment period to occur during the summer of 2015, comments regarding the 2016 Initially Prepared Plan were received from entities and/or individuals. This appendix includes copies of all written comments and a transcript of oral comments. Chapter 10 of the 2016 Plan includes responses to all comments received during the 2016 Initially Prepared Plan comment period.

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Texas Water Development Board
P.O. Box 13231, 1700 N. Congress Ave.
Austin, TX 78711-3231, www.twdb.texas.gov
Phone (512) 463-7847, Fax (512) 475-2053

August 10, 2015

Mr. Kelley Holcomb, Chair
c/o Angelina & Neches River Authority
P.O. Box 387
Lufkin, Texas 75902

Ms. Lila Fuller
City of Nacogdoches
P.O. Box 635030
Nacogdoches, Texas 75963

Re: Texas Water Development Board Comments on the East Texas Regional Water Planning Group (Region I) Initially Prepared Plan, Contract No. 1148301320

Dear Mr. Holcomb and Ms. Fuller:

Texas Water Development Board (TWDB) staff completed a review of the Initially Prepared Plan (IPP) submitted by May 1, 2015 on behalf of the Region I Regional Water Planning Group. The attached comments follow this format:

- **Level 1:** Comments, questions, and online regional water planning database revisions that must be satisfactorily addressed in order to meet statutory, agency rule, and/or contract requirements; and,

- **Level 2:** Comments and suggestions for consideration that may improve the readability and overall understanding of the regional water plan.

The TWDB's statutory requirement for review of potential interregional conflicts under Title 31 Texas Administrative Code (TAC) §357.62 will not be completed until submittal and review of adopted regional water plans. However, as previously requested by our Executive Administrator, please inform TWDB in advance of your final plan if your planning group believes that an interregional conflict exists. Additionally, subsequent review will be performed as the planning group completes its data entry into the regional water planning database (DB17). If issues arise during our ongoing data review, they will be communicated promptly to the planning group to resolve.

Our Mission
To provide leadership, information, education, and support for planning, financial assistance, and outreach for the conservation and responsible development of water for Texas

Board Members
Bech Bruun, Chairman | Carlos Rubinstein, Member | Kathleen Jackson, Member

Kevin Patteson, Executive Administrator

Title 31 TAC§357.50(d) requires the regional water planning group to consider timely agency and public comment. Section 357.50(e) requires the final adopted plan include summaries of all timely written and oral comments received, along with a response explaining any resulting revisions or why changes are not warranted. Copies of TWDB's Level 1 and 2 written comments and the region's responses must be included in the final, adopted regional water plan. While the comments included in this letter represent TWDB's review to date, please anticipate the need to respond to additional comments regarding data integrity, including any water source overallocations, in the regional water planning database (DB17) once data entry is completed by the region.

Standard to all planning groups is the need to include certain content in the final regional water plans that was not yet available at the time that IPPs were prepared and submitted. In your final regional water plan, however please be sure to also incorporate the following:

a) Completed results from the regional planning group's infrastructure financing survey (IFR) for sponsors of recommended projects with capital costs *[31 TAC §357.44]*;
b) Completed results from the implementation survey *[31 TAC §357.45(a)]*;
c) The socioeconomic impact evaluation provided by TWDB at the request of the planning group *[31 TAC §357.33(c)]*;
d) Documentation that comments received on the IPP were considered in the development of the final plan *[31 TAC §357.50(d)]*;
e) Evidence, such as a certification, that the final, adopted regional water plan is complete and adopted by the planning group *[31 TAC §357.50(j)(1)]*; and,
f) The required DB17 reports, as made available by TWDB, in the executive summary or elsewhere in the plan as specified in the Contract *[31 TAC §357.50(e)(2)(B), Contract Scope of Work Task 4D(p), Contract Exhibit 'C', Table 2]*. Please ensure that the numerical values presented in the tables throughout the final, adopted regional water plan are consistent with the data provided in DB17. For the purpose of development of the 2017 State Water Plan, water management strategy and other data entered by the regional water group in DB17 (and as presented in the regional plan) shall take precedence over any conflicting data presented in the final regional water plan *[Contract Exhibit 'C', Sections 12.1.3. and 12.2.2]*.

The following items must accompany, separately, the submission of the final, adopted regional water plan:

- The prioritized list of all recommended projects in the regional water plan *[Texas Water Code 15.436(a), Contract Scope of Work Task 13]*; and,
- Any remaining hydrologic modeling files or GIS files that may not have been provided at the time of the submission of the IPP but that were used in developing the final plan. *[31 TAC §357.50(e)(2)(C), Contract Exhibit 'C', Section 12.2.1; Contract Scope of Work Task 3-III-13]*

Note that provision of certain content in an electronic-only form is permissible as follows: Internet links are permissible as a method for including model conservation and drought contingency plans within the final regional water plan; hydrologic modeling files may be submitted as electronic appendices, however

all other regional water plan appendices should be incorporated in hard copy format within each plan *[31 TAC §357.50(e)(2)(C), Contract Scope of Work Task 5e, Contract Exhibit 'C', Section 12.2.1]*.

The following general requirements that apply to recommended water management strategies must be adhered to in all final regional water plans including:

- Regional water plans must not include any strategies or costs that are associated with simply maintaining existing water supplies or replacing existing infrastructure. Plans may include only infrastructure costs that are associated with volumetric increases of treated water supplies delivered to water user groups or that result in more efficient use of existing supplies *[31 TAC §357.10(28), §357.34(d)(3)(A), Contract Exhibit 'C", Section 5.1.2.2, Section 5.1.2.3]*; and,
- Regional water plans must not include any retail distribution-level infrastructure costs (other than those costs related to conservation strategies such as water loss reduction) *[31 TAC §357.10(28), §357.34(d)(3)(A), Contract Exhibit 'C", Section 5.1.2.3]*.

To facilitate efficient and timely completion, and Board approval, of your final regional water plan, please provide your TWDB project manager with early drafts of your responses to these IPP comments for preliminary review and feedback.

If you have any questions regarding these comments or would like to discuss your approach to addressing any of these comments, please do not hesitate to contact Lann Bookout at (512) 936-9439. TWDB staff will be available to assist you in any way possible to ensure successful completion of your final regional water plan.

Sincerely,

Jeff Walker
Deputy Executive Administrator
Water Supply and Infrastructure

Attachments

cc w/att: Mr. Rex Hunt, Alan Plummer Associates, Inc.

TWDB Comments to the Initially Prepared 2016 East Texas (Region I) Regional Water Plan

Level 1:	**Comments and questions must be satisfactorily addressed in order to meet statutory, agency rule, and/or contract requirements.**

1. Please describe how publicly available plans of major agricultural, municipal, manufacturing and commercial water users were considered in the final, adopted regional water plan. *[31 Texas Administrative Code (TAC) §357.22(a)(4)]*

2. The plan does not appear to include a listing of the water rights that are the basis for the surface water availability in the plan. Please include such a listing in the final, adopted regional water plan. *[Contract Exhibit 'C', Section 3.1]*

3. Please clarify how the run-of-river availabilities were calculated for municipal water users to ensure that all monthly demands are fully met for the entire simulation of the unmodified Texas Commission on Environmental Quality WAM Run 3 in the final, adopted regional water plan. *[Contract Exhibit 'C', Section 3.4]*

4. Pages 3-23 and 3-24, Tables 3.5 and 3.6; Vol. II, Appendix 3A: The availability volumes shown in Table 3.5 for the Carrizo-Wicox in Smith County, Neches Basin do not match the availability from DB17 in all decades. For example, 2020 availability is 12,245 AFY, compared to the 2020 value in the source availability report of 21,004 AFY. Additionally, the aquifer totals presented in Table 3.6 should reflect this correction. Please revise in the final, adopted regional water plan.

5. The plan does not appear to consider conservation or drought management as a potentially feasible strategy for all identified water supply needs. Please include documentation whether conservation and drought management were considered to meet identified needs and, if not recommended, please document the reason in the final, adopted regional water plan. *[Texas Water Code (TWC) §16.053(e)(5), 31 TAC §357.34(c)(3), §357.34(f)(2)]*

6. Page 5B-121: The plan does not appear to include a recommended water management strategy summary table including strategy names, total yield for all decades, total capital costs, and estimated unit costs. The table starting on page 5B-121 appears to present strategies but the header of the table is unclear as to exactly what information is being presented (e.g., recommended or alternative strategies) and costs are not included. Please include recommended and alternative strategy summary tables in the final, adopted regional water plan. *[Contract Exhibit 'C', Section 12.1.2]*

7. Page 6-2: The description of protection of water resources does not appear to include information on potential impacts to groundwater and surface water interrelationships. Please include this information in the final, adopted regional water plan. *[31 TAC §357.40(b)(2)]*

8. Chapter 7: The plan does not appear to include recommended drought triggers and actions for each water source. Please include this information in the final, adopted regional water plan. *[TWC §16.053(e)(3)(A-C); 31 TAC §357.42(c)(1-3)]*

9. Please indicate how the planning group considered relevant recommendations from the Drought Preparedness Council (a letter was provided to planning groups with relevant recommendations in November 2014) in the final, adopted regional water plan. *[31 TAC §357.42(h)]*

10. The technical evaluations of the water management strategies do not appear to estimate water losses from the associated strategies. Please include an estimate of water losses in the final, adopted regional water plan, for example in a format of an estimated percent loss. *[31 TAC §357.34(d)(3)(A); Contract Exhibit 'C', Section 5.1.1]*

11. Vol. II, Pages Appendix 5B-129, 5B-132, 5B-136, 5B-146, 5B-156, 5B-181: The plan appears to include water management strategies, including retail distribution system infrastructure, that appear to not increase the volume of supply to water user groups. For example, the Athens MWA Water Treatment Plant Improvements, the Volumetric Surveys of Lake Striker, Lake Center, and Lake Pinkston, the Normal Pool Elevation Adjustment of Lake Striker, Sabine River Authority Infrastructure Improvements, and the City of Jacksonville Distribution System Improvements. Regional water plans must not include any strategies or costs that are associated with simply maintaining existing supplies, improving retail distribution systems, improving water treatment processes, or replacing infrastructure. Plans may include only infrastructure costs that are associated with volumetric increases of treated water supplies delivered to water user groups or that result in more efficient use of existing supplies (e.g., conservation). Please revise as appropriate throughout the final, adopted regional water plan. *[31 TAC §357.34(d)(3)(A); Contract Exhibit 'C', Sections 5.1.2.2 and 5.1.2.3]*

12. Vol. II, Appendix 5A-B: The plan does not appear to identify potentially feasible water management strategies for all wholesale water provider (WWPs) with identified needs. Please include documentation that potentially feasible water management strategy types, as required by statute and rule, were considered for identified needs in the final, adopted regional water plan. *[TWC §16.053(e)(5), 31 TAC §357.34(a)]*

13. Vol. II, Pages Appendix 5B-15, 5B-24, 5B-42, 5B-45, 5B-150, and 5B-158: The plan in some instances, does not appear to include a quantitative reporting of environmental factors. For example, strategy evaluations for Alto Rural WSC New Wells, Houston Irrigation New Wells, D&M WSC New Wells, Nacogdoches Livestock New Wells, Houston County WCID #1 New Wells, and LNVA Purchase from Sabine River Authority provide qualitative descriptions such as "low" or "moderate" impacts, but the plan does not appear to include quantification of the impacts. Please include quantitative reporting in the final, adopted regional water plan. *[31 TAC §357.34 (d)(3)(B)]*

14. Vol. II, Pages Appendix 5B-108, 5B-114, and 5B-124: The plan in some instances, does not appear to include a quantitative reporting of impacts to agricultural resources. For example, strategy evaluations for Lake Columbia, ANRA Treatment Plant and Distribution System, and Athens MWA Indirect Reuse do not appear to include quantified impacts to agricultural resources, even in instances where there may be no impact. Please include quantitative reporting of impacts to agricultural resources in the final, adopted regional water plan. *[31 TAC §357.34 (d)(3)(C)]*

Level 2: Comments and suggestions for consideration that may improve the readability and overall understanding of the regional water plan.

1. Please consider numbering, titling, and referencing all tables in the final, adopted regional water plan. For example, all tables in Section 5B of Volume I.

2. Page 3-13, Table 3.3: Please consider specifying the stream or river source names for the run-of-river supplies listed in this table in the final, adopted regional water plan.

3. Page 3-24, Table 3.6: Please consider revising the citation for the source information to "GAM Run 10-038 MAG" and "GAM Run 10-016 MAG (ver. 2)" in the final, adopted regional water plan.

4. Page 5B-2: Reference is made to Appendix 5B-B, but there appears to be no associated Appendix or a listing for the appendix in the plan. Please reconcile in the final, adopted regional water plan.

5. Page 5C-12: The plan lists "appropriate conservation activities" for Irrigation, but does not appear to evaluate the BMPs for recommended strategies in chapter 5B. Please consider including additional documentation of potentially feasible irrigation conservation strategies in the final, adopted regional water plan.

6. Page 11-12: Although the plan contains a volumetric summary of the differences in recommended and alternative strategies between the 2011 and 2016 plans, please consider specifically identifying the individual recommended and alternative strategies in the plan.

EAST TEXAS
Regional Water Planning Group
Region I WPG

PUBLIC COMMENT REQUEST FORM

6-25-15 - 5:30 p.m.

Name: John W. Stine

Title: Self

Entity/Organization Represented:

Mailing Address: Route 2 Box 1012
San Augustine, TX 75972

Phone: 936-596-7308 **Email:** jj66stine at gmail.com

I would like to comment on Item(s) No. IPP public comment

June 15, 2015

Mr. John W. Stine

2673 FM 2785

San Augustine, Texas 75972

Gentlemen:

As a resident of San Augustine County and spokesperson for signatories below we do not support any future water impoundment projects for Groundwater Management Area 11 as proposed in The East Texas Regional Water Planning Group 2016 Initially Prepared Regional Water Plan.

Proposed water impoundments as incorporated in the above Regional Water Plan will continue to erode our East Texas land base used for Agriculture and Recreational Hunting--- cattle production, forestry production, and wildlife habitat. In addition it erodes the private property tax base and therefore will escalate private property taxes.

In November of 2013, the voters of Sabine, San Augustine and Shelby Counties soundly defeated the formation of a proposed Groundwater District by 5,720 Against and 489 For the proposal. This voter response further validated the inviolability of private property rights from government overreach and infringement. The grass roots electorate is resolute in its opposition to further water impoundment by the State of Texas that infringes on private property rights of Texans.

Enclosed is a letter from the Sabine River Authority in October 16, 2013 in which "The Sabine River Authority of Texas has a Texas water right for over 244 billion gallons per year, of which 96% is available to be sold under contract." Toledo Bend Reservoir is nearly 50 years old since impoundment in the late 1960's. This untapped source of surface water from Toledo Bend Reservoir is just one of many existing water impoundments in East Texas that precludes future water impoundment projects in East Texas and specifically in Groundwater Management Area 11.

Sincerely,

John W. Stine

San Augustine County

Alvin V. Newton

San Augustine County

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Commissioners

Dan Allen Hughes, Jr.
Chairman
Beeville

Ralph H. Duggins
Vice-Chairman
Fort Worth

T. Dan Friedkin
Chairman-Emeritus
Houston

Bill Jones
Austin

James H. Lee
Houston

Margaret Martin
Boerne

S. Reed Morian
Houston

Dick Scott
Wimberley

Lee M. Bass
Chairman-Emeritus
Fort Worth

Carter P. Smith
Executive Director

August 14, 2015

Mr. Rex Hunt, P.E.
Alan Plummer and Associates, Inc.
6300 La Calma Suite 400
Austin, Texas 78752

Re: 2016 Region I Initially Prepared Regional Water Plan

Dear Mr.Hunt:

Thank you for seeking review and comment from the Texas Parks and Wildlife Department ("TPWD") on the 2016 Initially Prepared Regional Water Plan for the East Texas Regional Planning Area (ETRWPA) Region I (IPP). As you know, water impacts every aspect of TPWD's mission to manage and conserve the natural and cultural resources of Texas. As the agency charged with primary responsibility for protecting the state's fish and wildlife resources, TPWD is positioned to provide technical assistance during the water planning process. Although TPWD has limited regulatory authority over the use of state waters, TPWD is committed to working with stakeholders and others to provide science-based information during the water planning process intended to avoid or minimize impacts to state fish and wildlife resources.

TPWD understands that regional water planning groups are guided by 31 TAC §357 when preparing regional water plans. These water planning rules spell out requirements related to natural resource and environmental protection. Accordingly, TPWD staff reviewed the IPP with a focus on the following questions:

- Does the IPP include a quantitative reporting of environmental factors including the effects on environmental water needs and habitat?
- Does the IPP include a description of natural resources and threats to natural resources due to water quantity or quality problems?
- Does the IPP discuss how these threats will be addressed?
- Does the IPP describe how it is consistent with long-term protection of natural resources?
- Does the IPP include water conservation as a water management strategy?
- Does the IPP include Drought Contingency Plans?
- Does the IPP recommend any stream segments be nominated as ecologically unique?
- If the IPP includes strategies identified in the 2010 regional water plan, does it address concerns raised by TPWD in connection with the 2010 Water Plan.

4200 SMITH SCHOOL ROAD
AUSTIN, TEXAS 78744-3291
512.389.4800
www.tpwd.texas.gov

The ETRWPA consists of all or portions of 20 counties located in the Neches, Sabine, and Trinity River Basins, and the Neches-Trinity Coastal Basin. The population of the ETRWPA was 1.07 million in 2010 and is expected to increase to 1.55 million by 2070. Regional water use, which is projected to be about 1.1 million acre-feet in 2020, is expected to increase to more than 1.6 million acre-feet by 2070. Approximately 55 percent of the current water use in ETRWPA is for manufacturing, primarily in the petrochemical industry in Jefferson County. Municipal water use accounts for about 17 percent of water use in ETRWPA. Most of the available water in the ETRWPA is surface water. Approximately 15 percent of the total freshwater supply is groundwater.

The ETRWPA IPP adequately describes the natural resources of the region. Aquatic resources including major rivers, estuaries, springs, and wetlands are discussed as well as terrestrial habitats and state and federal parks. Appendix 1-A lists Species of Special Concern in the ETRWPA.
Threats to natural resources due to water quantity or quality problems are also discussed. Aquifer depletion, saltwater intrusion, insufficient environmental flows and inundation due to reservoir construction are described. According to the IPP, between 1955 and 1992 overpumping of aquifers resulted in approximately 19,900 acres of estuarine intertidal emergent wetlands being lost in Texas as a result of submergence (drowning) and erosion.

Two major aquifers that underlie the region are the Carrizo-Wilcox and the Gulf Coast aquifers. Over 250 springs of various sizes have been documented in the ETRWPA. TPWD concurs with the statement that springs are an important source of water for local supplies and provide crucial water for wildlife. TWDB planning rules now require that groundwater supplies not exceed the Modeled Available Groundwater (MAG) values that were determined to meet the desired future conditions (DFCs) of the groundwater source. However, adopted DFCs for the primary aquifers in ETRWPA do not address protection of springs or groundwater surface water interaction. Ultimately TPWD would like to see DFCs adopted to protect these features.

Currently, over 25 percent of the municipal water users in the ETRWPA use less than 100 gallons per capita per day (gpcd) and 62 percent use less than the Water Conservation Implementation Task Force recommended 140 gpcd. According to the IPP, the projected total water savings are projected to be just over 5,000 acre-feet in 2020 increasing to over 20,000 acre-feet by 2070. TPWD commends Region I for progress made toward implementing municipal water conservation strategies and encourages further progress towards implementing manufacturing and irrigation water conservation strategies. Chapter 7 of the IPP includes existing drought contingency plans (DCPs). Drought management measures are not recommended as a water management strategy to provide additional supplies for the ETRWPA.

Other proposed water management strategies (WMS) include water reuse, expanded use of existing supplies and groundwater, and development of new reservoirs. Lake Columbia and the Fastrill Reservoir replacement project (also called the Neches Off-Channel Reservoir Project) are recommended as strategies for meeting future water needs. TPWD agrees that environmental impacts associated with the development of a new reservoir can be significant. Construction of off-channel reservoirs can also help to minimize wildlife impacts if reservoirs are located to minimize inundation of habitats and diversions are modified to avoid impacts to environmental flows. TPWD has worked closely with the Angelina Neches River Authority to minimize impacts to fish and wildlife resources associated with the construction of the proposed Lake Columbia.

Water management strategies were evaluated for impacts as addressed in Chapter 5B of this Plan. The evaluation was based on a numeric evaluation from most desirable (1) to least desirable (5). According to the IPP, both Lake Columbia and the Neches River Off-Channel Reservoir Project scored "3" medium environmental impacts. Table 1.9 lists potential impacts to fish and wildlife associated with the proposed Lake Columbia as well as Rockland Reservoir, Bon Weir Reservoir, and Tennessee Colony Reservoir. Protection of environmental flows, including recently adopted environmental flow standards, is briefly discussed in Chapter 3 of the IPP. TPWD agrees that the implementation of environmental flow recommendations will result in a need to more carefully consider environmental flow needs during the development of surface water management strategies.

As in the previous planning cycles TPWD staff appreciates the consideration the planning group gave to evaluating whether to recommend stream segments as ecologically unique. Ultimately the ETRWPA voted not to recommend any stream segments in the region for unique status, concluding that sufficient programs are already in place to protect the region's streams from inappropriate reservoir construction. TPWD continues to see the importance of recommending and designating significant stream segments and will support ETRWPA in this regard if requested in the next planning cycle.

We appreciate the opportunity to provide these comments. While TPWD values and appreciates the need to meet future water supply demands, we must do so in a thoughtful and sound manner that ensures the ecological health of our state's aquatic and natural resources. If you have any questions, or if we can be of any assistance, please feel to contact Cindy Loeffler at 512-389-8715. Thank you.

Sincerely,

Ross Melinchuk
Deputy Executive Director, Natural Resources

RM:CL:ms

cc: Robin Riechers, Division Director, Coastal Fisheries Division, TPWD
Clayton Wolf, Division Director, Wildlife Division, TPWD
Terry Stelly, Coastal Fisheries Division, TPWD

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UPPER NECHES RIVER MUNICIPAL WATER AUTHORITY

RECEIVED
AUG 21 2015
APAI - AUSTIN

August 18, 2015

Region I ETRWPG
% City of Nacogdoches
P.O. Box 635030
Nacogdoches, TX 75963-5030
Attn: Lila Fuller

Via: Email: fullm@ci-nacogdoches.tx.us
U.S. Post

Re: Comments on the 2016 Initially Prepared Region I Water Plan

Dear Sir:

The Upper Neches River Municipal Water Authority respectfully submits the attached comments regarding the 2016 Initially Prepared Region I Water Plan.

We appreciate this opportunity.

If there are any questions, or if any additional information is necessary or required, please contact us at your convenience.

Sincerely,

Monty D. Shank
General Manager
Upper Neches River Municipal Water Authority
P.O. Box 1965
Palestine, TX 75802
Phone: 903-876-2237
Fax: 903-876-5200
mdsunra@dctexas.net

Enclosure

XC: Rex Hunt, Principal ✓
Alan Plummer and Associates, Inc.
6300 La Calma, Suite 400
Austin, TX 78752

Sam Vaugh, PE, Vice President/Professional Associate
HDR Engineering, Inc.
4401 West Gate Blvd., Suite 400
Austin, Texas 78745

Upper Neches River Municipal Water Authority

Comments on the East Texas Regional Water Planning Area 2016 Initially Prepared Plan

August 18, 2015

1) Page 1-36 – Replace "Upper Neches River Authority" with "Upper Neches River Municipal Water Authority."
2) Page 5A-16 – The last two sentences of the first paragraph are duplicative of the previous two sentences and should be deleted.
3) Page 5A-18 – Replace the partial sentence at the top of the page with: "construction of an off-channel storage reservoir, which would be located on a tributary of the Neches River in Anderson County downstream of Lake Palestine and upstream of the Weches Dam Site."
4) Page 5B-3 – Please revise the last sentence. The UNRMWA does not presently intend to meet future steam-electric water needs in Anderson County with supplies from the recommended Neches Run-of-River water management strategy.
5) Page 5B-4 – Please revise text in the first paragraph. The UNRMWA does not presently intend to meet future steam-electric water needs in Anderson County with supplies from the recommended Neches Run-of-River water management strategy.
6) Page 5B-117 – In the first sentence, replace "2014" with "2015."
7) Page 5B-117 – Revise text of second paragraph to reflect UNRMWA intent to develop the recommended Neches Run-of-River water management strategy in the same configuration as included in the 2014 draft *Dallas Long Range Water Supply Plan to 2070 and Beyond* (i.e. with a firm yield of 47,250 acft/yr (42 MGD) and projected to meet Dallas needs starting in 2060). See Comments #4 and #5.
8) Page 5B-118 - After the first sentence in the paragraph regarding Neches Run-of-River Diversions with Tributary Storage (Alternate), insert the following sentence: "This alternate strategy includes system operations with Lake Palestine." System operations of this alternate strategy with Lake Palestine could result in a firm yield of 75,000 acft/yr (67 MGD) at a unit cost of $434/acft/yr during the debt service period. Revise the last sentence in this paragraph accordingly.
9) Page 5B-118 - After the second sentence in the paragraph regarding Neches Run-of-River Diversions with Groundwater (Alternate), insert the following sentence: "This alternate strategy includes system operations with Lake Palestine." System operations of this alternate strategy with Lake Palestine could result in a firm yield of 84,875 acft/yr (76 MGD) at a unit cost of $414/acft/yr during the debt service period. Revise the last sentence in this paragraph accordingly.
10) Page 5B-119 – Revise table pursuant to Comments #4, #5, and #7.
11) Page 5B-120 – Revise table and figure pursuant to Comments #4, #5, #7, #8, and #9.
12) Page 5B-121 – Revise table pursuant to Comment #4, #5, and #7.

13) Page 5B-128 – Revise table pursuant to Comments #4, #5, #7, #8, and #9.
14) Page 8-8 – Revise the footnote for Table 8.3 to reflect that the size of the Neches River National Wildlife Refuge was 3,729 acres as of September 2013.
15) Page 8-17 – In the second to last sentence, replace "275 ft msl" with "274 ft-msl."
16) Pages Appendix 5B-3 through 5B-5 – In this Technical Memorandum regarding purchase of water from the City of Palestine for Anderson County steam-electric power needs, delete the fourth and fifth sentences under the heading Supply Development pursuant to Comments #4, #5, and #7. Additional revisions may be needed throughout the Technical Memorandum.
17) Pages Appendix 5B-6 through 5B-8 – Delete or substantially revise this Technical Memorandum regarding purchase of water from UNRMWA for Anderson County steam-electric power needs pursuant to Comments #4, #5, and #7.
18) Pages Appendix 5B-21 through 5B-23 – Revise this Technical Memorandum regarding purchase of water from UNRMWA for City of Chandler needs to reflect that the UNRMWA does not presently intend to meet future municipal water needs in Henderson County with supplies from the recommended Neches Run-of-River water management strategy.
19) Pages Appendix 5B-187 through 5B-189 – Revise this Technical Memorandum regarding the recommended Neches Run-of-River water management strategy as follows:
    a. Page Appendix 5B-187 – In the title, replace "Region C" with "ETRWPA."
    b. Page Appendix 5B-187 – Revise Potential Supply Quantity to "47,250 acft/yr (42 MGD)."
    c. Page Appendix 5B-187 – Revise Implementation Decade to "2020 (2020)."
    d. Page Appendix 5B-187 – Revise Strategy Capital Cost to "$226,790,000 (Sept. 2013)."
    e. Page Appendix 5B-187 – Revise Unit Water Cost to "$1.44 per1,000 gallons (during loan period)."
    f. Page Appendix 5B-187 – Revise the last sentence in the second paragraph under Strategy Description to read: "Hence, the run-of-the-river project would be operated as a system with Lake Palestine using available storage capacity therein during drought."
    g. Page Appendix 5B-187 – In the last sentence, replace "62 MGD (68,625 acre-feet/year)" with "42 MGD (47,250 acre-feet/year)."
    h. Page Appendix 5B-188 – Delete the second paragraph and replace with: "It should be noted that the project configuration for the recommended Neches Run-of-River WMS for UNRMWA in the ETRWPA Regional Plan is identical to the configuration discussed in the *2014 Dallas Long Range Water Supply Plan to 2070 and Beyond* (Draft LRWSP). The project configuration discussed in the City of Dallas Draft LRWSP resulted in a firm yield of 47,250 acft/yr (42 MGD) that is projected to meet Dallas needs starting in 2060."
    i. Page Appendix 5B-188 – After the first sentence in the paragraph regarding Neches Run-of-River Diversions with Tributary Storage (Alternate), insert the

following sentence: "This alternate strategy includes system operations with Lake Palestine." System operations of this alternate strategy with Lake Palestine could result in a firm yield of 75,000 acft/yr at a unit cost of $434/acft/yr during the debt service period.

j. Page Appendix 5B-188 – After the second sentence in the paragraph regarding Neches Run-of-River Diversions with Groundwater (Alternate), insert the following sentence: "This alternate strategy includes system operations with Lake Palestine." System operations of this alternate strategy with Lake Palestine could result in a firm yield of 84,875 acft/yr at a unit cost of $414/acft/yr during the debt service period.

k. Page Appendix 5B-189 – Under the heading of Environmental Considerations, delete the table which is for the Nueces Off-Channel Reservoir. The recommended Neches Run-of-River water management strategy does not include an off-channel reservoir.

l. Page Appendix 5B-189 – Under the heading of Water Management Strategy Evaluation, revise the Rating and Explanation information to appropriately reflect the recommended Neches Run-of-River water management strategy focusing on the following Criteria: Quantity, Environmental Factors, Threat to Agricultural Resources/Rural Areas, Other Natural Resources, and Major Impacts on Key Water Quality Parameters. The recommended Neches Run-of-River water management strategy does not include an off-channel reservoir.

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Appendix 10-D

Initially Prepared Plan Submittal Letter

Attached as Appendix 10-D is the letter the East Texas Regional Water Planning Group chair, Kelley Holcomb, informing the Texas Water Development Board (TWDB) of the approval and adoption of the 2016 Initially Prepared Plan. This submittal letter accompanied the submittal documents when delivered to the TWDB.

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Region I
East Texas Regional
Water Planning Group

Kelley Holcomb, Chair
P.O. Box 387
Lufkin TX 75902
936-633-7543

May 1, 2015

Mr. Kevin Patteson
Executive Administrator
Texas Water Development Board
1700 North Congress Avenue
Austin, TX 78711-3231

Re: Submission of the Region I, East Texas Regional Water Planning Group 2016 Initially Prepared Plan

Dear Mr. Patteson:

The Region I, East Texas Regional Water Planning Group (ETRWPG) met on April 8, 2015 and formally adopted the 2016 Initially Prepared Plan (IPP) and approved its submission to the Texas Water Development Board (TWDB) commensurate with the May 1, 2015 deadline. The submittal was mailed to your office via overnight delivery.

The submission of the IPP includes twelve (12) double-sided copies and two (2) electronic copies of the 2016 East Texas IPP. The electronic submittal includes the following documents:

- The 2016 East Texas IPP in searchable Portable Document Format
- The 2016 East Texas IPP in Microsoft Word Format

If you have any questions regarding this matter, please contact me at 936-633-7543. I appreciate the opportunity to work with the TWDB and your staff on this matter.

Respectfully,

Kelley Holcomb, Chair
East Texas Regional Water Planning Group

Lila Fuller, Administrative Contact • P.O. Box 635030 • Nacogdoches, Texas 75963-5030
Phone: 936-559-2504 • Fax: 936-559-2912

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Appendix 11-A

TWDB Implementation Survey

The results of the Implementation Survey can be seen in the attachment included on page Appendix 11-A-3 through Appendix 11-A-6. The survey was used to analyze the 2011 projects and the 2016 projects in order to determine the progression and current status of proposed projects from the previous planning cycle.

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Sponsor and Recommended Water Mangement Strategy	Sponsor	Recommended Water Management Strategy	Sponsor Region	WMS Sponsor Entity Id	DBProjectId	CapitalCost	SS2010	SS2020	SS2030	SS2040	SS2050	SS2060	Y denotes strategies with supply volumes included in other strategies	Project Description	Infrastructure Type*
ANGELINA & NECHES RIVER AUTHORITY : Angelina-Neches River Authority Treatment and Distribution System	ANGELINA & NECHES RIVER AUTHORITY	Angelina-Neches River Authority Treatment and Distribution System	I	3	830	$35,127,250	0	0	0	0	0	0	Y	Water Treatment Plant and Distribution System	Water Treatment Plant
ANGELINA & NECHES RIVER AUTHORITY : New source - Lake Columbia	ANGELINA & NECHES RIVER AUTHORITY	New source - Lake Columbia	I	3	458	$231,865,000	0	75,700	75,700	75,700	75,700	75,700	N	New Reservoir	Impoundment
APPLEBY WSC : Lake Noconiche Regional Supply System	APPLEBY WSC	Lake Noconiche Regional Supply System	I	193	835	$4,392,350	0	300	300	300	300	300	N	Assumes Nacogdoches County will seek water right amendment for municipal water use designation and develop regional distribution system	Water Treatment Plant
APPLEBY WSC : Municipal conservation	APPLEBY WSC	Municipal conservation	I	193	439	$0	0	0	0	22	39	62	N	Municipal conservation	No Infrastructure
ATHENS : Indirect reuse	ATHENS	Indirect reuse	I	205	449	$0	0	19	29	42	65	94	Y	Contract to require Fish Hatury to return unused water to Lake Athens (current operations)	No Infrastructure
ATHENS : Municipal conservation	ATHENS	Municipal conservation	I	205	439	$0	1	6	12	17	22	30	N	Municipal conservation	No Infrastructure
ATHENS MUNICIPAL WATER AUTHORITY : Forest Grove Reservoir project	ATHENS MUNICIPAL WATER AUTHORITY	Forest Grove Reservoir project	I	6	451	$26,619,000	0	0	0	2,240	2,240	2,240	N	Amend water right for municipal water use.	Other
ATHENS MUNICIPAL WATER AUTHORITY : Indirect reuse	ATHENS MUNICIPAL WATER AUTHORITY	Indirect reuse	I	6	449	$0	0	2,872	2,872	2,872	2,872	2,872	N	Contract to require Fish Hatury to return unused water to Lake Athens (current operations)	No Infrastructure
ATHENS MUNICIPAL WATER AUTHORITY : New water treatment plant	ATHENS MUNICIPAL WATER AUTHORITY	New water treatment plant	I	6	463	$12,387,000	0	0	0	0	0	2,240	Y	Expand treatment capacity	Water Treatment Plant
ATHENS MUNICIPAL WATER AUTHORITY : Overdraft Carrizo Wilcox Aquifer	ATHENS MUNICIPAL WATER AUTHORITY	Overdraft Carrizo Wilcox Aquifer	I	6	444	$3,799,000	0	1,400	1,400	1,400	1,400	1,400	N	New groundwater wells. These wells have been permitted.	Other
BROWNSBORO : Overdraft Carrizo Wilcox Aquifer	BROWNSBORO	Overdraft Carrizo Wilcox Aquifer	I	299	444	$148,600	0	0	0	0	0	40	N	Assumed met by existing wellfield	Other
BULLARD : Municipal conservation	BULLARD	Municipal conservation	I	310	439	$0	0	3	4	5	6	8	N	Municipal conservation	No Infrastructure
BULLARD : New wells - Carrizo Wilcox Aquifer	BULLARD	New wells - Carrizo Wilcox Aquifer	I	310	443	$305,674	0	100	100	100	200	200	N	Expand existing well field	Wells
CENTER : Municipal conservation	CENTER	Municipal conservation	I	26	439	$0	15	34	47	60	67	75	N	Municipal conservation	No Infrastructure
COMMUNITY WATER COMPANY : New wells - Carrizo Wilcox Aquifer	COMMUNITY WATER COMPANY	New wells - Carrizo Wilcox Aquifer	I	393	443	$1,640,776	100	121	121	227	227	227	N	Plan states the recommended strategy is to purchase water from provider	Wells
CONSOLIDATED WSC : Purchase water from provider (1)	CONSOLIDATED WSC	Purchase water from provider (1)	I	398	440	$0	1,050	1,050	1,050	1,050	1,050	1,050	Y	Purchase from Houston County	No Infrastructure
COUNTY-OTHER, ANDERSON : New wells - Queen City Aquifer	COUNTY-OTHER, ANDERSON	New wells - Queen City Aquifer	I	412	445	$212,732	0	0	0	0	0	100	N	New wells - Queen City Aquifer	Wells
COUNTY-OTHER, ANDERSON : Overdraft Carrizo Wilcox Aquifer	COUNTY-OTHER, ANDERSON	Overdraft Carrizo Wilcox Aquifer	I	412	444	$262,189	0	0	0	100	100	100	N	Overdraft Carrizo Wilcox Aquifer	Other
COUNTY-OTHER, ANGELINA : New wells - Yegua Jackson Aquifer	COUNTY-OTHER, ANGELINA	New wells - Yegua Jackson Aquifer	I	414	448	$419,717	0	0	150	150	300	300	N	New wells - Yegua Jackson Aquifer	Wells
COUNTY-OTHER, ANGELINA : Purchase water from provider (2)	COUNTY-OTHER, ANGELINA	Purchase water from provider (2)	I	414	441	$0	0	0	0	0	500	500	N	This is a distribution system for Lufkin to supply smaller entities in Angelina County. Strategies #120 and I21 are the same strategy.	No Infrastructure
COUNTY-OTHER, ANGELINA : Purchase water from provider (2)	COUNTY-OTHER, ANGELINA	Purchase water from provider (2)	I	414	441	$10,604,000	0	0	1,100	1,100	600	600	Y	This is a distribution system for Lufkin to supply smaller entities in Angelina County. Strategies #120 and I21 are the same strategy.	Pipeline
COUNTY-OTHER, HARDIN : New wells - Gulf Coast Aquifer	COUNTY-OTHER, HARDIN	New wells - Gulf Coast Aquifer	I	511	446	$0	0	0	0	1	1	2	N	New wells - Gulf Coast Aquifer	Wells
COUNTY-OTHER, HARDIN : Overdraft Gulf Coast Aquifer	COUNTY-OTHER, HARDIN	Overdraft Gulf Coast Aquifer	I	511	643	$556,888	154	306	306	306	459	459	N	Overdraft Gulf Coast Aquifer	Other
COUNTY-OTHER, HENDERSON : Municipal conservation	COUNTY-OTHER, HENDERSON	Municipal conservation	I	518	439	$0	31	57	74	92	108	129	N	Municipal conservation	No Infrastructure
COUNTY-OTHER, HENDERSON : New wells - Carrizo Wilcox Aquifer	COUNTY-OTHER, HENDERSON	New wells - Carrizo Wilcox Aquifer	I	518	443	$609,900	50	50	50	50	50	50	N	New wells - Carrizo Wilcox Aquifer	Wells
COUNTY-OTHER, HENDERSON : New wells - Queen City Aquifer	COUNTY-OTHER, HENDERSON	New wells - Queen City Aquifer	I	518	445	$4,420,100	50	50	50	100	200	500	N	New wells - Queen City Aquifer	Wells
COUNTY-OTHER, HENDERSON : Overdraft Carrizo Wilcox Aquifer	COUNTY-OTHER, HENDERSON	Overdraft Carrizo Wilcox Aquifer	I	518	444	$0	100	0	0	0	0	0	N	Overdraft Carrizo Wilcox Aquifer	No Infrastructure
COUNTY-OTHER, HENDERSON : Purchase water from provider (2)	COUNTY-OTHER, HENDERSON	Purchase water from provider (2)	I	518	441	$8,937,350	0	150	200	300	400	500	N	UNRMWA, Palestine	No Infrastructure
COUNTY-OTHER, JASPER : New wells - Gulf Coast Aquifer	COUNTY-OTHER, JASPER	New wells - Gulf Coast Aquifer	I	532	446	$393,088	82	82	82	82	82	82	N	New wells - Gulf Coast Aquifer	Wells
COUNTY-OTHER, JASPER : Overdraft Gulf Coast Aquifer	COUNTY-OTHER, JASPER	Overdraft Gulf Coast Aquifer	I	532	643	$1,369,957	550	550	550	550	550	550	N	Overdraft Gulf Coast Aquifer	Other
COUNTY-OTHER, NACOGDOCHES : Lake Noconiche Regional Supply System	COUNTY-OTHER, NACOGDOCHES	Lake Noconiche Regional Supply System	I	585	835	$7,320,600	0	500	500	500	500	500	N	Assumes sponsor (Nacogdoches County) will seek water right amendment for municipal purposes and develop regional distribution system.	Other
COUNTY-OTHER, NACOGDOCHES : Purchase water from provider (1)	COUNTY-OTHER, NACOGDOCHES	Purchase water from provider (1)	I	585	440	$0	0	428	428	428	428	428	Y	ANRA, Lake Columbia	No Infrastructure

East Texas Regional Water Planningn Area
TWDB Implementation Survey Results

Sponsor	Recommended Water Management Strategy	At what level of Implementation is the project?*	If not implemented, why?*	Initial Volume of Water Provided (acft/yr)	Funds Expended to Date ($)	Project Cost ($) (should include development and construction costs)	Year the Project is Online?*	Is this a phased project?*	(Phased) Ultimate Volume (acft/yr)	(Phased) Ultimate Project Cost ($)	Year project reaches maximum capacity?*	What is the project funding source(s)?*	Included in the 2016 Plan?*	Comments
ANGELINA & NECHES RIVER AUTHORITY	Angelina-Neches River Authority Treatment and Distribution System	Not Implemented	Too soon										Yes	
ANGELINA & NECHES RIVER AUTHORITY	New source - Lake Columbia	Permit Application Submitted/Pending	Permit contraints										Yes	
APPLEBY WSC	Lake Noconiche Regional Supply System	All Phases Fully Implemented		3239									No	
APPLEBY WSC	Municipal conservation	Not Implemented	Too soon	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor did not request for project to be included in RWP.
ATHENS	Indirect reuse	Not Implemented	Too soon		0	0				0		Other	Yes	
ATHENS	Municipal conservation	Sponsor Has Taken Official Action to Initiate Project	Other		0	0				0			No	
ATHENS MUNICIPAL WATER AUTHORITY	Forest Grove Reservoir project	Not Implemented	Too soon										No	
ATHENS MUNICIPAL WATER AUTHORITY	Indirect reuse	Not Implemented	Too soon										Yes	
ATHENS MUNICIPAL WATER AUTHORITY	New water treatment plant	Not Implemented	Too soon										Yes	
ATHENS MUNICIPAL WATER AUTHORITY	Overdraft Carrizo Wilcox Aquifer	Permit Application Submitted/Pending	Permit contraints										Yes	
BROWNSBORO	Overdraft Carrizo Wilcox Aquifer	Not Implemented	Too soon	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor did not request for project to be included in RWP.
BULLARD	Municipal conservation	Sponsor Has Taken Official Action to Initiate Project	Other	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor did not request for project to be included in RWP.
BULLARD	New wells - Carrizo Wilcox Aquifer	Not Implemented	Environmental obstacles	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor did not request for project to be included in RWP.
CENTER	Municipal conservation	Sponsor Has Taken Official Action to Initiate Project	Other	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor did not request for project to be included in RWP.
COMMUNITY WATER COMPANY	New wells - Carrizo Wilcox Aquifer	Not Implemented	Other	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor did not request for project to be included in RWP.
CONSOLIDATED WSC	Purchase water from provider (1)	Permit Application Submitted/Pending	Permit contraints		0	0				0			No	
COUNTY-OTHER, ANDERSON	New wells - Queen City Aquifer	Not Implemented	Too soon	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
COUNTY-OTHER, ANDERSON	Overdraft Carrizo Wilcox Aquifer	Not Implemented	Too soon	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
COUNTY-OTHER, ANGELINA	New wells - Yegua Jackson Aquifer	Not Implemented	Too soon	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
COUNTY-OTHER, ANGELINA	Purchase water from provider (2)	Not Implemented	Too soon	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
COUNTY-OTHER, ANGELINA	Purchase water from provider (2)	Not Implemented	Too soon	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
COUNTY-OTHER, HARDIN	New wells - Gulf Coast Aquifer	Not Implemented	Too soon	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
COUNTY-OTHER, HARDIN	Overdraft Gulf Coast Aquifer	Not Implemented	Environmental obstacles	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
COUNTY-OTHER, HENDERSON	Municipal conservation	Sponsor Has Taken Official Action to Initiate Project	Other	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
COUNTY-OTHER, HENDERSON	New wells - Carrizo Wilcox Aquifer			Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
COUNTY-OTHER, HENDERSON	New wells - Queen City Aquifer	Not Implemented	Other	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
COUNTY-OTHER, HENDERSON	Overdraft Carrizo Wilcox Aquifer	Not Implemented	Environmental obstacles	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
COUNTY-OTHER, HENDERSON	Purchase water from provider (2)			Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
COUNTY-OTHER, JASPER	New wells - Gulf Coast Aquifer			Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
COUNTY-OTHER, JASPER	Overdraft Gulf Coast Aquifer	Not Implemented	Environmental obstacles	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
COUNTY-OTHER, NACOGDOCHES	Lake Noconiche Regional Supply System	Not Implemented	Other	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
COUNTY-OTHER, NACOGDOCHES	Purchase water from provider (1)	Sponsor Has Taken Official Action to Initiate Project	Too soon	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.

Sponsor and Recommended Water Mangement Strategy	Sponsor	Recommended Water Management Strategy	Sponsor Region	WMS Sponsor Entity Id	DBProjectId	CapitalCost	SS2010	SS2020	SS2030	SS2040	SS2050	SS2060	Y denotes strategies with supply volumes included in other strategies	Project Description	Infrastructure Type*
COUNTY-OTHER, ORANGE : Overdraft Gulf Coast Aquifer	COUNTY-OTHER, ORANGE	Overdraft Gulf Coast Aquifer	I	592	643	$432,222	140	140	140	140	140	140	N	Overdraft Gulf Coast Aquifer	Other
COUNTY-OTHER, POLK : New wells - Gulf Coast Aquifer	COUNTY-OTHER, POLK	New wells - Gulf Coast Aquifer	I	598	446	$2,991,138	208	417	624	832	832	832	N	New wells - Gulf Coast Aquifer	Wells
COUNTY-OTHER, SABINE : New wells - Carrizo Wilcox Aquifer	COUNTY-OTHER, SABINE	New wells - Carrizo Wilcox Aquifer	I	613	443	$328,840	32	32	32	64	64	64	N	New wells - Carrizo Wilcox Aquifer	Wells
COUNTY-OTHER, SHELBY : New wells - Carrizo Wilcox Aquifer	COUNTY-OTHER, SHELBY	New wells - Carrizo Wilcox Aquifer	I	621	443	$2,278,400	100	200	300	300	350	350	N	New wells - Carrizo Wilcox Aquifer	Wells
COUNTY-OTHER, SHELBY : Purchase water from provider (1)	COUNTY-OTHER, SHELBY	Purchase water from provider (1)	I	621	440	$0	50	50	50	50	50	50	N	SRA, Toledo Bend	No Infrastructure
COUNTY-OTHER, SHELBY : Purchase water from provider (2)	COUNTY-OTHER, SHELBY	Purchase water from provider (2)	I	621	441	$3,024,150	150	150	150	150	150	150	N	Center, Center Lake	Other
COUNTY-OTHER, TRINITY : New wells - Yegua Jackson Aquifer	COUNTY-OTHER, TRINITY	New wells - Yegua Jackson Aquifer	I	639	448	$249,851	0	0	0	60	60	60	N	New wells - Yegua Jackson Aquifer	Wells
COUNTY-OTHER, TYLER : New wells - Gulf Coast Aquifer	COUNTY-OTHER, TYLER	New wells - Gulf Coast Aquifer	I	640	446	$366,241	0	251	251	251	251	251	N	New wells - Gulf Coast Aquifer	Wells
D&M WSC : New wells - Carrizo Wilcox Aquifer	D&M WSC	New wells - Carrizo Wilcox Aquifer	I	2688	443	$492,348	0	0	310	310	310	310	N	New wells - Carrizo Wilcox Aquifer	Wells
DIBOLL : Municipal conservation	DIBOLL	Municipal conservation	I	713	439	$0	11	20	26	34	53	72	N	Municipal conservation	No Infrastructure
DIBOLL : New wells - Yegua Jackson Aquifer	DIBOLL	New wells - Yegua Jackson Aquifer	I	713	448	$576,576	600	600	600	600	600	600	N	Expand City's current wellfield	Wells
DIBOLL : Purchase water from provider (2)	DIBOLL	Purchase water from provider (2)	I	713	441	$6,195,000	800	800	800	800	1,600	1,600	Y	Purchase water from Lufkin, Abitibi wellfield in Carizzo-Wilcox	Other
FOUR WAY WSC : Purchase water from provider (2)	FOUR WAY WSC	Purchase water from provider (2)	I	811	441	$669,192	0	0	0	0	0	225	N	Participant in the Lufkin Agenlina Regional Project	Other
FRANKSTON : Municipal conservation	FRANKSTON	Municipal conservation	I	813	439	$0	0	0	6	7	8	9	N	Municipal conservation	No Infrastructure
FRANKSTON : New wells - Carrizo Wilcox Aquifer	FRANKSTON	New wells - Carrizo Wilcox Aquifer	I	813	443	$255,951	0	0	121	121	121	121	N	New wells - Carrizo Wilcox Aquifer	Wells
HOUSTON COUNTY WCID #1 : Permit amendment - Houston County Lake	HOUSTON COUNTY WCID #1	Permit amendment - Houston County Lake	I	77	831	$0	3,500	3,500	3,500	3,500	3,500	3,500	N	Houston County	No Infrastructure
HUDSON : Purchase water from provider (1)	HUDSON	Purchase water from provider (1)	I	962	440	$0	0	0	125	400	800	1,200	Y	Hudson WSC, Carizzo-Wilcox	No Infrastructure
HUDSON WSC : New wells - Carrizo Wilcox Aquifer	HUDSON WSC	New wells - Carrizo Wilcox Aquifer	I	964	443	$3,274,192	0	0	600	600	2,000	2,000	N	New well field	Wells
IRRIGATION, HARDIN : Purchase water from provider (2)	IRRIGATION, HARDIN	Purchase water from provider (2)	I	1074	441	$2,405,001	1,002	1,002	1,002	1,002	1,002	1,002	N	LNVA, Rayburn	Other
IRRIGATION, HENDERSON : Indirect reuse	IRRIGATION, HENDERSON	Indirect reuse	I	1081	449	$0	0	70	83	95	108	121	Y	AMWA, recycled water from Hatchery	No Infrastructure
IRRIGATION, HOUSTON : New wells - Carrizo Wilcox Aquifer	IRRIGATION, HOUSTON	New wells - Carrizo Wilcox Aquifer	I	1087	443	$3,205,560	766	1,149	1,149	1,639	1,915	2,298	N	New wells - Carrizo Wilcox Aquifer	Wells
IRRIGATION, SAN AUGUSTINE : New wells - Carrizo Wilcox Aquifer	IRRIGATION, SAN AUGUSTINE	New wells - Carrizo Wilcox Aquifer	I	1168	443	$224,690	100	100	100	100	100	100	N	New wells - Carrizo Wilcox Aquifer	Wells
IRRIGATION, SMITH : New wells - Queen City Aquifer	IRRIGATION, SMITH	New wells - Queen City Aquifer	I	1177	445	$357,794	40	40	80	120	168	168	N	New wells - Queen City Aquifer	Wells
JACKSON WSC : Purchase water from provider (2)	JACKSON WSC	Purchase water from provider (2)	I	1224	441	$0	0	600	600	600	600	600	Y	ANRA, Lake Columbia; Particpant in ANRA Regional Project (I1)	No Infrastructure
JACKSONVILLE : Infrastructure improvements	JACKSONVILLE	Infrastructure improvements	I	79	833	$1,000,000	1,000	1,000	1,000	1,000	1,000	1,000	N	Improvements at City's WTP to allow greater amount of water to be treated.	Water Treatment Plant
JACKSONVILLE : Purchase water from provider (3)	JACKSONVILLE	Purchase water from provider (3)	I	79	442	$19,133,700	0	1,700	1,700	1,700	1,700	1,700	Y	Contract with ANRA; construct own intake and pipeline	Pipeline
KIRBYVILLE : Municipal conservation	KIRBYVILLE	Municipal conservation	I	1270	439	$0	3	4	5	6	7	7	N	Municipal conservation	No Infrastructure
LILLY GROVE SUD : Lake Noconiche Regional Supply System	LILLY GROVE SUD	Lake Noconiche Regional Supply System	I	1322	835	$7,320,600	0	0	0	0	500	500	N	Assumes sponsor (Nacogdoches County) will seek water right amendment for municipal purposes and develop regional distribution system.	Pipeline
LILLY GROVE SUD : New wells - Carrizo Wilcox Aquifer	LILLY GROVE SUD	New wells - Carrizo Wilcox Aquifer	I	1322	443	$580,504	0	0	0	0	500	500	N	New wells - Carrizo Wilcox Aquifer	Wells
LINDALE RURAL WSC : Municipal conservation	LINDALE RURAL WSC	Municipal conservation	I	1325	439	$0	0	0	5	7	9	12	N	Municipal conservation	No Infrastructure
LINDALE RURAL WSC : New wells - Carrizo Wilcox Aquifer	LINDALE RURAL WSC	New wells - Carrizo Wilcox Aquifer	I	1325	443	$347,259	0	0	0	0	0	80	N	New wells - Carrizo Wilcox Aquifer	Wells
LIVESTOCK, ANGELINA : Expand local surface water supplies	LIVESTOCK, ANGELINA	Expand local surface water supplies	I	1334	453	$168,800	0	0	0	90	90	90	N	Build new stock tanks	Other
LIVESTOCK, HENDERSON : Indirect reuse	LIVESTOCK, HENDERSON	Indirect reuse	I	1438	449	$0	0	1,288	1,477	1,647	1,820	1,983	Y	Contract to require Fish Hatchery to return unused water to Lake Athens (which is current operations)	No Infrastructure

Sponsor	Recommended Water Management Strategy	At what level of Implementation is the project?*	If not implemented, why?*	Initial Volume of Water Provided (acft/yr)	Funds Expended to Date ($)	Project Cost ($) (should include development and construction costs)	Year the Project is Online?*	Is this a phased project?*	(Phased) Ultimate Volume (acft/yr)	(Phased) Ultimate Project Cost ($)	Year project reaches maximum capacity?*	What is the project funding source(s)?*	Included in the 2016 Plan?*	Comments
COUNTY-OTHER, ORANGE	Overdraft Gulf Coast Aquifer	Not Implemented	Environmental obstacles	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
COUNTY-OTHER, POLK	New wells - Gulf Coast Aquifer			Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
COUNTY-OTHER, SABINE	New wells - Carrizo Wilcox Aquifer			Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
COUNTY-OTHER, SHELBY	New wells - Carrizo Wilcox Aquifer			Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
COUNTY-OTHER, SHELBY	Purchase water from provider (1)	Currently Operating		Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
COUNTY-OTHER, SHELBY	Purchase water from provider (2)			Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
COUNTY-OTHER, TRINITY	New wells - Yegua Jackson Aquifer	Not Implemented	Too soon	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
COUNTY-OTHER, TYLER	New wells - Gulf Coast Aquifer			Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
D&M WSC	New wells - Carrizo Wilcox Aquifer	Not Implemented	Too soon										No	
DIBOLL	Municipal conservation	Sponsor Has Taken Official Action to Initiate Project	Other	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor did not request for project to be included in RWP.
DIBOLL	New wells - Yegua Jackson Aquifer												No	
DIBOLL	Purchase water from provider (2)												No	
FOUR WAY WSC	Purchase water from provider (2)	Not Implemented	Too soon										No	
FRANKSTON	Municipal conservation	Not Implemented	Too soon	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor did not request for project to be included in RWP.
FRANKSTON	New wells - Carrizo Wilcox Aquifer	Not Implemented	Too soon	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor did not request for project to be included in RWP.
HOUSTON COUNTY WCID #1	Permit amendment - Houston County Lake	Permit Application Submitted/Pending	Permit contraints	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor did not request for project to be included in RWP.
HUDSON	Purchase water from provider (1)	Not Implemented	Too soon	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor did not request for project to be included in RWP.
HUDSON WSC	New wells - Carrizo Wilcox Aquifer	Not Implemented	Too soon	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor did not request for project to be included in RWP.
IRRIGATION, HARDIN	Purchase water from provider (2)	Not Implemented		Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
IRRIGATION, HENDERSON	Indirect reuse	Not Implemented	Environmental obstacles	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
IRRIGATION, HOUSTON	New wells - Carrizo Wilcox Aquifer	Not Implemented	Environmental obstacles	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
IRRIGATION, SAN AUGUSTINE	New wells - Carrizo Wilcox Aquifer			Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
IRRIGATION, SMITH	New wells - Queen City Aquifer			Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
JACKSON WSC	Purchase water from provider (2)	Sponsor Has Taken Official Action to Initiate Project	Too soon		0	0				0			No	
JACKSONVILLE	Infrastructure improvements	Not Implemented	Other										No	
JACKSONVILLE	Purchase water from provider (3)	Not Implemented	Other										No	
KIRBYVILLE	Municipal conservation	Sponsor Has Taken Official Action to Initiate Project	Other	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor did not request for project to be included in RWP.
LILLY GROVE SUD	Lake Noconiche Regional Supply System	Not Implemented	Too soon										No	
LILLY GROVE SUD	New wells - Carrizo Wilcox Aquifer	Not Implemented	Too soon										No	
LINDALE RURAL WSC	Municipal conservation	Not Implemented	Too soon	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor did not request for project to be included in RWP.
LINDALE RURAL WSC	New wells - Carrizo Wilcox Aquifer	Not Implemented	Too soon										No	
LIVESTOCK, ANGELINA	Expand local surface water supplies	Not Implemented	Too soon	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
LIVESTOCK, HENDERSON	Indirect reuse	Not Implemented	Environmental obstacles	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.

Sponsor and Recommended Water Mangement Strategy	Sponsor	Recommended Water Management Strategy	Sponsor Region	WMS Sponsor Entity Id	DBProjectId	CapitalCost	SS2010	SS2020	SS2030	SS2040	SS2050	SS2060	Y denotes strategies with supply volumes included in other strategies	Project Description	Infrastructure Type*
LIVESTOCK, HOUSTON : New wells - Carrizo Wilcox Aquifer	LIVESTOCK, HOUSTON	New wells - Carrizo Wilcox Aquifer	I	1444	443	$1,335,649	111	111	221	363	542	665	N	New wells - Carrizo Wilcox Aquifer	Wells
LIVESTOCK, HOUSTON : New wells - Yegua Jackson Aquifer	LIVESTOCK, HOUSTON	New wells - Yegua Jackson Aquifer	I	1444	448	$1,335,649	110	130	221	300	342	416	N	New wells - Yegua Jackson Aquifer	Wells
LIVESTOCK, NACOGDOCHES : New wells - Carrizo Wilcox Aquifer	LIVESTOCK, NACOGDOCHES	New wells - Carrizo Wilcox Aquifer	I	1505	443	$1,969,392	0	0	322	644	966	1,350	N	New wells - Carrizo Wilcox Aquifer	Wells
LIVESTOCK, SABINE : Expand local surface water supplies	LIVESTOCK, SABINE	Expand local surface water supplies	I	1533	453	$562,700	50	100	107	200	210	300	N	Build new stock tanks	Other
LIVESTOCK, SABINE : New wells - Carrizo Wilcox Aquifer	LIVESTOCK, SABINE	New wells - Carrizo Wilcox Aquifer	I	1533	443	$226,430	50	50	50	100	100	100	N	New wells - Carrizo Wilcox Aquifer	Wells
LIVESTOCK, SAN AUGUSTINE : Expand local surface water supplies	LIVESTOCK, SAN AUGUSTINE	Expand local surface water supplies	I	1534	453	$562,700	0	50	100	200	200	300	N	Build new stock tanks	Other
LIVESTOCK, SAN AUGUSTINE : New wells - Carrizo Wilcox Aquifer	LIVESTOCK, SAN AUGUSTINE	New wells - Carrizo Wilcox Aquifer	I	1534	443	$568,710	150	150	250	300	400	400	N	New wells - Carrizo Wilcox Aquifer	Wells
LIVESTOCK, SHELBY : Expand local surface water supplies	LIVESTOCK, SHELBY	Expand local surface water supplies	I	1541	453	$689,600	0	0	500	500	500	500	N	Build new stock tanks	Other
LIVESTOCK, SHELBY : New wells - Carrizo Wilcox Aquifer	LIVESTOCK, SHELBY	New wells - Carrizo Wilcox Aquifer	I	1541	443	$2,428,400	1,500	2,500	3,000	3,000	3,500	3,500	N	New wells - Carrizo Wilcox Aquifer	Wells
LIVESTOCK, SHELBY : Purchase water from provider (2)	LIVESTOCK, SHELBY	Purchase water from provider (2)	I	1541	441	$4,763,200	0	0	0	4,000	4,000	4,000	N	SRA, Toledo Bend	Other
LOWER NECHES VALLEY AUTHORITY : Permit amendment for Sam Rayburn Reservoir	LOWER NECHES VALLEY AUTHORITY	Permit amendment for Sam Rayburn Reservoir	I	88	827	$0	0	28,000	28,000	28,000	28,000	28,000	N	Permit amendment for Sam Rayburn Reservoir	No Infrastructure
LOWER NECHES VALLEY AUTHORITY : Purchase water from provider (2)	LOWER NECHES VALLEY AUTHORITY	Purchase water from provider (2)	I	88	441	$39,168,200	0	0	0	0	36,000	36,000	N	Purchase water from SRA, Toledo Bend.	Other
LOWER NECHES VALLEY AUTHORITY : Reallocation of flood storage (Rayburn)	LOWER NECHES VALLEY AUTHORITY	Reallocation of flood storage (Rayburn)	I	88	828	$0	0	0	0	0	122,000	122,000	N	Reallocation of flood storage (Rayburn)	No Infrastructure
LOWER NECHES VALLEY AUTHORITY : Saltwater barrier conjunctive operation with Rayburn/Steinhagen	LOWER NECHES VALLEY AUTHORITY	Saltwater barrier conjunctive operation with Rayburn/Steinhagen	I	88	826	$2,000,000	0	111,000	111,000	111,000	111,000	111,000	N	Saltwater barrier conjunctive operation with Rayburn/Steinhagen	Other
LOWER NECHES VALLEY AUTHORITY : Wholesale customer conservation	LOWER NECHES VALLEY AUTHORITY	Wholesale customer conservation	I	88	889	$1,400,000	20,000	30,000	33,000	35,000	40,000	40,000	N	Water conservation associated with irrigation deliveries	Other
LUFKIN : Angelina County Regional Project	LUFKIN	Angelina County Regional Project	I	91	460	$53,164,000	0	0	0	11,210	11,210	11,210	N	Regional distribution system to serve Angelina County-Other, Diboll, Four-Way WSC	Pipeline
LUFKIN : Lake Kurth Regional System	LUFKIN	Lake Kurth Regional System	I	91	832	$56,488,600	6,800	18,400	18,400	18,400	18,400	18,400	N	Connect Lake Kurth to Lufkin	Pipeline
LUFKIN : Municipal conservation	LUFKIN	Municipal conservation	I	91	439	$0	50	117	189	249	319	408	N	Municipal conservation	No Infrastructure
LUFKIN : New wells - Carrizo Wilcox Aquifer	LUFKIN	New wells - Carrizo Wilcox Aquifer	I	91	443	$14,097,000	4,650	4,650	4,650	4,650	4,650	4,650	N	Develop well field purchased from Abitibi	Wells
MANUFACTURING, ANGELINA : Purchase water from provider (2)	MANUFACTURING, ANGELINA	Purchase water from provider (2)	I	1622	441	$26,176,750	6,800	21,351	21,351	22,651	25,351	27,351	Y	Purchase water from different providers: ANRA, Lufkin	Other
MANUFACTURING, HARDIN : New wells - Gulf Coast Aquifer	MANUFACTURING, HARDIN	New wells - Gulf Coast Aquifer	I	1686	446	$429,542	114	114	114	114	114	114	N	New wells - Gulf Coast Aquifer	Wells
MANUFACTURING, HOUSTON : Purchase water from provider (1)	MANUFACTURING, HOUSTON	Purchase water from provider (1)	I	1698	440	$0	30	30	30	30	30	30	Y	Purchase water from Houston County	No Infrastructure
MANUFACTURING, NEWTON : New wells - Gulf Coast Aquifer	MANUFACTURING, NEWTON	New wells - Gulf Coast Aquifer	I	1742	446	$891,529	400	400	400	800	800	800	N	New wells - Gulf Coast Aquifer	Wells
MANUFACTURING, ORANGE : Purchase water from provider (1)	MANUFACTURING, ORANGE	Purchase water from provider (1)	I	1745	440	$0	5,000	15,000	20,000	25,000	25,000	28,000	N	Purchase water from SRA Canal System.	No Infrastructure
MANUFACTURING, ORANGE : Purchase water from provider (2)	MANUFACTURING, ORANGE	Purchase water from provider (2)	I	1745	441	$0	0	0	0	0	5,000	8,000	N	Purchase water from SRA Toledo Bend Reservoir. Same strategy as #189	No Infrastructure
MANUFACTURING, PANOLA : Purchase water from provider (1)	MANUFACTURING, PANOLA	Purchase water from provider (1)	I	1747	440	$0	96	116	132	147	161	187	N	Carthage, Murvaul	No Infrastructure
MANUFACTURING, POLK : New wells - Gulf Coast Aquifer	MANUFACTURING, POLK	New wells - Gulf Coast Aquifer	I	1751	446	$581,344	0	225	225	450	450	450	N	New wells - Gulf Coast Aquifer	Wells
MANUFACTURING, SAN AUGUSTINE : New wells - Carrizo Wilcox Aquifer	MANUFACTURING, SAN AUGUSTINE	New wells - Carrizo Wilcox Aquifer	I	1762	443	$33,300	10	10	10	10	10	10	N	New wells - Carrizo Wilcox Aquifer	Wells
MANUFACTURING, SHELBY : Purchase water from provider (1)	MANUFACTURING, SHELBY	Purchase water from provider (1)	I	1766	440	$0	0	0	0	0	5	12	N	Center, Carizzo-Wilcox	No Infrastructure
MANUFACTURING, SMITH : Purchase water from provider (2)	MANUFACTURING, SMITH	Purchase water from provider (2)	I	1767	441	$1,476,152	0	0	294	294	294	295	N	Tyler, Palestine	Other
MAURICEVILLE SUD : New wells - Gulf Coast Aquifer	MAURICEVILLE SUD	New wells - Gulf Coast Aquifer	I	1811	446	$550,848	0	203	203	203	203	203	N	New wells in Jasper County	Wells
MINING , SAN AUGUSTINE : Purchase water from provider (2)	MINING , SAN AUGUSTINE	Purchase water from provider (2)	I	2692	441	$8,212,450	1,000	6,500	0	0	0	0	N	LNVA, Rayburn	Other
MINING , SAN AUGUSTINE : Purchase water from provider (2)	MINING , SAN AUGUSTINE	Purchase water from provider (2)	I	2692	441	$2,627,850	500	500	0	0	0	0	Y	ANRA, Lake Columbia (river diversion)	Other

East Texas Regional Water Planningn Area
TWDB Implementation Survey Results

Sponsor	Recommended Water Management Strategy	At what level of Implementation is the project?*	If not implemented, why?*	Initial Volume of Water Provided (acft/yr)	Funds Expended to Date ($)	Project Cost ($) (should include development and construction costs)	Year the Project is Online?*	Is this a phased project?*	(Phased) Ultimate Volume (acft/yr)	(Phased) Ultimate Project Cost ($)	Year project reaches maximum capacity?*	What is the project funding source(s)?*	Included in the 2016 Plan?*	Comments
LIVESTOCK, HOUSTON	New wells - Carrizo Wilcox Aquifer			Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
LIVESTOCK, HOUSTON	New wells - Yegua Jackson Aquifer			Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
LIVESTOCK, NACOGDOCHES	New wells - Carrizo Wilcox Aquifer	Not Implemented	Too soon	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	Yes	Project sponsor for aggregated entity unknown.
LIVESTOCK, SABINE	Expand local surface water supplies			Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
LIVESTOCK, SABINE	New wells - Carrizo Wilcox Aquifer			Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
LIVESTOCK, SAN AUGUSTINE	Expand local surface water supplies			Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
LIVESTOCK, SAN AUGUSTINE	New wells - Carrizo Wilcox Aquifer			Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
LIVESTOCK, SHELBY	Expand local surface water supplies	Not Implemented	Too soon	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
LIVESTOCK, SHELBY	New wells - Carrizo Wilcox Aquifer			Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
LIVESTOCK, SHELBY	Purchase water from provider (2)	Not Implemented	Too soon	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
LOWER NECHES VALLEY AUTHORITY	Permit amendment for Sam Rayburn Reservoir	Permit Application Submitted/Pending	Permit contraints		0	0				0			Yes	
LOWER NECHES VALLEY AUTHORITY	Purchase water from provider (2)	Not Implemented	Too soon										Yes	
LOWER NECHES VALLEY AUTHORITY	Reallocation of flood storage (Rayburn)	Not Implemented	Too soon		0	0				0			No	
LOWER NECHES VALLEY AUTHORITY	Saltwater barrier conjunctive operation with Rayburn/Steinhagen	Not Implemented	Financing										No	
LOWER NECHES VALLEY AUTHORITY	Wholesale customer conservation												No	
LUFKIN	Angelina County Regional Project	Not Implemented	Too soon										Yes	
LUFKIN	Lake Kurth Regional System	All Phases Fully Implemented											Yes	
LUFKIN	Municipal conservation	Sponsor Has Taken Official Action to Initiate Project	Other		0	0				0			No	
LUFKIN	New wells - Carrizo Wilcox Aquifer	All Phases Fully Implemented											No	
MANUFACTURING, ANGELINA	Purchase water from provider (2)			Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	Yes	Project sponsor for aggregated entity unknown.
MANUFACTURING, HARDIN	New wells - Gulf Coast Aquifer			Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
MANUFACTURING, HOUSTON	Purchase water from provider (1)			Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
MANUFACTURING, NEWTON	New wells - Gulf Coast Aquifer	Not Implemented	Other	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
MANUFACTURING, ORANGE	Purchase water from provider (1)	Currently Operating		Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	Yes	Project sponsor for aggregated entity unknown.
MANUFACTURING, ORANGE	Purchase water from provider (2)	Not Implemented	Too soon	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
MANUFACTURING, PANOLA	Purchase water from provider (1)	Currently Operating		Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	Yes	Project sponsor for aggregated entity unknown.
MANUFACTURING, POLK	New wells - Gulf Coast Aquifer			Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
MANUFACTURING, SAN AUGUSTINE	New wells - Carrizo Wilcox Aquifer			Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
MANUFACTURING, SHELBY	Purchase water from provider (1)	Not Implemented	Too soon	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
MANUFACTURING, SMITH	Purchase water from provider (2)	Not Implemented	Too soon	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	Yes	Project sponsor for aggregated entity unknown.
MAURICEVILLE SUD	New wells - Gulf Coast Aquifer			Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor did not request for project to be included in RWP.
MINING , SAN AUGUSTINE	Purchase water from provider (2)	Not Implemented		Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
MINING , SAN AUGUSTINE	Purchase water from provider (2)	Sponsor Has Taken Official Action to Initiate Project	Too soon	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	Yes	Project sponsor for aggregated entity unknown.

Sponsor and Recommended Water Mangement Strategy	Sponsor	Recommended Water Management Strategy	Sponsor Region	WMS Sponsor Entity Id	DBProjectId	CapitalCost	SS2010	SS2020	SS2030	SS2040	SS2050	SS2060	Y denotes strategies with supply volumes included in other strategies	Project Description	Infrastructure Type*
MINING , SHELBY : Purchase water from provider (1)	MINING , SHELBY	Purchase water from provider (1)	I	2691	440	$3,847,950	250	1,250	0	0	0	0	N	SRA, Toledo Bend	Other
MINING , SHELBY : Purchase water from provider (2)	MINING , SHELBY	Purchase water from provider (2)	I	2691	441	$1,543,400	250	250	0	0	0	0	Y	ANRA, Lake Columbia (river diversion)	Other
MINING, ANDERSON : New wells - Carrizo Wilcox Aquifer	MINING, ANDERSON	New wells - Carrizo Wilcox Aquifer	I	1844	443	$228,730	18	120	120	120	120	120	N	New wells - Carrizo Wilcox Aquifer	Wells
MINING, ANGELINA : Purchase water from provider (2)	MINING, ANGELINA	Purchase water from provider (2)	I	1846	441	$5,793,150	2,000	4,000	0	0	0	0	Y	ANRA (Lake Columbia or Angelina River); Lufkin (Lake Kurth)	Other
MINING, CHEROKEE : Purchase water from provider (2)	MINING, CHEROKEE	Purchase water from provider (2)	I	1876	441	$3,619,300	500	1,500	0	0	0	0	Y	ANRA, Lake Columbia	Other
MINING, JEFFERSON : New wells - Gulf Coast Aquifer	MINING, JEFFERSON	New wells - Gulf Coast Aquifer	I	1951	446	$103,083	0	0	0	0	5	9	N	New wells - Gulf Coast Aquifer	Wells
MINING, NACOGDOCHES : Purchase water from provider (2)	MINING, NACOGDOCHES	Purchase water from provider (2)	I	1997	441	$9,593,450	2,500	7,000	0	0	0	0	Y	ANRA (Lake Columbia or Angelina River); LNVA	Other
MINING, RUSK : New wells - Carrizo Wilcox Aquifer	MINING, RUSK	New wells - Carrizo Wilcox Aquifer	I	2021	443	$241,600	0	0	0	158	158	158	N	New wells - Carrizo Wilcox Aquifer	Wells
MINING, SMITH : New wells - Queen City Aquifer	MINING, SMITH	New wells - Queen City Aquifer	I	2029	445	$655,416	47	141	188	235	282	329	N	New wells - Queen City Aquifer	Wells
NACOGDOCHES : Municipal conservation	NACOGDOCHES	Municipal conservation	I	102	439	$0	0	229	425	514	654	787	N	Municipal conservation	No Infrastructure
NACOGDOCHES : New wells - Carrizo Wilcox Aquifer	NACOGDOCHES	New wells - Carrizo Wilcox Aquifer	I	102	443	$2,727,000	2,800	2,800	2,800	2,800	2,800	2,800	N	Expand exisitng well field	Wells
NACOGDOCHES : Purchase water from provider (3)	NACOGDOCHES	Purchase water from provider (3)	I	102	442	$0	0	0	0	0	5,175	5,175	N	Purchase water from SRA, Toledo Bend. Alternate strategy. Suggest delete.	No Infrastructure
NACOGDOCHES : Purchase water from provider (3)	NACOGDOCHES	Purchase water from provider (3)	I	102	442	$37,282,050	0	8,551	8,551	8,551	8,551	8,551	Y	ANRA, Lake Columbia. Assumes downstream diversion to Lake Nacogdoches.	Other
NEW SUMMERFIELD : Municipal conservation	NEW SUMMERFIELD	Municipal conservation	I	2116	439	$0	0	10	18	21	23	26	N	Municipal conservation	No Infrastructure
NEW SUMMERFIELD : Purchase water from provider (1)	NEW SUMMERFIELD	Purchase water from provider (1)	I	2116	440	$0	0	1,000	1,000	1,000	1,000	1,000	Y	ANRA, Lake Columbia; Particpant in ANRA Regional Project (11)	No Infrastructure
RUSK : Municipal conservation	RUSK	Municipal conservation	I	2308	439	$0	0	0	0	51	66	76	N	Municipal conservation	No Infrastructure
RUSK : Purchase water from provider (2)	RUSK	Purchase water from provider (2)	I	2308	441	$28,435,800	0	3,000	3,000	3,000	3,000	3,000	Y	ANRA, Lake Columbia. New river intake with downstream diversions	Other
STEAM ELECTRIC POWER, ANDERSON : Purchase water from provider (2)	STEAM ELECTRIC POWER, ANDERSON	Purchase water from provider (2)	I	2401	441	$24,917,413	0	21,853	21,853	21,853	21,853	21,853	N	UNRMWA, Palestine	Other
STEAM ELECTRIC POWER, ANGELINA : New wells - Carrizo Wilcox Aquifer	STEAM ELECTRIC POWER, ANGELINA	New wells - Carrizo Wilcox Aquifer	I	2673	443	$1,724,909	1,000	1,000	1,000	1,000	1,000	1,000	N	New wells - Carrizo Wilcox Aquifer	Wells
STEAM ELECTRIC POWER, JEFFERSON : Purchase water from provider (1)	STEAM ELECTRIC POWER, JEFFERSON	Purchase water from provider (1)	I	2440	440	$13,647,296	0	25,951	25,951	25,951	25,951	25,951	N	LNVA, Rayburn	Other
STEAM ELECTRIC POWER, NACOGDOCHES : Purchase water from provider (2)	STEAM ELECTRIC POWER, NACOGDOCHES	Purchase water from provider (2)	I	2458	441	$2,012,400	0	340	340	340	340	340	N	Houston County	Other
STEAM ELECTRIC POWER, NACOGDOCHES : Purchase water from provider (2)	STEAM ELECTRIC POWER, NACOGDOCHES	Purchase water from provider (2)	I	2458	441	$10,718,000	0	5,000	5,000	5,000	13,400	13,400	Y	ANRA, Lake Columbia	Other
STEAM ELECTRIC POWER, NEWTON : Purchase water from provider (2)	STEAM ELECTRIC POWER, NEWTON	Purchase water from provider (2)	I	2459	441	$12,515,350	0	0	15,000	15,000	15,000	15,000	N	SRA, Toledo Bend	Other
STEAM ELECTRIC POWER, RUSK : Purchase water from provider (2)	STEAM ELECTRIC POWER, RUSK	Purchase water from provider (2)	I	2468	441	$1,318,500	0	0	0	0	1,501	1,500	N	SRA, Toledo Bend	Other
STEAM ELECTRIC POWER, RUSK : Purchase water from provider (2)	STEAM ELECTRIC POWER, RUSK	Purchase water from provider (2)	I	2468	441	$8,640,450	0	0	0	0	0	8,500	Y	ANRA, Lake Columbia	Other
SWIFT WSC : Lake Noconiche Regional Supply System	SWIFT WSC	Lake Noconiche Regional Supply System	I	2503	835	$5,856,500	0	0	400	400	400	400	N	Assumes sponsor (Nacogdoches County) will seek water right amendment for municipal purposes and develop regional distribution system.	Other
SWIFT WSC : New wells - Carrizo Wilcox Aquifer	SWIFT WSC	New wells - Carrizo Wilcox Aquifer	I	2503	443	$498,171	350	350	350	350	350	350	N	New wells - Carrizo Wilcox Aquifer	Wells
TYLER : Lake Palestine infrastructure	TYLER	Lake Palestine infrastructure	I	144	834	$79,389,250	0	0	16,815	16,815	16,815	16,815	N	Expand treatment and pumping capacity from Lake Palestine.	Water Treatment Plant
UPPER NECHES MWD : Fastrill replacement (Region I component)	UPPER NECHES MWD	Fastrill replacement (Region I component)	I	149	936	$0	0	0	0	0	0	22,400	N	New reservoir. Project is water in place.	No Infrastructure
WHITEHOUSE : Purchase water from provider (2)	WHITEHOUSE	Purchase water from provider (2)	I	2616	441	$0	0	1,200	1,200	1,200	1,200	1,200	Y	ANRA, Lake Columbia; Particpant in ANRA Regional Project (11)	No Infrastructure
WHITEHOUSE : Purchase water from provider (3)	WHITEHOUSE	Purchase water from provider (3)	I	2616	442	$0	27	0	0	0	0	0	N	Purchases water from Tyler	No Infrastructure
WOODVILLE : New wells - Gulf Coast Aquifer	WOODVILLE	New wells - Gulf Coast Aquifer	I	2647	446	$511,400	0	300	300	300	300	300	N	New well near exisitng well field	Wells

Sponsor	Recommended Water Management Strategy	At what level of Implementation is the project?*	If not implemented, why?*	Initial Volume of Water Provided (acft/yr)	Funds Expended to Date ($)	Project Cost ($) (should include development and construction costs)	Year the Project is Online?*	Is this a phased project?*	(Phased) Ultimate Volume (acft/yr)	(Phased) Ultimate Project Cost ($)	Year project reaches maximum capacity?*	What is the project funding source(s)?*	Included in the 2016 Plan?*	Comments
MINING , SHELBY	Purchase water from provider (1)			Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
MINING , SHELBY	Purchase water from provider (2)	Sponsor Has Taken Official Action to Initiate Project	Too soon	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
MINING, ANDERSON	New wells - Carrizo Wilcox Aquifer			Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
MINING, ANGELINA	Purchase water from provider (2)	Sponsor Has Taken Official Action to Initiate Project	Too soon	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	Yes	Project sponsor for aggregated entity unknown.
MINING, CHEROKEE	Purchase water from provider (2)	Sponsor Has Taken Official Action to Initiate Project	Too soon	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	Yes	Project sponsor for aggregated entity unknown.
MINING, JEFFERSON	New wells - Gulf Coast Aquifer	Not Implemented	Too soon	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
MINING, NACOGDOCHES	Purchase water from provider (2)	Sponsor Has Taken Official Action to Initiate Project	Too soon	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	Yes	Project sponsor for aggregated entity unknown.
MINING, RUSK	New wells - Carrizo Wilcox Aquifer	Not Implemented	Too soon	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
MINING, SMITH	New wells - Queen City Aquifer			Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
NACOGDOCHES	Municipal conservation	Sponsor Has Taken Official Action to Initiate Project	Other		0	0				0			No	
NACOGDOCHES	New wells - Carrizo Wilcox Aquifer												No	
NACOGDOCHES	Purchase water from provider (3)			Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor did not request for project to be included in RWP.
NACOGDOCHES	Purchase water from provider (3)	Sponsor Has Taken Official Action to Initiate Project	Too soon										No	
NEW SUMMERFIELD	Municipal conservation	Sponsor Has Taken Official Action to Initiate Project	Other	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor did not request for project to be included in RWP.
NEW SUMMERFIELD	Purchase water from provider (1)	Sponsor Has Taken Official Action to Initiate Project	Too soon		0	0				0			No	
RUSK	Municipal conservation	Not Implemented	Too soon	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor did not request for project to be included in RWP.
RUSK	Purchase water from provider (2)	Sponsor Has Taken Official Action to Initiate Project	Too soon										No	
STEAM ELECTRIC POWER, ANDERSON	Purchase water from provider (2)			Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
STEAM ELECTRIC POWER, ANGELINA	New wells - Carrizo Wilcox Aquifer			Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
STEAM ELECTRIC POWER, JEFFERSON	Purchase water from provider (1)			Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
STEAM ELECTRIC POWER, NACOGDOCHES	Purchase water from provider (2)			Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
STEAM ELECTRIC POWER, NACOGDOCHES	Purchase water from provider (2)	Sponsor Has Taken Official Action to Initiate Project	Too soon	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	Yes	Project sponsor for aggregated entity unknown.
STEAM ELECTRIC POWER, NEWTON	Purchase water from provider (2)	Not Implemented	Too soon	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	Yes	Project sponsor for aggregated entity unknown.
STEAM ELECTRIC POWER, RUSK	Purchase water from provider (2)	Not Implemented	Too soon	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	Yes	Project sponsor for aggregated entity unknown.
STEAM ELECTRIC POWER, RUSK	Purchase water from provider (2)	Not Implemented	Too soon	Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor for aggregated entity unknown.
SWIFT WSC	Lake Noconiche Regional Supply System	Not Implemented	Too soon										No	
SWIFT WSC	New wells - Carrizo Wilcox Aquifer			Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor did not request for project to be included in RWP.
TYLER	Lake Palestine infrastructure	Not Implemented	Too soon										Yes	
UPPER NECHES MWD	Fastrill replacement (Region I component)	Not Implemented	Too soon		0	0				0			Yes	
WHITEHOUSE	Purchase water from provider (2)	Sponsor Has Taken Official Action to Initiate Project	Too soon		0	0				0			No	
WHITEHOUSE	Purchase water from provider (3)			Unknown	Unknown	Unknown			Unknown	Unknown		Unknown	No	Project sponsor did not request for project to be included in RWP.
WOODVILLE	New wells - Gulf Coast Aquifer												No	